PEARS
CYCLOPAEDIA

A book of reference and background information for everyday use

Sixty-ninth Edition

1960–61

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ASSISTED BY TEN SPECIALIST ASSOCIATE EDITORS

The Editor desires to express her gratitude to readers for their criticisms and suggestions and to all those who in one way or another have contributed to the making of this edition. Correspondence is welcomed and should be addressed to the Editor at 'Middlemarch', Halstead, Kent.

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New Features of this Edition

THERE are two new sections in this Edition of special interest to the family circle—on Careers and Gardening. The former is by a well-known Headmaster with long experience in helping young people to choose an occupation. The new Guide to Gardening, by a leading authority, embodies the latest ideas and methods in horticulture.

Eminent specialists tell of some of the exciting new advances in scientific discovery and its application: space exploration, future sources of power, chemistry in the living cell, electronic brains, and colour vision. This is in the Science Section (Part IV), where the naturalist will find an interesting new hypothesis on the migration of eels.

In the Science Section, also, a number of engrossing problems about the individual in our industrial society are unravelled in the light of psychology and sociology. This imparts a new understanding of the rebel, about whom there has been so much public discussion—whether he be an " angry young man," a " beat," or a " delinquent."

For the newspaper reader interested in public events and world affairs the Citizen's Guide has been revised, and there is a new supplement, to Medical Matters, on world mental health.

Those interested in books and in writing will find fresh pages in Literary Companion on Literary Forms and How to Enjoy a Poem.

The aim of *Pears* is to keep abreast of expanding knowledge in a changing world, and it presents its readers each year with a revised edition with the latest facts and background information on a variety of subjects of general interest.

Plan of Volume

This book of reference is divided into sections which fall into three main groups:—

Contents

I. THE WIDER WORLD

II. EVERYDAY INFORMATION

III. HOME AND PERSONAL

Index

Some of the sections are alphabetically arranged, and consequently self-indexing. Their contents are not indexed here, except where it is anticipated some special difficulty in reference may arise. Each section has a letter and, where appropriate, the column is given in parentheses after the page number, e.g., F8(1), G20(2). Where the contents of a section are not alphabetically arranged, a Table of Contents will be found at the beginning of the section.

Events

Setting forth in chronological order the leading events in the history of the world

Chronicle of Events

Note.—*Dates given below earlier than the first millenium* B.C., *and even later, must necessarily be approximate in the absence of contemporary records.*

B.C.	
5000	Earliest settlements in Egypt and Mesopotamia.
4000	Susa founded.
3500	Sumerian civilisation flourishes. Cuneiform writing.
3000	First Egyptian Dynasty. Hieratic writing already perfected.
3000	Early Minoan Age (Crete). Pictorial writing, copper, silver, gold in use. Early Mycenean civilisation begins.
2980	Memphis capital of Egypt.
2870	First settlements at Troy.
2850	Golden Age of China begins (700 years).
2700	Great Pyramid age in Egypt begins.
2400	Aryan migrations.
2400	Sargon founds Agade: Semitic empire.
2205	Hsia Dynasty begins in China.
2200	Middle Minoan Age; pottery, linear writing in pen and ink.
1766	Shang Dynasty begins in China.
1750	Aryan invasion of Mesopotamia.
1720	Hyksos conquest of Egypt. War chariots introduced.
1700	Code of Hammurabi at Babylon.
1600	Late Minoan Age: bronze in use.
1550	Sack of Babylon by Hittites.
1546	18th Dynasty in Egypt commences. Civilisation at peak (under Thotmes III, 1490). Chronology more certain.
1500	Powerful Mitanni (Aryan) kingdom in Asia Minor. Phœnicia thriving—trade with Egypt and Babylonia. Vedic literature in India.
1450	Zenith of Minoan civilisation.
1400	Ugarit (N. Syria) culture at its zenith. Cretan civilisation ends: Knossos burnt. Temple at Luxor built.
1377	Amenhotep IV (Ikhnaton), the "heretic" Pharaoh.
1350	Zenith of Hittite civilisation.
1300	Israelite oppression (Rameses II). Phœnician settlements—Hellas and Spain (Cadiz). Tyre flourishing. Etruscan emigration to Italy from Asia Minor.
1250	Assyrian conquest in Babylon: dominant in Western Asia.
1230	Exodus of Israelites from Egypt.
1200	End of Hittite Empire. Iron in use in Egypt. Philistines in Palestine.
1190	Fall of Troy. Achæan expansion.
1122	Chou Dynasty begins in China (870 years).
1115	Magnetic needle reputed in China.
1110	Greek migrations commence—Asia Minor settled.
1000	Jerusalem capital of Israel—David king. Rig Veda (India)—hymns and prayers.
961	Solomon begins temple at Jerusalem.
900	Period of Homeric poems.
893	Assyrian chronological records begin.
846	Carthage founded.
820	Laws of Lycurgus in Sparta.
781	Chinese record of an eclipse.
776	First Olympiad in Greece.
753	Rome founded.
750	Greek Mediterranean colonisation begins.
728	Assyria incorporates Old Babylonian Empire.
727	Tyre subject to Assyrians.
723	Sparta victorious against Messenia.
722	Israel absorbed into Assyria.
660	Byzantium founded. First Mikado and Japanese history commences.
650	Greek colony (Naukratis) in Egypt.
630	Sparta victorious in 2nd Messenian war.
626	Death of Asshur-bani-pal: end of Assyrian Empire.
625	New Babylonian Empire.
612	Fall of Nineveh.
607	Scythians overrun Assyria.
600	Greek city states. Thales of Miletus flourishes. Art of writing introduced (India).
597	Jerusalem captured—prisoners to Babylonia.
594	Solon reforms in Athens.
586	Jerusalem destroyed—more prisoners to Babylon.
578	Etruscan power dominant in Italy.
560	Buddha born. Athenian ascendancy.
559	Cyrus king of Persia—"Master of the East."
555	Babylonian chronology instituted.
551	Confucius born.
549	Crœsus (Lydia) extends his rule. Great wealth of trade routes E. and W.
538	Babylon becomes Persian province.
532	Phœnicia becomes Persian province.
530	Carthage independent.
525	Persian conquest of Egypt.
521	Darius founds Persian dynasty. Bas-reliefs at Behistun and palace at Persepolis.
490	Greeks defeat Persians at Marathon.
480	Third Persian (Xerxes) invasion of Greece. Thermopylæ. Athenian fleet saves Athens at Battle of Salamis.
479	Greek victories over Persians (Platæa, Mycale).
477	Confederacy of Delos against Persians.
466	Democracy in Syracuse.
462	Reforms of Pericles in Athens.
458	Athens victory over Corinth.
456	Death of Æschylus.
443	Athens under Pericles—end of Persian war.
431	Pelopennesian war—Athens and Sparta.
430	Great plague in Egypt.
413	Athenian defeat at Syracuse.
406	Death of Euripides.
405	Sparta supreme in Greece.
404	Death of Sophocles.
399	Death of Socrates.
394	Decline of Sparta after Corinthian war.
390	Gauls sack Rome.
380	Death of Aristophanes.
371	Thebes predominant in Greece.
360	Carthaginian settlements in Spain.
358	Philip, King of Macedonia.
347	Death of Plato.
338	Athens submits to Philip.
336	Accession of Alexander the Great.
331	Alexandria founded.
330	Persian Empire, Macedonia and Greece incorporated.
327	Alexander crosses Indus into India.
323	Death of Alexander. Ptolemaic period commences in Egypt. Culture and learning encouraged.
322	Deaths of Aristotle and Demosthenes.
312	Seleucid kingdom of Syria—Antioch built.
285	Septuagint begun at Alexandria.
282	Death of Euclid.
272	Rise of Buddhism and Jainism in India.
265	Rome supreme in Italy.
264	First Punic War—Carthaginians and Greeks.
246	Ch'in-Shih-Huang-Ti "Universal Emperor" in China. Great Wall built.
237	Carthaginians invade Spain.
226	Athens allied to Rome.
218	Second Punic War. Hannibal crosses Alps.
217	Roman defeat at Lake Trasimene.
212	Archimedes killed at Syracuse.
210	Sicily becomes Roman Province.
203	Rosetta Stone—records accession of Ptolemy V.
202	Punic War ends—Carthage conquered.
200	Rome champion of Greek independence. Second Macedonian War.
189	Antiochus (Syria) defeated by Romans. Asia Minor absorbed by Rome.
171	First Latin colony—Carteia (Spain).
167	Maccabean revolt.
166	Tartar invasion of China.
146	Carthage destroyed. Roman province of Africa constituted.
135	Great slave revolt in Sicily.
133	Siege and destruction of Numantia (N. Spain).
129	Province of Asia (Pergamum) organised.

B.C.
113 Teutons defeat Romans in Istria.
107 Helvetii in Gaul destroy Roman force.
82 Sulla dictator.
81 Cornelian Laws designed for supremacy of Senate in Rome.
78 Death of Sulla.
64 Syria annexed by Rome.
63 Jerusalem taken by Pompey.
60 First Triumvirate—Cæsar, Pompey, and Crassus.
58 Cæsar's victories in Gaul.
55 Cæsar's invasion of Britain.
49 Cæsar in Rome, flight of Pompey.
48 Cæsar defeats Pompey in Greece.
47 Cæsar sets Cleopatra on Egyptian throne.
46 Cæsar returns to Rome—amnesty. Social, economic, and calendar reforms.
44 Cæsar assassinated in Senate.
41 Antony and Cleopatra meet at Tarsus.
31 Defeat of Antony by Octavian at Actium.
30 Deaths of Antony and Cleopatra. Egypt a Roman province.
28 Restoration of Senate.
27 Octavian takes title "Augustus." Restoration of Republic.
20 Augustus in Asia.
16 Roman incursion across Rhine defeated.
4 True date of birth of Jesus of Nazareth.

CHRISTIAN ERA BEGINS.

A.D.
6 Judea becomes Roman province.
8 Death of Horace.
9 Arminius defeats Romans (Teutoberg Forest).
17 Deaths of Ovid and Livy.
19 Death of Virgil.
30 (or 33) Crucifixion of Jesus of Nazareth.
38 Caligula persecutes Jews.
43 Claudius invades Britain.
50 Jews banished from Rome.
51 Caractacus taken prisoner to Rome. Missionary travels of St. Paul commence.
61 Boadicea leads Britons against Romans.
63 St. Paul at Rome.
64 Nero burns Rome. Persecution of Christians.
68 Death of Nero after flight from Rome.
70 Jerusalem sacked by Titus.
78 Agricola, Governor of Britain.
79 Pompeii and Herculaneum destroyed.
80 Colosseum at Rome completed.
87 Library of Aristotle brought to Rome.
89 Ink and paper writing in China.
90 Andhra dynasty in India—trade with Rome.
102 Trajan penetrates to Dacia.
113 Death of Tacitus.
115 Trajan crosses the Tigris.
121 Hadrian visits Britain, Wall built.
180 Decline of Rome begins (Gibbon).
193 Emperor Pertinax murdered by Prætorians.
197 British soldiers in Gaul under Romans.
208 Septimus Severus in Britain.
212 Roman citizenship to all free subjects.
220 End of great Han dynasty in China.
226 New dynasty in Persia under Artaxerxes.
238 Goths invade Eastern Europe.
251 Emperor Decius killed in campaign against Goths on lower Danube.
253 Franks invade Gaul.
259 Goths over-run Asia Minor. Destruction of Temple of Diana at Ephesus.
265 End of three kingdoms in China.
270 Dacia lost to Goths. Ojin 15th Mikado: worshipped as God of War.
285 East and West division of Empire.
292 Quadruple partition of the Empire.
320 Gupta period in India commences.
325 Council of Nicæa—Arianism condemned.
326 Constantinople Seat of Empire.
330 Christianity official religion.
337 Three sons of Constantine share Empire.
350 Huns invade Europe.
364 Empire again divided. Emperor in East and West.
360 Picts and Scots appear in Britain.
382 Alaric, King of the Goths.
396 Visigoths overrun the Balkans.
397 Confessions of St. Augustine.

A.D.
406 Franks overrun Gaul.
407 Roman withdrawal from Britain.
410 Sack of Rome by Alaric (Visigoth).
417 Visigoths conquer Vandals in Spain.
429 Vandal kingdom in N. Africa.
432 St. Patrick's mission to Ireland.
433 Attila, King of the Huns.
449 Angles, Saxons, and Jutes invade Britain.
451 Attila defeated in Gaul.
455 Vandal sack of Rome.
466 Visigoth conquest of Spain begins.
476 End of dual E. and W. Roman Empire.
484 First schism—Eastern and Western Churches.
489 Theodoric conquers Italy.
500 Legendary King Arthur of the Round Table.
529 Code of Justinian.
542 Great plague in East.
543 War with Goths—Rome taken.
552 Goths leave Italy.
568 Lombard kingdom founded in Italy.
570 Mohammed born at Mecca.
590 Gregory the Great, Pope.
596 Kent Christianised—Augustine mission.
600 Rome at nadir of power.
610 Mahomet's vision and call as Allah's prophet.
617 Supremacy of Northumbria under Edwin. Christianity adopted.
618 T'ang Dynasty, China—period of great wealth, culture, and refinement.
622 The Hejira or first year of Mohammedan Era.
632 Death of Mahomet.
641 Egypt under Moslem control.
686 Conversion of Britain completed.
692 Saracens at Carthage.
711 Saracens overrun Spain, Asia Minor, Sardinia. Spanish-Gothic arms annihilated (Guadalete).
718 Pelayo defeats Moors in N. Spain.
719 Charles Martel king of the Franks.
731 Venerable Bede flourished.
732 Western Saracen advance broken near Tours.
751 Pepin first Carolingian king of the Franks.
755 Temporal power of Pope commences.
756 Cordova capital of Moorish kingdom in Spain.
771 Charlemagne king of the Franks.
787 Danish raids on English coasts begin.
800 Charlemagne crowned Roman Emperor at St. Peter's.
814 Death of Charlemagne.
829 Egbert, over-king in England.
857 Papacy dispute—Roman and Greek Empires.
860 Ethelbert in England—many Danish raids.
875 The Saxon chronicle commences.
878 Alfred defeats Danes at Ethandune.
882 First bishop to become Pope (Marinus I).
886 Normans besiege Paris.
888 France separated from Empire.
904 Saracens seize Salonika.
911 Abd-er Rahman III—Omayyad ruler at Cordova. Period of extensive culture.
916 Saracens defeated in Spain.
980 Viking attacks begin on English coasts.
987 Hugh Capet—beginning of modern French Kingdom.
991 Venice an independent Kingdom.
1000 Norse discovery of America (Nova Scotia).
1002 Massacre of Danes in England.
1009 Danes attack London.
1016 Canute king of England, Normans in S. Italy.
1028 Canute conquers Norway.
1035 Partition in Spain after death Sancho III.
1054 Separation of Greek and Latin churches reaffirmed by Patriarch of Constantinople.
1066 Death of Edward the Confessor; defeat of King Harold by Normans at Hastings; William of Normandy crowned William I.
1071 Seljuks take Jerusalem.
1073 Struggle between Empire and Papacy.
1077 Henry IV at Canossa.
1085 Toledo recovered from Moors.
1086 Domesday Book completed.
1095 Peter the Hermit and First Crusade.

A.D.
1099 Capture of Jerusalem; Knights of St. John instituted.
1100 William II. killed in New Forest; Henry I. succeeded.
1118 Order of Knights Templars established.
1135 Stephen king of England.
1138 Battle of the Standard at Northallerton. David, king of Scotland defeated.
1141 Stephen taken prisoner; Matilda crowned at Winchester.
1145 Matilda, defeated, retires to France.
1147 Second Crusade.
1154 Henry II. king of England; Nicholas Breakspeare, an Englishman, Pope as Adrian IV.
1162 à Becket, archbp. Canterbury.
1170 Henry and à Becket reconciled; Dec. 29, Assassination of à Becket.
1173 Saladin sultan of Egypt; à Becket canonised
1177 Saladin defeated by Renaud de Chatillon.
1180 Carthusian monasteries established in England.
1187 Saladin takes Jerusalem; Third Crusade.
1189 Siege of Acre; Richard I. king of England.
1190 Richard embarks for the Crusade.
1191 Crusaders capture Acre. [Austria.
1192 Richard held captive by Leopold duke of
1198 Richard defeats French at Gisors.
1199 John king of England. [war.
1202 Fourth Crusade; France and England at
1203 Crusaders conquer Constantinople. Prince Arthur murdered by John.
1206 Mogul empire founded.
1209 Franciscan order established.
1212 Moors routed in battle of Las Navas de Tolosa, Spain.
1215 Magna Carta signed by John. [England.
1216 Henry III. king; first Parliament in
1217 Fifth Crusade.
1219 Crusaders capture Damietta.
1227 Thomas Aquinas b.
1228 Sixth Crusade.
1229 Jerusalem ceded to Christians.
1236 Henry III. marries Elenor of Provence.
1248 Seventh Crusade.
1253 Jews driven out of France.
1264 Battle of Lewes, Barons victorious
1265 First British Commons meet; Battle of Evesham, De Montfort killed.
1266 Roger Bacon presents his *Opus Majus* to Pope Clement IV.
1272 Edward I. king of England.
1282 "Sicilian Vespers" massacre; Edward I. conquers Wales.
1290 Jews expelled from England.
1295 First regular English Parliament.
1296 Edward I. subdues Scotland.
1297 Battle of Stirling, Wallace victorious
1298 Battle of Falkirk, Edwd. I. defeats Wallace.
1302 Battle of the Golden Spurs, Courtrai.
1304 Edward I. captures Stirling.
1305 Wallace executed in Smithfield.
1306 Robert Bruce king of Scotland.
1307 Edward II. king of England. [Stirling.
1313 Boccaccio b.; Edward Bruce besieges
1314 Battle of Bannockburn; English defeated.
1318 Edw. Bruce defeated and killed at Dundalk.
1324 Wyclif b.
1327 Edward III. king of England.
1329 David II. (Bruce) king of Scotland.
1332 Scotland invaded by Edward III.
1333 Edward III. defeats Scots at Halidon Hill.
1339 France invaded by Edward III.
1340 Edward victorious over French fleet at Sluys.
1346 Battle of Crecy, Edward III. defeated
1347 Calais captured by the English. [French.
1348 Black Death plague makes its appearance.
1350 Order of the Garter instituted.
1351 Statute of labourers passed in England.
1353 Rienzi made Senator of Rome.
1354 Rienzi killed.
1356 Battle of Poictiers, English defeat French.
1359 Tamerlane in Persia.
1360 English Court of Admiralty founded.
1376 Edward "The Black Prince" d.
1377 Richard II, king of England.
1380 Thomas à Kempis b.
1381 Poll tax established in England; peasant rising under Wat Tyler.
1384 Death of Wyclif.
1385 Scots invade England, and Richard II, retaliates by taking Edinburgh.
1386 Duke of Gloucester made Regent.
1387 Barons seize Tower of London; Winchester College founded by William of Wykeham.
1388 Another invasion of England by Scots; Battle of Otterburn, Scots victorious.
1397 Duke of Gloucester murdered. [England.
1399 Richard II. deposed, Henry IV. king of
1400 Revolt in Wales headed by Owen Glendower.
1402 Scots defeat at Homildon Hill, Sept. 14.
1403 Battle of Shrewsbury, the Percys defeated.
1406 James I., king of Scotland, seized and imprisoned in Tower of London.
1410 Poles defeated Teutonic Order at Tannenberg.
1413 Henry V. king of England.
1414 Council of Constance.
1415 Capture of Harfleur; Battle of Agincourt.
1417 Henry V. takes Caen.
1420 Henry V. regent of France.
1422 Henry VI. king of France.
1424 James I. of Scotland liberated and crowned.
1428 English lay siege to Orleans.
1429 Joan of Arc enters Orleans.
1430 Joan of Arc made prisoner.
1431 Joan of Arc burnt at the stake.
1437 James I. of Scotland murdered.
1440 Eton College founded. First printing at Mainz.
1450 Jack Cade's insurrection.
1452 Savonarola b.; Leonardo da Vinci b.
1455 Battle of St. Albans (May 23) beginning the Wars of the Roses.
1460 Battle of Northampton, Henry VI. taken prisoner; Battle of Wakefield, Yorkists defeated, Duke of York killed.
1461 Second Battle of St. Albans, Yorkists defeated; Edward IV. king of England; battle of Towton Field, Yorkists victorious.
1466 Henry VI. deposed.
1467 Erasmus b.
1469 Marriage of Ferdinand of Aragon and Isabella of Castile; Machiavelli b.
1470 Edward IV. escapes to Flanders.
1471 Edward IV. returns to claim his dukedom of York. Battles of Barnet and Tewkesbury fought, resulting in victory of Yorkists, and deaths of Henry VI. and Warwick.
1475 Edward IV. invades France; Michelangelo b.
1476 Caxton begins printing at Westminster.
1477 Titian b.
1478 Inquisition established in Spain.
1483 Edward IV. d. succeeded by his young son Edward V., who was murdered in the Tower. Richard III. succeeded; Raphael b.
1485 Aug. 22, Battle of Bosworth Field, Richard III. slain; Henry VII. king of England.
1486 Lambert Simnel Rebellion.
1492 Ferdinand II. captures Granada and drives the Moors from Spain; Columbus sails on his first expedition, Aug 3; Henry VII. invades France; Perkin Warbeck in Ireland.
1494 Columbus discovers Jamaica.
1495 Perkin Warbeck rebellion in England.
1497 The Cabots discover Newfoundland; Vasco di Gama doubles the Cape of Good Hope.
1498 Savonarola put to death; third voyage of Columbus, touches the mainland of the American continent; Vasco di Gama discovers sea route to India.
1499 Perkin Warbeck executed.
1500 Discovery of Brazil by the Portuguese.
1502 Fourth voyage of Columbus.
1506 Death of Columbus; foundation stone of St. Peter's, Rome, laid.
1509 Henry VIII. king of England, April 22.
1510 Spaniards take Cuba; Luther goes to Rome.
1513 Battle of Flodden; Scots defeated.
1514 Wolsey archbishop of York.
1515 French invade Italy; Wolsey made cardinal and chancellor.
1519 Cortes conquers Mexico.
1521 Luther excommunicated; Henry VIII. opposes Lutheran ideas; Magellan discovers the Philippines. Diet of Worms.
1522 Magellan's ship, the *Victoria*, reached Spain (Sept. 6), navigated by Sebastian del Cano, the first voyage round the world.
1526 Tyndale's New Testament published.
1527 The imperialists capture Rome and make a prisoner of the Pope.

A.D.
1528 Conquest of Peru.
1529 Fall of Wolsey.
1530 Confession of Augsburg; death of Wolsey.
1534 Act of Supremacy passed and the Papal power in England abolished.
1535 Fisher and More executed; Barbarossa captures Tunis; Loyola founds Jesuits; Charles V. captures Tunis from Barbarossa; Coverdale's Bible, first printed English Bible.
1536 Death of Catherine of Aragon; Anne Boleyn executed May 19; Henry marries Jane Seymour May 26; Wales united to England; dissolution of smaller monasteries.
1537 Death of Jane Seymour; Etna in eruption. Henry VIII. granted charter to the Hon. Artillery Compy.
1538 Parish registers established in England; Pope Paul III. excommunicates Henry VIII.
1539 Revolt of Ghent; general dissolution of monasteries in England.
1540 Henry VIII. marries Anne of Cleves Jan. 6; Henry marries Catherine Howard July 28.
1542 Catherine Howard executed; Mary Queen of Scots b. Dec. 14; Copernicus d.; Henry VIII. marries Catherine Parr.
1544 Henry VIII. invades France. [Trent.
1545 Needles first made in England; Council of
1547 Earl of Surrey executed; Edward VI. king of Eng. Jan 28; Somerset made Protector.
1549 Act of Uniformity.
1551 Another Council of Trent.
1552 Somerset executed; Charles V. besieges Metz.
1553 Mary Tudor queen of England, July 6; Lady Jane Grey proclaimed, July 10.
1554 Wyatt's insurrection; Lady Jane Grey executed; Mary marries Philip of Spain.
1555 Diet of Augsburg; Ridley and Latimer burnt.
1556 Cranmer burnt at stake; Cardinal Pole archbishop of Canterbury.
1557 Battle of St. Quentin, Aug. 10, French defeated by English and Spanish forces.
1558 Calais taken by French; Mary Queen of Scots marries the Dauphin; death of Charles V., Nov. 17; Elizabeth queen of England.
1559 John Knox returns to Scotland from France.
1560 Reformation established in Scotland.
1561 Mary Queen of Scots returns to Scotland.
1562 English occupy Havre.
1563 Council of Trent, last sitting of; Church of England's 39 articles settled; Duc de Guise assassinated.
1564 Shakespeare b.; Calvin d.
1565 Mary Queen of Scots marries Darnley.
1566 Pius V. Pope; murder of Rizzio; revolt of the Netherlands.
1567 Murder of Darnley (Feb. 10); Mary Queen of Scots marries Bothwell (May 15); Mary forced to resign in favour of her son James VI.; Mary imprisoned, Murray made Regent.
1568 Revolt of Moors in Spain; Mary Queen of Scots escapes to England; death of Don Carlos.
1569 Battle of Jarnac, Huguenots defeated, and Condé killed.
1570 Regent Murray assassinated.
1571 Holy League against Turks.
1572 Duke of Norfolk executed; massacre of St. Bartholomew, Aug. 24; death of John Knox.
1573 Siege of La Rochelle.
1577 Drake's first voyage round the world.
1580 Spain annexes Portugal.
1584 Virginia discovered and colonised.
1585 Drake sets out for West Indies.
1586 Babington's plot against Elizabeth; Battle of Zutphen, Spaniards defeated by English and Dutch; Sir Philip Sidney receives death wound; trial of Mary Queen of Scots.
1587 Mary beheaded, Feb. 8; Drake's expedition against Cadiz; Davis's Straits discovered.
1588 Spanish Armada leaves Lisbon June 1; defeat of Spanish Armada; Guise assassinated.
1589 Death of Catherine de Medici; Henry IV. of Navarre king of France.
1590 Battle of Ivry, League defeated by Henry IV.; Henry IV. lays siege to Paris.
1591 Maurice captures Zutphen and Deventer.
1594 Henry IV. crowned at Chartres.
1595 Tyrone rebellion.
1596 Spaniards take Calais; France and England join forces against Spain; English and Dutch capture Calais.

A.D.
1598 Edict of Nantes.
1599 Oliver Cromwell b.
1600 Gowrie Conspiracy to dethrone James VI. of Scotland; English East India Co. formed.
1603 Death of Queen Elizabeth, James VI. of Scotland succeeds as James I.; England and Scotland thus united.
1604 Hampton Court Conference between Church prelates and Puritans.
1605 Gunpowder plot; *Don Quixote* published; death of Akbar, great Mogul Emperor.
1607 Dutch destroy Spanish fleet at Gibraltar.
1610 Henry IV. assassinated by Ravaillac; Louis XIII. king of France.
1611 Gustavus Adolphus king of Sweden; Ulster plantation; baronets first created.
1613 Romanoff dynasty founded in Russia.
1615 Arabella Stuart dies in the Tower; Louis XIII. marries Anne of Austria.
1616 Death of Shakespeare and Cervantes.
1618 Raleigh executed; Thirty Years' War begins.
1620 Treaty of Ulm, by which the Elector Frederick lost Bohemia; Spinola invades Palatinate; "Pilgrim Fathers" land in New England in *Mayflower*, Dec. 11, 21 (N.S.).
1623 Spanish marriage treaty broken.
1624 Monopolies declared illegal in England; Barbadoes colonised by English; Virginia becomes a Crown Colony.
1625 Charles I. king of England; Charles marries Henrietta of France; English attack on Cadiz; Parliament dissolved by Charles I.
1626 Buckingham impeached; Charles I. dissolves his second Parliament.
1627 Siege of Rochelle.
1628 Cromwell enters Parliament for Huntingdon; Petition of Right; Buckingham assassinated; Richelieu takes Rochelle.
1629 Charles I. dissolves his third Parliament.
1630 Italy invaded by Richelieu, Germany invaded by Gustavus Adolphus; death of Spinola.
1631 France and Sweden in alliance against Germany; Magdeburg taken by Tilly; Battle of Leipsic, Gustavus defeats Tilly.
1632 Death of Tilly; Gustavus seizes Munich and Nuremberg; Battle of Lutzen, Gustavus is slain but victorious; Christina becomes queen of Sweden.
1634 France annexes Lorraine; assassination of Wallenstein; Charles I. demands ship-money; East Anglian fens reclaimed.
1639 Rebellion in Scotland.
1640 Charles I. dissolves Short Parliament; Long Parliament meets.
1641 Trial and execution of Strafford; Star Chamber abolished; rebellion in Ireland; the Grand Remonstrance; coffee first used in England.
1642 Charles I. orders the arrest of the Five Members; Charles sets up his standard at Nottingham; Cinq-Mars executed; death of Richelieu; Charles I. occupies Oxford; New Zealand and Tasmania discovered; Battle of Worcester, Sept. 23, Rupert victorious; Battle of Edgehill, Oct. 23.
1643 Louis XIV. king of France; Anne of Austria Regent; Mazarin first Minister; death of Hampden; Charles I. besieges Gloucester; Rupert captures Bristol; Battle of Newbury, Falkland killed.
1644 Laud tried and condemned; Battle of Marston Moor, July 2, Rupert defeated; second Battle of Newbury.
1645 Laud beheaded; Battle of Naseby, Royalists defeated; Rupert surrenders Bristol.
1646 Charles I. surrenders to Scots; Oxford surrendered to Roundheads.
1647 Charles I. surrendered to Parliament, taken prisoner at Holmby House, June 4.
1648 Battle of Preston, Cromwell victor; Fairfax occupies Colchester; end of Thirty Years' War; "Rump" Parliament elected.
1649 Execution of Charles I. Jan 30; Commonwealth declared, May 19; Cromwell captures Drogheda and Wexford.
1650 Montrose's rebellion; execution of Montrose; Cromwell defeats Lesley at Dunbar.
1651 Charles II. invades England, Battle of Worcester, Charles defeated, flees to France; Navigation Act passed.

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1652 England at war with Dutch; Dunkirk captured by Spanish; Blake's victory over Dutch.

1653 Blake defeats Van Tromp; Cromwell dismisses "Rump" Parliament; Cromwell made Lord Protector.

1654 England and Holland at peace; Scotland incorporated with England; Christina of Sweden abdicates.

1655 Cromwell dissolves Parliament; Jamaica captured by British; Warsaw temporarily fell to Swedes under Charles X.

1656 Blake takes Spanish treasure fleet off Cadiz.

1657 Cromwell declines the English crown.

1658 Turenne takes Dunkirk; death of Cromwell; Richard Cromwell named Protector.

1659 Richard Cromwell resigns.

1660 General Monk occupies London; Charles II. proclaimed May 8.

1661 Bodies of Cromwell, Ireton, and Bradshaw exhumed and hung in chains at Tyburn.

1662 Act of Uniformity passed; Charles II. marries Catherine of Braganza; Nonconformist clergy deprived of their livings.

1664 England and Holland at war; Conventicle Act passed; New Amsterdam (New York) captured by British.

1665 Great plague in London; *London Gazette* first issued; Five Mile Act passed.

1666 France declares war against England; Dutch fleet defeated off North Foreland, July 25; Great Fire of London.

1667 De Ruyter's fleet in the Thames; war with Holland ended; "Cabal" ministry; Clarendon impeached; "Paradise Lost" issued.

1668 Triple Alliance (England, Holland, and Sweden) against France; Bombay ceded to East India Co.

1670 Second Conventicle Act; Hudson's Bay Co. formed.

1672 France and England form treaty; Declaration of Indulgence to Nonconformists; England and France join forces against the Dutch.

1673 Withdrawal of Declaration of Indulgence.

1674 England and Holland at peace.

1677 Prince of Orange defeated at Cassel by French; Princess Mary of England marries William of Orange.

1678 English and Dutch alliance.

1679 Habeas Corpus Act passed; Monmouth obtains victory over Covenanters at Bothwell Bridge.

1680 Stafford executed.

1681 William Penn receives grant of Pennsylvania.

1682 Algiers bombarded by French; Peter the Great and Ivan V. joint-Czars of Russia.

1683 Rye House plot; Poles under Sobieski defeated Turks in battle of Vienna.

1685 Death of Charles II., James II. succeeds, Feb. 6; Monmouth insurrection; Argyll executed, June 30; Battle of Sedgemoor; Monmouth defeated and captured, July 6; Monmouth executed July 15; Judge Jeffreys opens the "Bloody Assize," Aug.; revocation of the Edict of Nantes.

1686 Test Act suspended.

1687 Declaration of Indulgence.

1688 Fresh Declaration of Indulgence by James; trial of seven bishops; William of Orange lands at Torbay, Nov. 5; James II. abdicates and flees to France, Dec. 11; Smyrna destroyed by earthquake.

1689 William and Mary proclaimed k. and q. of England, Feb. 13; James II. lands in Ireland, March; James besieges Londonderry, April 20, relieved, July 30; Toleration Act passed; Battle of Killiecrankie, July 27; Bill of Rights passed.

1690 English and Dutch fleets defeated by French off Beachy Head; Battle of the Boyne, July 1, William defeated James; William lays siege to Limerick.

1691 Nonjuring bishops deprived of their sees; Limerick capitulates Oct. 3.

1692 Massacre of Glencoe, Feb. 13; Battle of La Hogue, May 19; Battle of Steinkirk, Aug 3.

1694 Bank of England incorporated.

1695 William III. captures Namur.

1696 Plot to kill William III.

1697 Charles XII. king of Sweden; Peace of Ryswick; Peter the Great in England.

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1701 Frederick III. king of Prussia; Marlborough goes to Holland as commander-in-chief; war of the Spanish Succession begins. Hanoverian Act of Settlement passed.

1702 Death of William III., Mar. 8; Anne, queen of Great Britain; England declares war against France and Spain; Marlborough takes Liège, Oct. 23.

1703 Battle of Pultusk, Swedes defeat the Poles; Marlborough takes Bonn.

1704 Admiral Rooke captures Gibraltar; Battle of Blenheim, Aug. 13.

1705 Battle of Cassano; British invest and capture Barcelona; Charles XII. invades Silesia.

1706 Battle of Ramillies, May 12; French defeated by Marlborough; English enter Madrid, June 24; Battle of Turin, Prince Eugene defeats French; English enter Milan.

1707 Scotch Parliament passes Act of Union; Charles XII. invades Russia; First Parliament of Great Britain, Oct. 23.

1708 Pretender James in Scotland; Battle of Oudenarde, Marlborough victorious.

1709 Marlborough and Eugene take Tournay; Battle of Malplaquet, Marlborough victorious; Allies take Mons.

1710 Allies take Douay; Battle of Saragossa, Aug. 20; French defeated by Austrians.

1713 Frederick William I. king of Prussia; peace of Utrecht, Mar. 31.

1714 Death of Queen Anne; George I. king of England, Aug. 1.

1715 Fresh war between Prussia and Sweden; Riot Act passed; Louis XV. king of France; Jacobite rebellion; Walpole Premier; Battle of Sheriffmuir, Nov. 13; Battle of Preston, Nov. 12, 13, rebels defeated.

1716 Lords Derwentwater and Kenmure executed.

1717 Triple Alliance, England, France, Holland; Eugene defeats Turks at Belgrade, Aug. 16.

1718 Spaniards invade Sicily; Quadruple Alliance, Gt. Britain, France, Holland, and the Emperor; England declares war against Spain.

1719 France at war with Spain

1720 Spain joins Quadruple Alliance; South Sea Bubble bursts.

1727 Gibraltar besieged by Spaniards; Peter II. Czar of Russia; George I. dies, George II. succeeds July 10.

1729 Peace between Britain, France, and Spain.

1733 Fred. Aug. II. of Poland died; France and Spain support Stanislas as his successor; Russia and the Emperor declare for Fred. Aug. Elector of Saxony and elect him; war results between France and the Emperor.

1734 Siege of Dantzig, French take Treves.

1735 Don Carlos king of Two Sicilies.

1738 Lorraine ceded to France.

1739 Nadir Shah defeats and captures Great Mogul; Turks besiege Belgrade; peace declared between Turkey and the Emperor; England goes to war with Spain.

1740 Frederick the Great king of Prussia.

1741 Battle of Mollwitz, Frederick defeats Austrians; Maria Theresa crowned queen of Hungary, June 25; Sweden declares war against Russia; Frederick takes Breslau; Ivan VI. deposed, Elizabeth Petrovna made empress; Behring's voyage.

1742 Elector of Bavaria elected emperor as Charles VII.; Austrians take Munich; France declares war against Maria Theresa, Holland, and Great Britain.

1743 Austrians take Munich; Battle of Dettingen, French defeated by George II.

1744 Charles Edward makes attempt to enter England, but is frustrated; Louis XV. declares war against Great Britain; French capture Munich, Oct. 16; Frederick captures Prague, Sept. 16.

1745 Battle of Fontenoy (Cumberland defeated); British capture Cape Breton; Charles Edward lands in Scotland, July 23; Battle of Prestonpans, rebels victorious, Sept. 21; Pretender takes Carlisle, Nov. 15, retreats to Scotland, Dec. 20.

1746 Battle of Falkirk, Jan. 17 (rebels victorious); Battle of Culloden, April 16 (rebels defeated and rebellion crushed by Cumberland); Marshal Saxe takes Antwerp; Lords Kilmar-

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nock and Balmerino executed; French capture Madras.

1747 French fleet defeated by Anson off Cape Finisterre, May 14; French invade Brabant; execution of Lord Lovat; Nadir Shah murdered; Pretender escapes to France; Hawke defeats French fleet off Belle Isle, Oct. 14.

1748 French capture Maestricht; peace concluded at Aix-la-Chapelle; Afghans invade India.

1749 English regain Madras.

1751 Clive captures Arcot, Aug. 31.

1752 Great Britain adopts New Style Calendar.

1755 British expedition against French in Canada fails; Lisbon earthquake; eruption of Etna.

1756 Great Britain declares war against France; French defeat Admiral Byng off Minorca, May 20; Calcutta taken by Suraja Dowla, June 18; "Black Hole" atrocity; Seven Years' War begins; Frederick defeats Austrians at Löwositz, Oct. 1.

1757 British recapture Calcutta, Jan. 2; Admiral Byng shot, Mar. 14; Clive victorious at Plassey, June 23; French take Minden, Aug. 3.

1758 Russians invade Prussia; French take Arcot, Oct. 4; Prussians defeated at Hochkirchen, Oct. 14.

1759 British capture Surat, Mar. 2; Battle of Minden (Aug. 1), French defeated; Charles III. king of Spain; Boscawen defeats French fleet at Lagos, Aug. 18; Battle of Quebec; death of Wolfe after complete victory over Montcalm, who was also killed; Hawke's victory over French in Quiberon Bay.

1760 British recapture Arcot; Canada conquest completed; Russians enter Berlin; death of George II., George III. succeeds, Oct. 25.

1762 Great Britain declares war against Spain, Jan. 2; British take Martinique; Prussia makes peace with Russia, May 5; Czar Peter III. deposed and succeeded by Catherine II.; British capture Havana.

1763 Great Britain, France, Spain and Portugal sign a Treaty of Peace at Paris, Feb. 10, ending the Seven Years' War; John Wilkes arrested.

1766 Second Pitt Administration, Aug. 2.

1767 Corsica surrendered to France by Genoa.

1768 Wilkes elected M.P. for Middlesex.

1769 The first letter of "Junius" appears, Jan.

1770 Lord North Prime Minister; Captain Cook discovers New South Wales.

1772 Treaty for partition of Poland between Russia, Austria, and Prussia; Warren Hastings appointed Governor of Bengal; Cook's second voyage round the world.

1773 Strong opposition to the Tea Tax in Boston.

1774 Boston Harbour closed until restitution made for tea destroyed; Warren Hastings made first Governor-General of India.

1775 Battle of Lexington, Apr. 19, Gage victorious; Battle of Bunker's Hill, Americans defeated, June 17; Washington took command of American Army, July; Washington lays siege to Boston.

1776 British troops retire from Boston, March 17; Declaration of American Independence, July 4; Washington lost Battle of Long Island, Aug. 27; British troops in New York, Sept. 15; British defeated at Trenton, Dec. 26.

1777 Battle of Brandy Wine, Sept. 11; Washington defeated by General Howe, who a few days later took Philadelphia; Battle of Germantown, Oct. 4, Howe victorious; Battle of Saratoga, Oct. 7, Burgoyne forced to surrender.

1778 France recognises American Republic, Jan. 16; death of Earl of Chatham, May 11; siege of Gibraltar; France declares war against Great Britain, July 10; British capture Savannah, Dec. 28.

1779 Capt. Cook killed at Owhyhee, Feb. 14; Spain declares war against England, June 16.

1780 Rodney's victory over the Spanish fleet off Cape St. Vincent, Jan. 16; Charleston captured by the British, who took 6,000 prisoners; Gordon riots in London.

1781 Spaniards lay siege to Gibraltar from April to November without success; Florida conquered by Spaniards; Lord Cornwallis occupies Yorktown, Aug. 1; Washington captures Yorktown, Oct. 19.

1782 Rodney defeats French fleet off Dominica, April 12; loss of the *Royal George*, Aug. 29; British troops retire from Charleston; American Independence acknowledged by Britain, Nov. 30.

1783 Fox and North's Coalition Ministry; peace established between England and U.S., Sept. 3; at Paris, and on the same date Great Britain, France, and Spain agree upon terms of peace; Coalition Ministry defeated and Pitt appointed Prime Minister.

1786 Warren Hastings impeached; Lord Cornwallis Governor-General of India.

1788 Death of Prince Charles Edward; *Times* first published, Jan. 1; trial of Warren Hastings opens Feb. 13.

1789 Mutiny of the *Bounty*, April 28; Washington elected first President of U.S.; French Revolution began; Bastille in Paris destroyed, July 14.

1791 Death of John Wesley, March 2; death of Mirabeau, April 2; New French Constitution adopted by National Assembly.

1792 Gustavus III. assassinated, March 16; slavery abolished in St. Domingo, April 4; attack on the Tuileries, Aug. 10; French royal family imprisoned in the Temple; National Convention, Sept. 21; Royalty abolished in France and Proclamation of the Republic.

1793 Louis XVI. executed, Jan. 21; insurrection in La Vendée; Reign of Terror begins; Charlotte Corday assassinates Marat, July 13; she is executed four days later; death of Lord Mansfield; Lord Hood captures Toulon, Aug. 28; 2nd partition of Poland, Sept. 23; Marie Antoinette executed, Oct. 15.

1794 Polish insurrection under Kosciusko; Danton executed, April 6; Lord Howe's victory over French off Brest; defeat of Robespierre and end of Reign of Terror, July 27.

1795 Warren Hastings acquitted, April 23; insurrection in Paris; Directory established, Aug. 22; British take possession of Cape of Good Hope; France annexes Belgium, Oct. 1; 3rd partition of Poland, Oct. 24.

1796 Battle of Lodi, Napoleon victorious; Napoleon enters Milan, May 15, Bologna, June 18; Spain declares war against England; Battle of Arcola, Napoleon victorious.

1797 Battle of Rivoli, Napoleon again victorious, Jan. 14; Mantua surrenders to Napoleon, Feb. 1; Spanish fleet defeated by Jervis off Cape St. Vincent, Feb. 14; mutiny at the Nore; Napoleon enters Venice, May 16; vaccination introduced by Jenner.

1798 Rome occupied by the French, Feb. 10, and a Republic proclaimed; the French conquer Switzerland; Napoleon captures Malta, June 11, and in July invades Egypt; Battle of the Pyramids, July 21, Napoleon victorious; Battle of the Nile, Aug. 1–2, French fleet defeated by Nelson. Rebellion in Ireland;

1799 French occupy Naples. Napoleon invades Syria, and storms Jaffa, March 7; lays siege to Acre (March 16 to May 21), but is repulsed; Seringapatam attacked by the British and Tippoo killed, May 4; Battle of Aboukir, July 25, Napoleon defeats Turks; French occupy Zurich, French Directory overthrown, Nov. 9, and Napoleon made First Consul, Dec. 24; death of Washington, Dec. 14; Pitt imposes Income Tax.

1800 East India Co. obtains possession of Surat, May 13; Napoleon crosses the Great St. Bernard, May 17–20; Battle of Marengo, June 14, Austrians defeated by Napoleon; Legislative Union of Great Britain and Ireland effected, July 2; Battle of Hohenlinden, Dec. 3, Austria defeated.

1801 First Parliament of U.K., Jan.; Pitt resigns Feb. 5, is succeeded by Addington; Battle of Alexandria, British victorious, Abercromby killed; Czar Paul murdered, Mar. 24, succeeded by Alexander I.; Battle of Copenhagen; Nelson obtains complete victory over Danish fleet, April 2; French retire from Egypt; Treaty of peace between Great Britain and France, Oct. 1.

1802 Napoleon appointed First Consul for life, Aug. 3; France annexes Piedmont, Sept. 11.

1803 Dutch recover Cape of Good Hope; Napoleon sells Louisiana to U.S., April 30; Great Brit. declares war against France, May 18; insurrection in Ireland under Robt. Emmet.

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1804 Code Napoleon published; Napoleon orders Duke of Enghien to be shot; Pitt again Prime Minister, May 12; Napoleon made Emperor, May 18; Napoleon and Josephine crowned by the Pope at Paris, Dec. 2; Spain declares war against Great Britain.

1805 Napoleon crowned king of Italy, May 26; Battle of Trafalgar; Nelson's great victory and death, Oct. 21; French occupy Vienna, Nov. 13; Battle of Austerlitz, Dec. 2, Napoleon defeats Austrians and Russians.

1806 British re-occupy Cape of Good Hope; death of Pitt, Jan. 23; Administration of Grenville and Fox; England declares war against Prussia; death of Fox, Sept. 13; Napoleon occupies Berlin, Oct. 27, after Battle of Jena; Berlin decree, by which Napoleon declared Great Britain in a state of blockade.

1807 Battle of Eylau, Feb. 8; slave trade abolished in British Empire; French occupy Dantzig, May 26; Battle of Friedland, June 14; Russians defeated by Napoleon; Copenhagen bombarded by British forces, Danish fleet to surrender; dissolution of German Empire; Sierra Leone and Gambia are organised as English Crown colonies.

1808 Napoleon enters Rome, Feb. 2; Charles IV. of Spain abdicates, March 19; Murat occupies Madrid, March 22; Joseph Bonaparte, king of Spain, June 26; Murat king of Naples, July 15; Spanish defeat French in Battle of Bailén July 19; Wellington (Wellesley) enters Spain, Aug. 1; Saragossa besieged from June 15 to Aug. 4, when raised; Battle of Vimeiro, Aug. 21; British defeat French; Napoleon enters Madrid, Dec. 4.

1809 Battle of Corunna and death of Sir John Moore, Jan 16; Gustavus IV. of Sweden deposed in favour of Charles XIII.; Soult takes Oporto, Mar. 29; Wellington crosses the Douro and enters Oporto, May 12; Napoleon occupies Vienna, May 13; Pope arrested, July 5, after excommunicating Napoleon; Battle of Wagram, July 6, French defeat Austrians; Battle of Talavera, July 27, British victorious; Walcheren expedition sails, July 28; France and Austria sign treaty of peace, Oct. 14; Josephine divorced, Dec. 15; Walcheren evacuated by the English.

1810 Cuidad Rodrigo taken by French (July); Napoleon and Marie Louise married, April 1; Russians take Silistria, June 23; France annexes Holland after abdication of Louis Bonaparte; English take Mauritius, Dec. 3.

1811 Massacre of Mamelukes at Cairo, Mar. 1; French take Badajos, Mar. 10; Battle of Fuentes d'Onore, May 4-5, Wellington victorious; Battle of Albuera, May 16, British defeat Soult; Luddite riots.

1812 Ciudad Rodrigo taken by Wellington, Jan. 19; storming of Badajos by British, April 6; Liverpool Administration, June 8; war declared against Great Britain by United States, June 18; Napoleon declares war against Russia, June 22; Battle of Salamanca, July 22, British victory; Wellington occupies Madrid, Aug. 12; Battle of Borodino, Sept. 7, French defeat Russians; burning of Moscow, Napoleon occupies the ruined city from Sept. 14 to Oct. 19.

1813 Execution of 14 Luddites at York, Jan. 10; Battle of Lutzen, May 2, Napoleon checks Allies; Battle of Vittoria, June 21, Wellington victorious; Battles of the Pyrenees, July 28 to Aug. 2, Wellington defeats Soult; Wellington storms St. Sebastian, Aug. 31; France invaded by Wellington, Oct. 7; Battle of Leipsic, Oct. 16–18, defeat of Napoleon.

1814 Norway ceded to Sweden, Jan. 14; Battle of Orthes, Feb. 27; Wellington defeats Soult; allied sovereigns enter Paris; Napoleon deposed, March 31; Battle of Toulouse, April 10; Wellington defeats Soult; Napoleon abdicates, April 11; Louis XVIII king of France; Napoleon banished to Elba; peace of Paris, May 30; Belgium annexed to Holland; Washington occupied by General Ross, Aug. 24; peace between England and the United States, Dec 24.

1815 Battle of New Orleans, Jan. 8th, British defeated; escape of Napoleon from Elba, Feb. 26; Napoleon at Cannes, March 1; Napoleon enters Paris, March 20; Murat surrenders Naples to Ferdinand IV., May 20; Napoleon proclaims a new constitution, June 1; Battle of Ligny, June 16, Blucher defeated; Battle of Quatre Bras, June 16, defeat of Ney; Battle of Waterloo, June 18, Napoleon defeated and overthrown; re-abdication of Napoleon, June 22; allies enter Paris, July 7; Restoration of Louis XVIII., July 5; Napoleon is placed on board the *Bellerophon*, July 15; Napoleon arrives at St. Helena, Oct. 16; Ney shot, Dec. 7.

1816 Algiers bombarded by Lord Exmouth, Aug. 26.

1817 Riots at Manchester, rioters scattered by military, March 11; death of Kosciusko, Oct. 15; Death of Queen Charlotte, Nov. 5; Battle of Mehudpore, Dec. 21, Holkar defeated.

1818 Bernadotte made king of Sweden (Charles XIV.), Feb. 6; royal marriages: Duke of Clarence (afterwards William IV.) with Princess Adelaide of Saxe-Meiningen, and Duke of Kent with Princess Mary of Saxe-Coburg, July 13.

1819 Florida ceded to U.S. by Spain, Feb. 22; Kotzebue murdered, March 23; Princess (afterwards Queen) Victoria b., May 24; great Reform meeting at Manchester dispersed by military ("Peterloo"), Aug. 17.

1820 Death of Duke of Kent, Jan. 23; death of George III., Jan. 29; George IV. succeeds; death of Grattan, May 14; Carbonari revolt in Naples, July 2.

1821 Austrians occupy Naples; Victor Emmanuel I., king of Sardinia abdicates in favour of his brother, Chas. Felix, Mar. 23; Napoleon dies at St. Helena, May 5; Provisional Government in Greece, Jan. 9; coronation of George IV., July 19; death of Queen Caroline, Aug. 7.

1822 Greek Declaration of Independence, Jan. 1; massacre of 40,000 persons at Scio by Turks, April-May; Greeks take Athens, June 22; Brazilian Independence proclaimed; Caledonian Canal opened, Nov. 1.

1823 French invade Spain, Apl. 7; French bombard Cadiz, Sept. 20, and take it, Oct. 1.

1824 Bolivar becomes Dictator of Peru, Feb. 10; British take Rangoon, May 11; Louis XVIII. died; Charles X. king of France, Sept. 16.

1825 Stephenson drove first steam locomotive, Stockton to Darlington, at 12 m.p.h.; Nicholas I. Czar of Russia.

1826 France and England sign treaty of navigation, Jan. 26; Dom Pedro of Brazil becomes king of Portugal, Mar. 10; Menai Suspension Bridge opened, Jan. 30.

1827 Kingdom of Greece founded, July 6; death of Canning, Aug. 8; Lord Goderich Premier, Aug. 11; death of Ugo Foscolo, Oct. 10; Battle of Navarino, Turkish and Egyptian fleets destroyed.

1828 Goderich resigns, Jan. 8, Wellington Administration succeeds, Jan. 25; Russia declares war against Turkey, April 26; Dom Miguel king of Portugal; Ibrahim Pasha evacuates Greece, Oct. 4; Russians take Varna, Oct. 11; death of Lord Liverpool, Dec. 4; repeal of Test Act.

1829 Death of Leo XII., Feb. 10; Andrew Jackson President U.S.; duel between Wellington and Winchilsea, March 21; Pius VIII. Pope, March 31; surrender of Silistria, June 18; peace of Adrianople signed, Sept. 14.

1830 Death of George IV., William IV. succeeds, June 26; French take Algiers, July 5; revolution in Paris, flight of Charles X. (July 30), abdicates, Aug. 2; Louis Philippe proclaimed king of the French, Aug. 9; Belgian independence proclaimed, Oct. 4; Wellington resigns, Nov. 15; uprising in Warsaw, Nov. 29; death of Pius VIII., Nov. 30.

1831 Gregory XVI. Pope, Feb. 2; Lord John Russell introduces the first Reform Bill, March 1; revolution in Brazil, Dom Pedro abdicates, April 7; Leopold I, king of the Belgians, June 4; coronation of William IV.; Bristol riots, Oct. 29; first epidemic of Asiatic cholera in England, Nov.; British Association founded.

1832 Constitution in Russian Poland overthrown, Feb. 26; Reform Bill passed, June 7; Otho king of Greece, Aug. 30; French besiege Antwerp, Nov. 13, which surrenders, Dec. 24.

1833 Slavery abolished in British colonies, Bill passed Aug. 28; Isabella II. queen of Spain,

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Sept. 29; first Government grant made to English schools.
1834 Lord Melbourne, Premier, July 14; Houses of Parliament burned, Oct. 16; Sir R. Peel Premier, Dec. 8; Faraday discovers electric self-induction.
1835 Lord Melbourne again Premier, April 18.
1836 Thiers First Minister of Louis Philippe, Feb. 22; Louis Napoleon attempts a rising at Strasburg, Oct. 29.
1837 Death of William IV., Queen Victoria succeeds June 20; Morse alphabet adopted.
1838 Royal Exchange destroyed by fire, Jan. 10; National Gallery opened, April 9; coronation of Queen Victoria, June 28; *Great Western* steamer crosses the Atlantic.
1839 British occupation of Kandahar, April 26; Chartist riots at Birmingham, July 15; Christian VIII. king of Denmark; gold discovered in Australia; Aden is annexed by England.
1840 Penny postage instituted, Jan. 10; Queen Victoria and Prince Albert married; Fred. Wm. IV. king of Prussia; Canton blockaded by British, June 28; Louis Napoleon's attempt to incite insurrection at Boulogne, Aug. 6; William II. king of Holland; Napoleon's remains transferred to Paris, Dec. 15.
1841 Second Peel Administration; Prince of Wales (Edward VII.) b., Nov. 9; armoury at Tower of London burnt; Livingstone discovers Lake Ngami.
1842 Massacre of British troops, in retreat from Cabul, Jan. 13; Khyber Pass captured by General Pollock, Apl. 5–14; great Chartist procession in London, and presentation of monster petition to Parliament, May 2.
1843 Battle of Meeanee, Feb. 17, British defeat Afghans; Thames Tunnel opened, Mar. 25; annexation of Natal; Sinde annexed; Irish Repeal Agitation, O'Connell arrested, Oct. 14; Battle of Maharajpore, defeat of Mahrattas, Dec. 29.
1844 Joseph Smith, founder of Mormonism, murdered June 27; Brigham Young succeeds him.
1845 Sir John Franklin's Arctic expedition sails, May 23; Maynooth College endowed, June 30; Battle of Moodkee, Gough defeats Sikhs, Dec. 18; Battle of Ferozeshah, Dec. 21, further defeat of Sikhs; famine in Ireland.
1846 Battle of Aliwal, Jan. 28; Sikhs defeated; Battle of Sobraon, Feb. 10, Sikhs defeated by Gough; Louis Napoleon escapes from Ham, May 26; repeal of the Corn Laws, June 26; Sir R. Peel resigns, June 29; Lord John Russell Premier ; Planet Neptune discovered; Pius IX. elected Pope.
1847 Death of O'Connell, May 15; Earl of Dalhousie made Governor-General of India; Abd-el-Kader surrenders, Dec. 22; Ten Hours Factory Bill passed; British Museum opened.
1848 Gold discovered in California; general revolutionary movement throughout the Continent; riots at Milan, Messina, Munich, Paris, etc.; Louis Philippe abdicates and escapes to England, Feb. 24; French Republic proclaimed; monster meeting of Chartists on Kennington Common, Apl. 10; Lombardy annexed by Sardinia, June 4; Louis Napoleon elected to National Assembly; insurrection in Paris; Louis Napoleon president French Republic, Dec. 20.
1849 Annexation of the Punjab; Republic proclaimed at Rome, Feb. 8; Charles Albert abdicates in favour of his son, Victor Emmanuel, March 24; French occupation of Civita Vecchia; Austrians occupy Leghorn, May 12; Rome besieged by French, June 3; Hungary invaded by Russians, June 17; Rome surrenders to French, July 3; Austrians take Venice, Aug. 22; repeal of the old Navigation Laws.
1850 Britannia Tubular Bridge opened, March; submarine telegraph between England and France laid, Aug. 28.
1851 Great exhibition in Hyde Park, May to Oct.; Paris *coup d'état*, Dec. 2; Louis Napoleon elected President of the French Republic for 10 years, Dec. 20.
1852 First Derby Administration, Feb. 27; British capture Rangoon, April 14; Brit. take Pegu, June 4; Paraguay independence recognised, July 17; death of Duke of Wellington, Sept. 14; Louis Napoleon proclaimed Emperor, Dec. 2; Lord Derby resigns, Dec. 17; Lord Aberdeen's Ministry, Dec. 27.
1853 Napoleon III. marries Eugénie de Montijo, Jan. 29; Brit. and French fleets in the Dardanelles; Russia and Turkey at war, Oct. 23; Turkish fleet destroyed off Sinope by Russians.
1854 Brit. and French fleets enter the Black Sea, Jan. 4; war declared against Russia by France, March 27, Great Brit., March 28; allied fleets bombard Odessa, April 22; Crystal Palace opened, June 10; allied armies land in the Crimea, Sept. 14; Battle of the Alma, Sept. 20; siege of Sebastopol begins, Oct. 17; Battle of Balaklava, Oct. 25; Battle of Inkerman, Nov. 5.
1855 Sardinia joins England and France against Russia, Jan. 26; first Palmerston Administration, Feb. 6; death of Czar Nicholas, March 2, Alexander II. succeeds; great exhibition in Paris, May to Oct.; newspaper stamp abolished, June 15; Malakoff and Redan stormed, Sept. 8; Russians defeated before Kars, Sept. 29; Kars capitulated, Nov. 28.
1856 Oudh annexed, Feb. 7; peace treaty signed at Paris, March 30; Crimea evacuated by allied armies, July 12; Persia declares war against India, Nov. 1; British bombard Canton, Nov. 3.
1857 Indian Mutiny breaks out; Persians defeated at Khooshab, Feb. 8; treaty of peace with Persia, March 4; mutineers at Lucknow, May 10–11, at Delhi, May 11, Meerut, May 10–11; Cawnpore massacre, July 15; Havelock occupies Cawnpore, July 17; Delhi stormed, Sept. 14; Relief of Lucknow, Sept. 25; Lucknow garrison rescued, Nov. 22; death of Havelock, Nov. 25; visit to England of Emperor and Empress of the French, Aug. 8; Canton captured by English and French, Dec. 28–29.
1858 Attempted assassination of Napoleon III. by Orsini and others, Jan. 14; *Great Eastern* launched, Jan. 31; Derby Ministry succeeds that of Palmerston, Feb.; siege of Lucknow, March 18–21, when captured; Queen Victoria and Prince Albert visit Napoleon III. at Cherbourg, Aug. 4–5; Atlantic cable's first message, Aug. 20; Crown assumes Government of India.
1859 Victor Emmanuel declares war against Austria, May 3; Battle of Montebello, May 20, Austrians defeated; Garibaldi takes Como, May 27; Battle of Magenta, Austrians defeated; Napoleon III. and Victor Emmanuel enter Milan, June 8; Lombardy annexed to Sardinia; Derby Ministry defeated, Palmerston succeeds again; Battle of Solferino, June 24, Austrians defeated; peace treaty signed at Villafranca, where Nap. III. and Empr. Franc. Jos. meet, July 11; Chinese repulse British, June 25; Harper's Ferry insurrection, Oct. 17; John Brown hanged, Dec. 2.
1860 Treaty of commerce between Great Britain and France signed, Jan 23; Tuscany annexed to Sardinia, Mar. 22; Savoy and Nice ceded to France, Mar. 24; Garibaldi enters Palermo, May 27; *Great Eastern's* first trip across Atlantic, June 17–27; Prince of Wales (Edward VII.) visits Canada and the United States; French and English forces occupy Tientsin, Aug. 23; Garibaldi occupies Naples and proclaims Victor Emmanuel king of United Italy, Sept. 9; Battle of Volturno, Garibaldi defeats Neapolitans, Oct. 1; treaty of peace with China, Oct. 24; Two Sicilies annexed to Sardinia, Nov. 3; S. Carolina secedes from Union, Dec. 20; first English ironclad (*The Warrior*) launched.
1861 William I. king of Prussia, Jan. 2; further secession of American States—Mississippi, Jan 9; Florida, Georgia, Alabama, Louisiana, and Texas followed between Jan. 10 and Feb. 1; Confederate States proclaimed with Jeff. Davis Pres., Feb. 4; Abraham Lincoln Pres. U.S.; Victor Emmanuel recognised as king of Italy, March 17; Confederates capture Fort Sumter, April 13; Virginia joins Confederate States, April 17; Arkansas, Tennessee, and N. Carolina secede, May 6, 8, 20; Southern ports blockade, April 19; death of Count Cavour, June 6; Great Britain and France recognise Confederate States as belligerents, June 15; Jeff. Davis elected President Confederate States for six years; death of Prince Albert, Dec. 14.

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1862 Fight between *Merrimac* and *Monitor*, March 9; second great exhibition S. Kensington, May 1–Nov. 1; Battle of Williamsburg, May 5, Confederates victorious; *Alabama* leaves the Mersey, July 29; Garibaldi captured at Aspromonte, Aug. 29; second Battle of Bull Run, Aug. 30, Federals defeated; Battle of South Mountain, Sept. 14, Confederates defeated; cotton famine in Lancashire.

1863 Slavery abolished in U.S. by proclamation of President Lincoln, Jan. 1; Ismail Pasha khedive of Egypt, Jan. 18; uprising in Warsaw, Jan. 22; Prince of Wales (Edward VII.) marries Princess Alexandra of Denmark, March 10; Prince George of Denmark elected king of Greece, March 18; French in Mexico, General Forey enters city of Mexico, June 10; Vicksburg surrendered to General Grant, July 4; Battle of Gettysburg, July 1–3; Maximilian of Austria made emperor of Mexico, July 10; Battle of Chattanooga, Confederates defeated, Nov. 24.

1864 Sir J. Lawrence Viceroy of India, Jan. 12; German ultimatum to Denmark on Schleswig-Holstein question, Jan. 16; Holstein entered by German army, Jan. 21; Prussians take Dupple, April 18; war suspended May 12, resumed June 26; peace signed Oct. 30; *Alabama* sunk off Cherbourg by *Kearsage*, June 19; Federal army enters Atlanta, Sept. 2; Lincoln re-elected for his second term, Nov.; General Sherman captures Savannah, Dec. 21; Geneva Convention originated.

1865 Death of Cobden, April 2; surrender of General Lee to Grant, April 9; Lincoln assassinated, April 14; Jeff. Davis captured, May 10, war ends; death of Palmerston, Oct. 18; Earl Russell Premier, Oct. 19; death of Leopold I. king of Belgians, Leopold II. succeeds, Dec. 10; Lister introduces antiseptic surgery in Glasgow.

1866 Bank of England Charter Act suspended, May 11; Fenian raids in Canada, May 31, June 7; demobilisation of Prussian army demanded by Austria, April 9; Prussians enter Saxony and Hanover, June 15; Austria declares war, June 17; Prussia and Italy do the same, June 18–20; Battle of Custozza (June 24), Austrians defeat Italians; Battle of Sadowa (July 3), Austrians defeated by Prussians; Austria surrenders Venetia to France, July 5; Prussians take Frankfort, July 16; Battle of Lissa, July 20; Italians defeated by Austrians in naval fight; Prussia and Austria sign treaty of peace, Aug. 23; peace signed between Austria and Italy, Oct. 3; Venetia annexed to Italy, Nov. 4; French evacuate Rome, Dec. 3–11.

1867 Schleswig-Holstein annexed to Prussia, Jan. 24; ships pass through the Suez Canal; French retire from Mexico, March 16; Second Reform Bill passed, Apr. 12; Emperor Maximilian of Mexico shot, June 19; Dominion of Canada established, March 29; Garibaldi advances on Rome, Oct. 26; French enter Rome, Oct. 30; Garibaldi taken at Mentana, Nov. 3; British Abyssinian expedition.

1868 Resignation of Lord Derby, Disraeli succeeds, Feb. 29; Magdala taken and K. Theodore of Abyssinia committed suicide, April 13; Michel III. of Servia assassinated, June 10; succeeded by Prince Milan, July 2; Isabella II. escapes from Spain, and her deposition declared, Sept. 29; provisional Government formed; Disraeli resigns, Dec. 2; Gladstone's Ministry succeeds, Dec. 9; Lord Mayo Viceroy of India.

1869 General Grant, President U.S.; Hudson Bay Territory added to British America, April 9; Serrano becomes Regent of Spain, June 18; Irish Church disestablished, Act passed, July 26; Suez Canal formally opened, Nov. 17.

1870 Death of Dickens, June 9; Isabella II. formally abdicates, June 25; Spanish Government propose to grant kingship to Leopold of Hohenzollern, July 4; French Government express disapproval, July 6; France declares war against Prussia, July 19; French take Saarbruck, Aug. 2; Battle of Woerth, Aug. 6, French defeated; Battle of Gravelotte, Aug. 18, French defeat; Battle of Sedan, Sept. 1, and surrender of Napoleon III. and his army, Sept. 2; 25,000 French were taken prisoners in the battle and 83,000 surrendered; Napoleon III. taken a prisoner to the castle of Wilhelmhöhe, Sept. 5; Republic proclaimed in Paris, Sept. 4; Empress escapes to England; Germans besiege Paris, Sept. 19; Strasburg surrenders, Sept. 28; Rome and Papal States annexed to kingdom of Italy, Oct. 28; Insurrection by revolutionaries in Paris, Oct. 31; Germany proclaimed an united empire, Dec. 10; Duke of Aosta elected king of Spain, Nov 16; Marshal Prim assassinated, Dec. 28, Irish Land Act passed, Aug. 1; smokeless powder invented.

1871 William I. of Prussia proclaimed emperor of Germany at Versailles, Jan. 18; Paris capitulates, Jan. 28; National Assembly at Bordeaux, Feb. 12; Thiers First Minister; Peace preliminaries confirmed, Mar. 1; National Assembly at Versailles, Mar. 20; Commune proclaimed, Mar. 28; formal treaty of peace concluded, May 21; Communards destroy Tuileries, Hôtel de Ville, Vendôme Column, and set fire to Louvre, Palais Royal, and other Parisian public buildings, May 24; Archbishop of Paris shot, May 24; Government troops enter Paris and crush Communards, May 28; Thiers made President of the Republic, Aug. 31; Purchase system abolished in British army, July 20; Mont Cenis Tunnel opened, Sept. 17; Great Fire at Chicago, Oct. 8–10; Tichborne trial from May 11 to March 6, 1872, claimant non-suited; Trade Unions are legalised.

1872 The Ballot is introduced in England; Earl Mayo assassinated, Feb. 8; Lord Northbrook succeeds him as Viceroy of India, Feb. 22; death of Mazzini, Mar. 10; fresh commercial treaty between England and France, Nov. 5; Alabama Convention at Geneva on Sept. 14 award damages over £3,000,000 to U.S.A.

1873 Death of Napoleon III., Jan. 9; General Grant President U.S. (2nd term); death of Dr Livingstone, May 4; Marshal MacMahon succeeds Thiers as President of the French Republic, May 24; Ashantee War; Shah visits England, June 18–July 5; Alabama claims paid, Sept. 9; Marshal Bazaine tried and sentenced; Scholes invents Remington typewriting machine.

1874 British capture Coomassie, Feb. 4; Gladstone Ministry resigns, Feb. 17; Disraeli succeeds, Feb. 18; Tichborne claimant sentenced to 14 years' imprisonment for perjury, after a trial lasting 188 days, Feb. 28; Czar Alexander II. visits England, May 13–21; Marshal Bazaine escapes from prison, Aug. 9; Alfonso (son of Isabella II.) declared king of Spain.

1875 Gladstone retires; Prince of Wales (King Edward) left England for Indian tour, Oct. 11; England purchased Khedive's shares in the Suez Canal, Nov. 26.

1876 Prince of Wales in Calcutta, Jan. 1; Philadelphian Exhibition, May–Oct.; Bulgarian massacres; Sultan Abdul Aziz deposed, May 29; Disraeli becomes Earl of Beaconsfield, Aug. 16.

1877 The Queen declared Empress of India, Jan. 1; Col. Gordon made Governor of the Soudan, Feb. 12; Diaz formally proclaimed President of Mexico, Feb. 18; Transvaal annexed to British Empire, April 12; Russia declares war against Turkey, April 24; Roumania declared independent, May 21; Russians repulsed at Plevna, July 30; fall of Plevna, Dec. 10.

1878 Death of King Victor Emmanuel, Jan. 9; Russians take Adrianople, Jan. 20; Leo XIII. elected Pope; Cleopatra's Needle arrives in London, Jan. 21; Paris Exhibition, May to Oct.; Berlin Congress; Cyprus ceded to England; *Princess Alice* sunk in collision in the Thames, 700 lives lost, Sept. 3; war with Afghanistan; death of Princess Alice, Dec. 4; electric lighting is introduced; David Hughes discovers microphone.

1879 Gen. Roberts occupies Kandahar, Jan. 8; war in Zululand, Isandhlwana and Rorke's Drift, Jan. 22; Alexander of Battenberg elected prince of Bulgaria, April 29; Prince Louis Napoleon killed in Zululand, June 1; Khedive Ismail Pasha deposed, Tewfik succeeds, June 26; death of Lord Lawrence, June 27; Battle of Ulundi, July 4; Cetewayo captured, Aug. 28; Cavagnari and his escort massacred by Afghans, Sept. 3; Gen. Roberts occupies Cabul, Oct. 12; Gladstone's Midlothian campaign, Nov.; Tay Bridge destroyed, Dec. 28.

1880 Beaconsfield Ministry succeeded by second

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Gladstone Ministry, April 23; Garfield President U.S., Nov. 2; Parnell arrested for conspiracy, Nov. 3; Transvaal declared a Republic, Dec. 16.

1881 Parnell conspiracy trial ends, Jan. 25, jury disagree; British defeat at Lang's Neck, Jan. 28; Battle of Majuba Hill, Feb. 27; assassination of Czar Alexander II., Mar. 13; Peace arranged with Boers, Mar. 22; death of Lord Beaconsfield, April 19; President Garfield shot, July 2, died Sept. 19; Transvaal Convention signed, reserving British suzerainty, Aug. 3.

1882 Arabi Pasha Egyptian War Minister, Feb. 2; Servia proclaimed a kingdom, March 6; assassination of Lord F. Cavendish and Mr. Burke in Phœnix Park, Dublin, May 6; Alexandria bombarded, July 11; British military expedition to Egypt under command of Sir. G. Wolseley; Battle of Tel-el-Kebir, Sept. 13; Cairo occupied by British troops, Sept. 14, Arabi Pasha made prisoner, and (Dec.) banished from Egypt.

1883 Phœnix Park murderers arrested on evidence of James Carey, Feb.; Royal Coll. of Music opened, May 7; Fisheries Exhibition in London, May–Oct.; trial and condemnation of Phœnix Park murderers (April), five of whom were hanged; Lord Lansdowne, Gov.-Genl. of Canada; Capt. Webb drowned at Niagara, July 24; Carey the informer murdered, July 29; Mahdi's forces destroy Hicks Pasha's army, Nov. 3; tribute of £38,000 presented to Parnell in Dublin.

1884 Gen. Gordon starts for Khartoum, Jan. 18; death of Cetewayo, Feb. 8; death of Duke of Albany, Mar. 8; Health Exhibition in London, May–Oct.; Lord Wolseley heads an expedition to Khartoum to rescue Gordon; the Fabian Society founded.

1885 Battle of Abu Klea, Col. Burnaby killed, Jan. 17; Khartoum captured, Gordon slain, Jan 26; Inventions Exhibition in London, May–Oct.; Gladstone resigns, June 12, Lord Salisbury succeeds; King Theebaw of Burma surrenders to British, Nov.

1886 Upper Burma annexed, Jan. 1; Salisbury Government defeated; Gladstone again Premier, Feb.–Aug.; Indian and Colonial Exhibition in London, May–Oct.; Home Rule Bill defeated in Commons, June 8; King Ludwig of Bavaria commits suicide, June 15; General Election, Conservative majority, Lord Salisbury again Premier.

1887 H. M. Stanley sets out on Emin Pasha relief expedition, Jan.; Queen Victoria's Jubilee celebration, June 21.

1888 Lord Dufferin resigns Viceroyalty of India; Lord Lansdowne succeeds, Feb. 8; death of Emperor William I., March 9; death of Emperor Frederick, June 15; William II. succeeds; Parnell Commission opened, Oct. 22.

1889 Tragic death of Prince Rudolf of Austria, Jan. 30; Milan of Servia abdicates, March 6; Paris Exhibition, May–Oct.; Shah visits England, July; Louise, Princess Royal, and Duke of Fife married, July 27; great London dock strike, Aug. 15–Sept. 16; Republic proclaimed in Brazil, Dom Pedro deposed; Parnell Commission concludes sittings, Nov. 23 (129th day); disappearance of Piggott after confessing forgery; death of Jeff. Davis, Dec. 6.

1890 Opening of Forth Bridge, March 4; Bismarck resigns, March 17, Caprivi succeeds; H. M. Stanley returns from Emin Pasha expedition, April 26; Heligoland ceded to Germany, Aug. 9.

1891 German Emperor and Empress visit England, July 4; death of Parnell, Oct. 6; United States of Brazil formed; Education Act passed, giving free education in England.

1892 Death of Duke of Clarence, Jan 14; death of Cardinal Manning, Jan. 14; death of Spurgeon, Jan. 31; hurricane in Mauritius, April 29; Parliament dissolved, June 28; General Election, Salisbury defeated; fresh Gladstone administration.

1893 Home Rule Bill introduced, Feb. 13; Home Rule Bill, second reading, April 21; Chicago World's Fair, May–Oct.; Nansen's Arctic expedition starts, June 24; Duke of York marries Princess Mary of Teck, July 6; Duke of Edinburgh becomes Duke of Coburg, Aug. 22; Home Rule Bill passes third reading in Commons, Sept. 1; Lords reject Home Rule Bill, Sept. 8.

1894 Opening of Manchester Ship Canal, Jan. 1; Gladstone resigns, March 3, Lord Rosebery succeeds; death of Kossuth, March 20; President Carnot assassinated, June 24; opening of Tower Bridge, June 30; Japan declares war against China, Aug. 1; death of Czar Alexander III., Nicholas II. succeeds, Nov. 1; Dreyfus (wrongfully) convicted of treason, Dec. 22.

1895 Faure President French Republic, Jan. 17; Mr. Gully elected Speaker, April 10; opening of Kiel canal, June 21; Rosebery resigns, June 22, Salisbury Ministry succeeds; Parliament dissolved, July 12; Lord Wolseley succeeds Duke of Cambridge as Commander-in-Chief, Nov. 1; Ashanti expedition, Nov.; Jameson raid, Dec. 29.

1896 Jameson raiders defeated by Boers, Jan. 1; Cecil Rhodes resigns Cape Colony Premiership, Jan. 6; British forces occupy Kumassi, Jan. 18; Shah of Persia assassinated, May 1; conviction of Jameson raiders, July 28; McKinley President of U.S.A., Nov. 3; Röntgen discovers *X*-rays.

1897 Turkey declares war against Greece, April 17; Sir A. Milner appointed High Commissioner in South Africa, May; Queen Victoria's Diamond Jubilee, June 22.

1898 *Maine*, U.S. warship, blown up in Havana harbour; Port Arthur ceded to Russia, March 23; U.S. goes to war with Spain, April 21; Dewey destroys Spanish fleet at Manila, May 1; Death of Gladstone, 19; Peace between U.S. and Spain, Aug.; Battle of Omdurman, decisive defeat of the Mahdists, Sept. 2; Empress of Austria assassinated, 10;

1899 Hague Peace Conference, May–July; Boer war begins, Oct. 10; Battle of Elandslaagte, Oct. 21; British defeat at Nicholson's Nek, Oct. 30; Battle of Modder River, Nov. 28; Buller's forces defeated at Colenso, Dec. 15; Lord Roberts appointed Commander-in-Chief in South Africa and Lord Kitchener Chief of Staff, Dec. 16; retrial, condemnation and pardon of Capt. Dreyfus; Marconi experiments in wireless telegraphy.

1900 Boers attack Ladysmith, Jan. 6; Battle of Spion Kop, Buller repulsed with severe losses, Jan. 24; Lord Roberts begins advance from Modder River, Feb. 11; relief of Kimberley, Feb. 15; surrender of Cronje, Feb. 27; Ladysmith relieved, Feb. 28; Roberts enters Bloemfontein, Mar. 13; Paris Exhibition opened, May–Oct.; Mafeking relieved, May 17; Boxer outbreak in China, May; annexation of Orange Free State, May 26; Roberts occupies Johannesburg, May 31; King Humbert assassinated, July 29; Parliament dissolved, Sept. 25; General Election, Unionist majority; Lord Roberts Commander-in-Chief, Sept.; proclamation of annexation of Transvaal, Oct. 25; Australian Commonwealth proclaimed, Dec. 30.

1901 Queen Victoria died, Jan. 22; proclamation of King Edward VII., Jan. 24; Empress Frederick of Germany d. Aug. 5; President McKinley assassinated, Sept. 14.

1902 Treaty concluded between Britain and Japan, Jan. 30; death of Cecil Rhodes, Mar. 26; St. Pierre destroyed by eruption of Mont Pelée, 36,000 lives lost, May 8; accession of King Alfonso of Spain, May 17; surrender of Boer leaders at Pretoria, war ended, May 31; Peace rejoicings through the kingdom, June 8; Lord Salisbury resigned, July 11; Mr. A. J. Balfour became Premier, July 12; coronation of King Edward VII., Aug. 9.

1903 Coronation Durbar at Delhi, Jan. 9; wireless telegraphic messages passed between King Edward and President Roosevelt, Jan 20; King Edward left England on a visit to Portugal, Mar. 31; disaster to British Somaliland expedition, 180 men and 10 officers killed, April 17; Royal Family of Serbia assassinated, June 11; Pope Leo. XIII. d., July 20; Cardinal Sarto elected Pope Pius X., Aug. 4; Lord Salisbury d., Aug. 22; Ministerial crisis; Mr. Chamberlain and other members of the Government resign over the Protectionist proposals, Sept. 17; first controlled flight in heavier-than-air machine—Orville and Wilbur Wright at Kitty Hawk, U.S.A., Dec. 17.

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1904 Russo-Japanese War commenced, FEB. 8; Great Japanese victory on the Yalu River, MAY 1; excursion steamer "General Slocum" caught fire at New York, 1,021 lives lost, JUNE 15; British force reaches Lhasa, AUG. 3; Russian Port Arthur fleet defeated by the Japs., 10; Vladivostok squadron defeated, 14; treaty with Tibet signed at Lhasa, SEPT. 7; *Discovery* returned to Spithead from the Antarctic expedition, 10; Russian forces defeated in four days' fight and driven back into Mukden, OCT. 10.
1905 Port Arthur forts transferred to the Japs., JAN. 3; "Red Sunday" massacre at St. Petersburg, 22; Grand Duke Sergius of Russia assassinated, FEB. 17; King Edward visited President Loubet in Paris, APR. 6; Togo defeated remnant of Russian fleet, and captured Admiral Rozhdestvensky in battle of Sea of Japan, MAY 27; peace signed at Portsmouth (U.S.A.) between Russia and Japan, SEPT. 5.
1906 Disturbances in Russia, over 1,000 persons shot dead in Moscow alone, JAN. 2; San Francisco destroyed by earthquake and fire, APR. 18; Simplon tunnel opened for railway traffic, JUNE 1.
1907 Earthquake at Kingston, Jamaica, great loss of life and property, JAN. 14; Mr. Wm. Whiteley murdered by Horace G. Rayner, 24; wreck of the s.s. *Berlin* off the Hook of Holland, with great loss of life; the King opens new Central Criminal Court, Old Bailey, 27; discovery of theft of State regalia at Dublin Castle, JULY 8; new docks at Cardiff opened by the King and Queen, 17; Deceased Wife's Sister Bill passed the Lords, AUG. 26; accident to bridge over St. Lawrence, 70 killed, 31.
1908 King and Crown Prince of Portugal assassinated while driving through Lisbon, APR. 3; Rotherhithe Tunnel opened, JUNE 12; terrible earthquake, destroying a great part of Calabria and Sicily, 156,500 lives lost, DEC. 28.
1909 Old age pensions came into operation, JAN. 1; despatch published claiming the discovery of the North Pole by Commander Peary, APR. 6; Blériot made first cross-Channel flight, 37 min., JULY 25.
1910 King Edward d., MAY 6; King George V. proclaimed, 9; funeral of King Edward, 20; revolution in Lisbon, fall of the monarchy, proclamation of a Republic, OCT. 3; colliery disaster at Pretoria Pit, Bolton, 344 lives lost, DEC. 21.
1911 Coronation of King George V. and Queen Mary, JUNE 22; Leonardo da Vinci's "La Gioconda" stolen from Louvre, AUG. 22; T. W. Burgess swam the Channel, SEPT. 6; Italy declared war against Turkey, OCT. 6; Capt. Amundsen reaches South Pole, DEC. 14.
1912 Republic established in China, FEB. 12; *Titanic* disaster off Cape Race, 1,517 lives lost, APR. 14-15; first Alexandra Day in London, over £12,000 realised for charities, JUNE 26; dedication of Rhodes memorial, Rhodesia, by Lord Grey, JULY 5; war declared against Turkey by Montenegro, OCT. 8.
1913 Home Rule Bill passed H. of Commons, majority 110, JAN. 17; war in Balkans resumed, FEB. 3; news received of Antarctic tragedy, involving deaths of Capt. Scott and Oates, Evans, Wilson and Bowers, in March, 1912, from exposure and privation, 10; King George of Greece assassinated, MAR. 18; recovery of Leonardo da Vinci's "Mona Lisa."
1914 s.s. *Empress of Ireland* sunk in St. Lawrence after collision with *Stortstadt*, 1,014 lives lost, MAY 29; Archduke Francis Ferdinand and his consort assassinated at Sarajevo, JUNE 28; Austria-Hungary declares war against Serbia, JULY 28; Germany declares war against Russia, AUG. 1; Germany declares war against France, 3; Great Britain declares war against Germany, 4; Great Britain declares war on Austria-Hungary, 12; first British Expeditionary Force lands in France, 16; Japan declares war on Germany, 23; Germans capture Namur, 24; Germans destroy Louvain, 25; Ostend occupied by British marines. Germans take Amiens, SEPT. 1; great defeat of Austrians at Lemberg, 2; Dinant sacked, 3; Germans take Rheims, 5; Allies begin to drive the Germans back from the north-east of Paris. British army crosses the Marne, 9; Louvain retaken by Belgians, 11; Germans in retreat. Verdun relieved, 15; three British cruisers (*Aboukir*, *Hogue* and *Cressy*) sunk. German cruiser *Emden* shells Madras, 22; Malines bombarded for the third time, cathedral destroyed, 26. Seat of the Belgian Government removed to Ostend, OCT. 7; Germans impose a war levy of £20,000,000 on Antwerp, 10; Franco-British forces occupy Ypres. German forces enter Ostend. Lille taken by the Allies. German cruiser *Emden* reappears in the roadstead of Penang, flying the Japanese flag, and succeeds in torpedoing two warships—a Russian cruiser and a French destroyer, 30; naval battle between German and British ships off the coast of Chile, *Good Hope*, *Monmouth*, and *Glasgow* cruisers engaged the *Scharnhorst*, *Gneisenau*, *Leipzig*, and *Dresden* in stormy weather, the action lasting an hour. The *Good Hope* and the *Monmouth* caught fire and sank; the *Glasgow* was not greatly damaged, NOV. 1; Great Britain declares war against Turkey, 5; Admiralty makes official announcement of the capture and destruction of the German raiding cruiser *Emden*, at Keeling (Cocos) Islands, by H.M.A.S. *Sydney*; H.M.S. *Bulwark* blew up and entirely disappeared, nearly 800 lives being lost; only 12 saved, 26. Russian army of Galicia wins a signal victory; 25,000 Austrians have been taken prisoners within the past fortnight, 29; De Wet is captured by the S. African forces, DEC. 1; four German warships —the raiding cruisers *Scharnhorst*, *Gneisenau*, *Nurnberg*, and *Leipzig*—sunk off the Falkland Islands by a British squadron commanded by Sir F. Sturdee, 8; Germans make another attempt to "smash through" the Allies' lines near Ypres, but without success, 11; British submarine B 11 dives under five rows of mines in the Dardanelles and torpedoes the Turkish warship *Messudiyeh*, 13; Serbians recapture Belgrade, 14; British Protectorate over Egypt proclaimed, 17.
1915 H.M.S. *Formidable* sunk, JAN. 1; complete defeat overtakes the Turkish army in the Caucasus, 5; Turks made an attempt to cross the Suez Canal at Toussoum, near Ismailia, FEB. 2; 32 British and French warships attack the forts at the mouth of the Dardanelles, 19; Great Britain declares the blockade of Germany, MAR. 1; an action is fought between the combined British and French squadrons against the great fortress of the Narrows in the Dardanelles. Four of the forts were silenced, but three vessels of the Allied fleets—the *Irresistible* and the *Ocean*, of the British fleet, and the *Bouvet* of the French squadron—were sunk by mines, 18; British troops gain a notable success near Ypres, conquering Hill 60, APR. 19; Germans first use gas on Western front, 23; First landing of British, Australian, New Zealand and French troops on Gallipoli Peninsula, 24; the *Leon Gambetta*, French cruiser, torpedoed by an Austrian submarine, nearly 700 lives lost, 27; Cunard liner *Lusitania* torpedoed by a German submarine off the Old Head of Kinsale. Nearly 1,500 lives lost, MAY 7; Italy declares war on Austria, 22; H.M.S. *Triumph* torpedoed off the Gallipoli Peninsula, 26; Italian army crosses the Isonzo. Austrians defeated, JUNE 2; Zeppelin destroyed by R. A. J. Warneford, 7; conquest of German S.W. Africa, JULY 9; fall of Warsaw, AUG. 4; British troops win a notable success north and west of Hooge. Second landing of allied troops at Suvla Bay. Italy declares war on Turkey, 20; fall of Brest Litovsk, 25; Vilna falls, SEPT. 18; Turks defeated at Kut-el-Amara, 28; Bulgarians enter Serbia, OCT. 11; Great Britain declares war against Bulgaria, 14; fall of Monastir, DEC. 2; General Townshend reaches Kut-el-Amara, 3; French and British troops occupy Salonika, 13; British forces withdraw from Anzac and Suvla, 19.
1916 Evacuation of Gallipoli completed, JAN. 8; Germany declares war on Portugal, MAR. 11; British defeated on the Tigris, APR. 9; capture of Trebizond, 17; fall of Kut, 30; First Day-

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light Saving Bill passed. White Star steamer *Cymric* sunk, MAY 8; Battle off Jutland, 31; Lord Kitchener drowned, JUNE 5; British offensive begun in the West, JULY 1; heavy battles on the Thiepxal Plateau, 5; second stage of great British advance on the Somme begins, 7; Delville Wood taken by the British, 15; British capture Pozières, 25; Italians capture Gorizia, AUG. 10; Russians take Stanislau, 11; great defeat of Prussian Guards at Guillemont, 25; Rumania declares war against Austria and Germany, 27; Tanks first used by British, SEPT. 15; Allies take Thiepval and Combles, 26; P. & O. liner *Arabia* sunk, NOV. 8; Monastir captured by the Allies, 19; British hospital ship *Britannic* sunk, 21.

1917 H.M.S. *Cornwallis* sunk, JAN. 7; H.M.S. *Laurentic* sunk, 29; British capture Grandcourt, FEB. 7; fall of Kut-el-Amara, Sanna-i-Yat evacuated and Turks in retreat; over 1,700 prisoners taken, 24; British troops occupy Baghdad, MAR. 11; Revolution in Russia, 12; St. Pierre Vaast Wood occupied by British, 16; British take Bapaume, 17; British take Péronne, Nesle and Chaulnes, 18; British hospital ship *Asturia* torpedoed, 21; General Murray gains a complete victory over 20,000 Turks at Gaza, capturing 900 prisoners, 27; Cuba declared war against Germany, APR. 7; Vimy Ridge taken by Canadians, 10; General Maud annihilates 18th Turkish Army Corps, taking 1,217 prisoners, 18; General Foch appointed Chief of Staff of the French Army, MAY 15; British victory in the Ypres salient, Messines Ridge taken, JUNE 7; first American contingents arrive in France, 26; Gen. Allenby assumes Palestine command, 29; Austrian front west of Stanislau broken, JULY 8; H.M.S. *Vanguard* blown up, over 700 lives lost, 9; Russian retreat begins, 16; British capture Hill 70, AUG. 15; Canadians enter Lens, 21; Russia proclaimed a Republic, SEPT. 15; British victory on Passchendaele Ridge, OCT. 4; French victory on the Aisne, 23; Italians in retreat, 24; Russian Revolution, 27; Passchendaele won by Canadians, NOV. 6; Hindenburg Lines smashed on a 10-mile front, 20; United States declares war with Austria-Hungary, DEC. 7; fall of Jerusalem, 9; Russo-German armistice signed, 15; German attacks at Cambrai, aided by liquid fire, 31.

1918 Naval engagement at Imbros; *Goeben* and *Breslau* emerge from the Straits and sink H.M.S. *Raglan* and a small monitor; *Breslau* sunk and *Goeben* beached, JAN. 20; Treaty of Brest Litovsk signed, MAR. 3; Rumania agrees to enemy peace terms, 4; massed German onslaught at Vimy Ridge, 28; General Foch appointed Generalissimo of the Allied armies in France, APR. 14; British naval raid on Zeebrugge and Ostend, 22; peace signed between Rumania and the Central Powers, MAY 7; H.M.S. *Vindictive*, laden with concrete, sunk in Ostend harbour, 9; Germans bomb Paris, 30; Australians and Americans captured Hameil, JULY 4; British press forward, recapturing Albert, taking 5,000 prisoners, AUG. 22; Australians capture Péronne, SEPT. 1; French capture St. Quentin, OCT. 3; Germans retreat on Lille, 4; great Italian advance, 29; Turkey surrenders unconditionally, 30; British enter Valenciennes, NOV. 2; Austria accepts imposed terms, and makes full surrender, 3; American troops enter Sedan, 6; Popular Government in Poland (Lublin), 7; revolutionary movement spreads over Germany, 8; Kaiser abdicates and escapes to Holland, 9; armistice signed by German plenipotentiaries; firing stopped on all fronts; great jubilation throughout Britain and allied countries, 11; King Nicholas of Montenegro deposed; Montenegro unites with Serbia under King Peter, 29

1919 Peace Conference in Paris, FEB. 3; first direct air-flight across the Atlantic by Sir J. Alcock and Sir A. W. Brown, JUNE 15; interned German fleet scuttled at Scapa Flow, 19; Treaty of Peace with Germany signed at Versailles, 28.

1920 Peace Treaty ratified in Paris and League of Nations came formally into existence, JAN. 13; Prohibition came into force in U.S., 17; Joan of Arc canonised at St. Peter's at Rome, MAY 16; Protocol containing the Allies' disarmament terms signed by Germany at Spa, JULY 9; Peace Treaty with Turkey signed at Sèvres, AUG. 10; Women graduates admitted for first time to degrees in Oxford University, OCT. 14; Cenotaph unveiled by the King in Whitehall; an Unknown Warrior buried in Westminster Abbey, NOV. 11.

1921 Sinn Fein outrages in Dublin, FEB. 7; Riots in Egypt, MAY 23; Battle in Dublin, Customs House burnt down, 25; Official end of Great War, 31; Heligoland fortresses demolished, OCT. 14.

1922 Dublin Castle handed over to Provisional Government, JAN. 16; Four-power Pacific Treaty ratified by U.S. Senate, MAR. 24; P. & O. steamer *Egypt* sunk off Ushant, MAY 20; Heavy fighting in Dublin, the Four Courts blown up, JULY 2; King opens new L.C.C. County Hall, 17; Defeat of Greek armies, AUG.–SEPT.; Great find of treasures in tomb of King Tutankhamen near Luxor in Egypt by Lord Carnarvon, NOV. 29.

1923 French troops despatched to Ruhr, JAN. 8; Treaty of Lausanne, JULY 24; Great earthquake in Japan, Tokio and Yokohama in ruins, SEPT. 1; Gordon-Bennet balloon race ends disastrously, 5 lives and 3 balloons lost, 24; Rhine Republic proclaimed, Bavaria defies the Reich, OCT. 20; Turkish Republic proclaimed, Kemal Pasha first president, 29; Luxor Tomb re-opened, NOV. 23.

1924 Lenin died, JAN. 21; King George II of Greece deposed and a Republic declared, MAR. 25; Wembley Exhibition opened by King, APR. 23; Dawes Scheme accepted by London Conference, Ruhr evacuation agreed to, AUG. 16.

1925 Madame Tussaud's burnt down, MAR. 18; Hindenburg elected German President, 26; U.S. airship *Shenandoah* destroyed, 13 killed, SEPT. 3; Treaty of Locarno signed in London, DEC. 1; Summer Time Act made permanent.

1926 Ibn Saud proclaimed king of the Hedjaz in Yeddah, JAN. 11; Evacuation of Cologne by British troops, 31; Shakespeare Memorial Theatre burned, MAR. 6; General Strike.

1927 Beam service to Australia starts, APR. 8; New Zealand offers £1,000,000 towards cost of Singapore base, 23; Canberra, the new capital of Australian Commonwealth, inaugurated by Duke of York, MAY 9; Lindbergh flies Atlantic alone, 21; Temme swims Channel in 14 hrs 29 min., AUG. 5; South African flag agreement, OCT. 24.

1928 Hinkler flies London to Australia in 16 days, FEB. 22; Capt. Wilkins flies across Arctic Regions, no land seen, APR. 16; Earthquake in Greece, Corinth destroyed, 23; Capt. Kingsford-Smith flies the Pacific, JUNE 9; General Nobile rescued by aeroplane from Arctic one month after disaster, 24; Kellogg Peace Pact accepted by Gt. Britain and Colonies, JULY 18; German airship with 60 persons crosses Atlantic, OCT. 15; Women in Britain enfranchised.

1929 King Amanullah of Afghanistan abdicates, JAN. 14; Vesuvius in eruption, JUNE 5; Graf Zeppelin flies from New York to Friedrichshaven in 55½ hours, AUG. 10; Graf Zeppelin at Los Angeles, having crossed Pacific from Japan in 68 hours, 28; Graf Zeppelin reaches New York, having flown round the world with three stops in 21 days 7 hours. Actual flying time 12 days, 29; Hatry Group Crash, SEPT. 20; New Tilbury Dock opened, 26; Prince of Wales' dinner to 321 V.C.s at House of Lords, NOV. 9; Commander Byrd flies over South Pole, 30.

1930 End of Boards of Guardians, APR. 1; Sir H. Seagrave killed on Lake Windermere, JUNE 13; Maltese Constitution suspended; *Enterprise* beats *Shamrock* in 4 races during September; R 101 destroyed in France on first flight to India, 48 lives lost, OCT. 5.

1931 New Road Traffic Act comes into force, JAN. 1; Opening of new Zoological Gardens at Whipsnade, MAY 23; Great floods in China, 16; provinces devastated, 4,000,000 homes

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destroyed and 23,000,000 people affected, AUG. 5.

1932 Sydney Harbour Bridge opened, MAR. 19: Consecration of Buckfast Abbey by Cardinal Bourne, AUG. 25.

1933 Hitler appointed Chancellor by Hindenburg, JAN. 30, and step by step gains supreme control; German Reichstag set on fire by incendiaries, FEB. 27; The Soviet Balloon "Stratostat S.S.S.R." ascended 19,000 metres, SEPT. 30; The *Discovery II* left England on an Antarctic expedition, OCT. 21.

1934 An appalling earthquake occurred in N. India, resulting in a loss of 7,252 lives, JAN. 15; The first vertical bridge in England opened by the Duke of York at Middlesbrough, FEB. 28; Herr Dollfuss, the Austrian Chancellor, assassinated by Austrian Nazis, JULY 25; Death of Hindenburg, AUG. 2; Hitler becomes Dictator.

1935 A severe earthquake occurred in Formosa, Japan, 3,185 killed and 10,630 injured, APR. 21; Silver Jubilee of the King's Accession celebrated with great splendour and rejoicing, MAY 6; 30,000 lives lost in earthquake at Quetta, British Baluchistan, 31; British offer of a piece of Somaliland Territory, to avert Abyssinian War, refused by Italy, JUNE 27; Queen Astrid of the Belgians killed in a motoring accident near Lucerne, Switzerland, AUG. 29; War commences between Italy and Abyssinia, OCT. 3.

1936 Death of King George V. at Sandringham, aged 70, accession of King Edward VIII, JAN. 20; Repudiation of the Locarno Treaty by Germany, MAR. 7; The Emperor of Abyssinia and his family fled from Addis Ababa, MAY 2; Italian troops occupy Addis Ababa, 5; Civil War breaks out in Spain, JULY 18; Foundation stone of Guildford Cathedral laid by the Archbishop of Canterbury, 22; Crystal Palace at Penge, near Sydenham, destroyed by fire, NOV. 30; King Edward VIII abdicates after a reign of 325 days, DEC. 10; The Duke of York succeeds his brother as King George VI, 12.

1937 King George VI and Queen Elizabeth crowned in Westminster Abbey with traditional ceremony and pageantry, MAY 12; Salaries of M.P.s raised from £400 to £600 p.a., JUNE 22; U.S.A. retained the America's Cup after beating the English challenger by 4 races to nil, AUG. 5.

1938 Singapore Naval Base opened, FEB 14; Austria annexed by Germany, MAR. 12; World Speed record of 126 m.p.h. by L.N.E.R. steam locomotive *Mallard*, JULY 3; The *Queen Mary* gained the "Blue Riband" of the Atlantic by making a record West-to-East crossing in 3 days 20 hrs. 42 mins., AUG. 14; the largest liner, *Queen Elizabeth*, launched at Clydebank by H.M. the Queen, SEPT. 27; British Navy mobilised, 28; Munich Agreement between Chamberlain, Daladier, Hitler and Mussolini, 29.

1939

February 27 Great Britain recognises General Franco's Government.

March 16 Bohemia and Moravia annexed by Hitler and proclaimed a German Protectorate; **17** Mr. Chamberlain warns Germany against domination by force in that Great Britain will resist to the utmost limit of her power; **21** Memel ceded to Germany by Lithuania; **28** Anti-Polish press campaign begun by Germany.

April 1 Spanish War ends; **7** Italy seizes Albania; **14** First British talks with Russia; **27** Conscription introduced in Great Britain; **28** Hitler denounces Anglo-German Naval agreement and the Polish Non-Aggression Treaty.

May 12 Great Britain signs defensive agreement with Turkey; **22** Italy and Germany sign pact; **13** Mr. Strang arrives in Moscow to assist Anglo-Russian negotiations; **23** France and Turkey sign defensive agreement; **25** Anglo-Polish treaty signed in London.

July 10 Mr. Chamberlain re-affirmed British pledge to Poland.

August 13 Intensive German press campaign against Poland; **23** German–Soviet Pact signed

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by von Ribbentrop; **25** Japan breaks away from the Anti-Comintern Pact; **28** Holland mobilises; **31** British fleet mobilised.

September 1 Poland invaded by German forces; Great Britain and France mobilise; **2** Compulsory military service for all men aged 18 to 41; **3** War declared (11 a.m.) between Britain and Germany; France at war with Germany as from 5 p.m.; **4** British liner *Athenia* sunk by submarine; R.A.F. raid the Kiel Canal entrance and bomb German warships; **5** Germans advance into Silesia and the Polish Corridor; **6** First enemy air raid on Britain; Allied war planes bomb Saar objectives; **7** Polish garrison at Westerplatte surrenders; **8** Russia mobilises; **10** Fighting on Western Front intensified; Russian troops on Polish border; **11** British troops on French soil; **12** Warsaw fights back; **14** Poland's only seaport falls; **15** Germans repulsed on Western Front; **17** Polish resistance collapsed; Russian troops crossed the Polish frontier along its entire length; Russian and German troops meet near Brest Litovsk; H.M.S. *Courageous* sunk with a loss of 515 lives; **27** Capitulation of Warsaw; **29** Nazi–Soviet pact signed in Moscow approving of the partitioning of Poland; R.A.F. units attacked ships of the German Navy in the Heligoland Bight.

October 3 Japanese losses of 18,000 against Russia on the Manchukuo and Outer Mongolian border. **4** British steamer *Clement* sunk in South Atlantic by an armed raider; **14** *Royal Oak* sunk with a loss of 810 lives; **16** German bombers raid Rosyth and the Firth of Forth; **17** H.M.S. *Iron Duke* attacked and slightly damaged by an air raid on Scapa Flow; **21** Four German planes shot down during an unsuccessful attack on a North Sea Convoy; **31** German heavy guns in action on the Western Front.

November 8 Hitler violently attacks Britain and orders Goering to prepare for a five years' war. Bomb explosion occurred in the Bürgerbräukeller at Munich after Hitler's speech, as a result of which 9 persons lost their lives; **10** Russo Finnish negotiations hitch; **13** Enemy aircraft reached the outskirts of Paris; **18** Dutch ship *Simon Bolivar* sunk by German mine with a loss of 130 lives; Germans using magnetic mines; **23** British armed merchant cruiser *Rawalpindi* sunk; **25** Polish liner *Pilsudski* sunk; **29** Diplomatic relations between Russia and Finland severed; **30** Finland attacked by Russia on land, sea, and air; Helsinki, the capital, bombed.

December 1 Finns fighting back; A number of Russian aircraft and tanks destroyed; Air raids on Helsinki; **11** Italy leaves the League of Nations; **14** The rejection by Russia of the League of Nations' offer of mediation in the Russo–Finnish war; Russia expelled from the League of Nations; **18** *Admiral Graf Spee* scuttles herself in the entrance of Montevideo harbour; **19** German liner *Columbus* of 32,000 tons scuttled; **27** Russian attacks in Finland fail; **31** Finnish troops secure a big victory over the Russians near Lake Kianta, destroying a whole division.

1940

January 16 Submarines *Seahorse*, *Undine* and *Starfish* lost; **23** H.M.S. *Exmouth* lost.

February 14 Finnish advanced posts captured by Russians; **16** 299 British prisoners taken off the German Naval Auxiliary *Altmark*; **23** Finns lose the island fortress of Koivisto; Finns retreat from Petsamo.

March 1 Russian troops enter Vipuri suburbs; **12** British ships to be fitted with a protective device against magnetic mines; Finland concludes a peace treaty whereby she cedes to Russia the Karelian Isthmus, the town of Vipuri and a military base on Hango Peninsula.

April 9 Invasion of Denmark and Norway by Germany; **10** German cruisers *Blücher* and *Karlsruhe* sunk; **13** Seven German destroyers destroyed at Narvik; **15** British troops arrive in Norway; **19** British soldiers landed in the Faroes; **23** Fighting in Norway near Trondheim.

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May 2 British troops withdrawn from Norway; 10 Holland, Belgium and Luxembourg invaded by vast enemy forces; Parachute troops landed near Rotterdam; British troops cross the Belgian border; British troops land in Iceland; Rotterdam bombed; 11 National Government formed under Mr. Churchill; 13 Queen Wilhelmina arrived in London; 14 Rotterdam captured; Holland ceased fighting; Allied troops landed near Narvik; 16 Heavy fighting near Brussels; 17 Belgian Government moved to Ostend; 24 Enemy forces enter Boulogne; 28 Belgian army capitulated on the order of King Leopold; British forces to be withdrawn from Flanders; Narvik captured by Allied forces; 29 Ostend, Ypres, Lille and other Belgian and French towns lost to the Germans; 30 Allied troops commence evacuation.

June 1 Bulk of the B.E.F. in Dunkirk safely landed in England; 3 887 British ships of all types used in the evacuation of 335,000 troops from Dunkirk; 5 Hitler proclaims a war of total annihilation against his enemies; 8 Enemy armoured forces penetrate French defences in the West near Rouen; 10 Italy declared war on Great Britain and France; H.M.S. *Glorious*, two destroyers and one transport lost; 11 R.A.F. raid aerodromes in Libya and Italian East Africa; Malta bombed by Italian planes; 13 Evacuation of school children in Greater London begins; 14 Paris captured by enemy forces; 15 Soviet troops occupy Lithuania; 17 Prime Minister broadcasts that Great Britain and the British Empire to be the sole champions in arms to defend the world cause; Russian troops occupy both Latvia and Estonia; 22 French delegates accept terms for an Armistice; Alexandria bombed; 25 Hostilities in France cease at 12.35 a.m.

July 1 Channel Islands occupied by Germany; 2 R.A.F. raid Kiel docks; 3 British liner *Arandora Star* torpedoed and sunk; 16 Japanese Cabinet resigned; 18 Krupp's works bombed by R.A.F.; 19 Italian cruiser *Bartolomeo Colleoni* sunk in Mediterranean by H.M.A.S. *Sydney*; 21 Rumania cedes the Southern Dobrudja to Bulgaria; 29 Dover harbour raided by 80 enemy planes of which 17 were destroyed.

August 4 British Somaliland invaded by Italian forces; 15 180 enemy planes destroyed over Great Britain; 18 152 enemy planes destroyed whilst attacking Great Britain; 19 British Somaliland evacuated; 22 S.E. Kent shelled by German guns from the French coast; 24 Central London bombed.

September 6 King Carol of Rumania abdicated in favour of his son Michael; 7 London sustained severe damage in the largest aerial attack since war commenced; 103 enemy aircraft destroyed; 13 Five bombs dropped on and around Buckingham Palace, but the King and Queen escaped injury; 15 55 enemy planes destroyed; 23 Japanese troops entered Indo-China.

October 2 Military objectives in Berlin and other parts of Germany bombed; 7 German troops enter Rumania; 450 enemy planes attack London; 8 R.A.F. bombers raid Berlin military objects; 25 *Empress of Britain* lost; 28 Greece rejects an Italian ultimatum; Skoda works in Czechoslovakia bombed.

November 1 Greeks repel Italian attacks; 6 Southampton bombed; 7 Bari and Brindisi bombed; 11 Krupp's works at Essen heavily attacked from the air; 14 Coventry heavily attacked by German bombers, the Cathedral being destroyed; 22 Albanian town of Koritza captured by the Greeks; 25 Greeks capture 7,000 Italians; 27 Cologne attacked by the R.A.F.; 28 Merseyside raided by German bombers; 30 Southampton heavily attacked.

December 2 Bristol heavily attacked; Naples bombed; 11 Sidi Barrani captured by British forces; 12 Sheffield bombed; 15 Laval dismissed from the Vichy Government; 16 Sollum and Port Capuzzo captured; 20 Berlin raided; 22 Manchester severely raided; 29 City of London severely burned by incendiary bombs; The Guildhall destroyed and eight Wren Churches; 30 Naples raided.

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1941

January 1 Bremen heavily raided; 3 Cardiff raided and extensive damage done; 5 Bardia captured; 10 Portsmouth bombed; British fleet in Mediterranean dive-bombed; 13 Plymouth bombed; 22 Tobruk captured by Australian troops; 29 Naples again raided.

February 7 Benghazi captured; 15 Kismayu, Italian Somaliland, captured; 19 Swansea heavily attacked; 26 Mogadishu, capital of Italian Somaliland, occupied by Imperial troops; German mechanised troops in Libya; 27 Cologne heavily attacked.

March 3 Cardiff attacked by fire bombs; 4 Naval raid on the Lofoten Islands; 11 U.S.A. Lease and Lend Bill signed by Mr. Roosevelt; 17 Berbera, capital of British Somaliland, recaptured; 19 British forces capture Jijiga in Abyssinia; 20 Plymouth heavily attacked; 27 Keren and Harar fall; 28 Cologne and Düsseldorf heavily attacked; 30 Naval victory in Mediterranean resulted in the loss of three Italian cruisers and two destroyers and one battleship damaged.

April 1 Asmara, cap. of Eritrea, captured; 5 Addis Ababa entered by Imperial troops; 6 Greece and Yugoslavia invaded by German troops; 8 Massawa capitulates; 9 Salonika occupied by Germans; Berlin State Opera House destroyed; 10 Birmingham and Coventry raided; 11 Belgrade occupied by German forces; 13 Bardia given up; Tobruk holds out; 23 H.M.S. *Rajputana* torpedoed and sunk; 24 Empire forces withdrawing from Greece; 27 Athens captured by the Germans; 28 Portsmouth severely attacked by night planes; 29 Plymouth again severely raided.

May 1 Enemy infantry and tanks penetrate the outer defences of Tobruk; 2 Evacuation from Greece completed; 10 Heavy attack on London; Westminster Abbey, Houses of Parliament, and the British Museum damaged, 33 night bombers destroyed; Rudolf Hess descended by parachute, in Scotland; 20 Crete invaded by air-borne troops; 23 Crete heavily attacked by German bombers; 24 H.M.S. *Hood* sunk; 27 German battleship *Bismarck* sunk.

June 1 British forces withdrawn from Crete; Iraqi armistice signed; 2 Clothes rationing commenced; 4 William II (Ex-Kaiser of Germany) died; 18 Treaty of friendship between Turkey and Germany signed; 22 Germany attacks Russia; 24 Russia loses Brest Litovsk.

July 3 Palmyra (Syria) and Debra Tabor (Abyssinia) surrender to Allied forces; 7 U.S.A. forces arrived in Iceland; 9 General Dentz, the High Commissioner in Syria, asks for Armistice terms; 10 Beirut occupied by Australian forces; 14 Rumanian oil centre bombed by the Soviet Air Force; 22 Moscow raided; 23 Japan demands air bases in Indo-China; 25 Fighting round Smolensk.

August 7 Japan concentrating troops on Thai border; 25 British and Russian troops enter Persia; 27 The Dnepropetrovsk dam blown up by the Russians.

September 8 Allied troops land in Spitzbergen and destroy coal-mines; 18 Crimea cut off from mainland; 19 Kiev entered by Germans; 21 Bitter fighting round Odessa; 30 Poltava evacuated by Russians.

October 6 German attack on Moscow; 16 Soviet Government leaves Moscow; Odessa occupied by German and Rumanian troops; 19 Taganrog on Sea of Azov captured by Germans; 26 Kharkov captured by the Germans.

November 10 H.M.S. *Cossack* sunk; 14 Aircraft Carrier *Ark Royal* sunk; 17 Russians evacuate Kerch; 21 Libyan battle opens, 130 German tanks destroyed; 23 Rostov claimed by the Germans; 24 H.M.S. *Dunedin* torpedoed in S. Atlantic by *U.124*; 25 H.M.S. *Barham* lost; 27 Gondar captured; 30 Russians re-take Rostov.

December 1 Points rationing scheme in force; 2 Our forces in Tobruk isolated; H.M.A.S. *Sydney* lost; 7 Hostilities break out in the Pacific; Japan declared war on Great Britain and the U.S.A.; Pearl Harbour, Hawaii and Manila attacked from the air; 8 Japanese forces land in Malaya; 10 H.M.S. *Repulse* and *Prince of Wales* sunk off Malaya; Philippines

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invaded; 11 Penang raided; 12 Burma raided; 14 Germans in retreat on Moscow front; 17 Sarawak invaded; German forces in Libya in full retreat; 18 Kedah evacuated; 20 Japanese forces land on Hongkong; 22 Rangoon raided; 26 Hongkong surrendered; 30 Kerch and Feodosia re-captured; 31 Kaluga re-captured.

1942

January 1 Lofoten Islands raided; 2 Manila and Cavite evacuated; 13 Tarakan Island surrendered; 14 Pahang State cleared by Japanese; 23 Japanese forces land in New Guinea and the Solomon Islands.

February 7 Japanese forces land on Singapore Island; 9 Soap rationed; 15 Singapore surrendered; 16 Palembang occupied by the Japanese; 19 Port Darwin raided.

March 1 Japanese land troops in Java; 9 Surrender of Java; 25 Andaman Islands occupied by Japanese forces.

April 7 Malta receives its heaviest raid; 10 British Aircraft Carrier *Hermes* sunk; 15 George Cross awarded to the Island of Malta; 18 Tokyo raided by U.S. aircraft.

May 5 Madagascar invaded by British forces; 7 U.S. forces sink 11 Japanese warships off the Solomon Islands; H.M.S. *Edinburgh* lost; 31 Over 1,000 bombers raid Cologne; Canterbury bombed; Japanese midget submarine night attack on Sydney Harbour.

June 1 1,036 bombers raid Essen and the Ruhr; 2 Dutch Harbour, Alaska, raided by the Japanese; 21 Tobruk captured by the Germans; 25 Bremen attacked by a force of 1,000 bombers.

July 1 Battles raging near El Alamein; Sevastopol captured; 2 Rommel withdraws his forces from El Alamein; 16 R.A.F. make first daylight raid on the Ruhr; 22 The 8th Army in Egypt attacks on all fronts; 27 Tobruk heavily attacked by Allied bombers; Rostov evacuated by the Russians; 31 Russians resisting pressure in the Don elbow.

August 6 Germans advancing towards the Caucasus; 10 American forces land in the Solomon Islands; 11 Aircraft Carrier *Eagle* torpedoed and sunk; 25 Duke of Kent killed in air crash.

September 6 German progress halted outside Stalingrad.

October 23 Allied offensive opened in Egypt.

November 4 Rommel's army in full retreat; 5 Axis forces in Egypt continue to retreat; Red Army holding firm at Stalingrad; Cessation of hostilities in Madagascar; 8 U.S. troops land on French North Africa coast, Algiers occupied; 9 British troops also landed; 10 Oran captured by U.S. forces; 11 Casablanca capitulates; Hostilities cease in French North Africa and French Morocco; 13 Allied armies advancing in Tunisia; Tobruk, Bardia and Sollum taken by the Eighth Army; 16 U.S. Naval forces secure a great victory over the Japanese near Guadalcanar; 25 German forces retreating before the Red Army offensive at Stalingrad; 27 German forces enter Toulon; French Fleet scuttled.

December 15 Buna in Papua captured by U.S.A. forces; 17 Rommel's army cut in two; 24 Admiral Darlan assassinated.

1943

January 3 Russians capture many important towns; 6 German armies in the Caucasus and the Don elbow in retreat; 16 Iraq declares war against the Axis; 18 Leningrad siege raised after sixteen months' investment; 23 Tripoli occupied by the Eighth Army; 27 American bombers make their first attack on Germany; 31 Remnants of the German army outside Stalingrad surrender, among whom are Field-Marshal Paulus, Commander of the Sixth German Army and 16 other Generals.

February 2 Surrender of 45,000 Germans in Stalingrad; 9 Russians re-take Byelgorod; Guadalcanal Island cleared of Japanese troops; 12 Russians capture Krasnodar; 13 1,000 tons of bombs dropped on L'Orient; 14 Russians capture Rostov and Voroshilovgrad; 16 Kharkov retaken by the Russians; 24 German forces in Tunisia driven back after 3 days of severe fighting.

March 7 Rommel attacks Eighth Army and is repulsed, losing 50 tanks; 12 Germans claim the re-capture of Kharkov; 21 Byelgorod evacuated by the Russians; 23 8th Army penetrates the Mareth Line; 29 Axis forces withdraw from the Mareth Line.

April 10 Sfax occupied; 12 Sousse taken by the 8th Army; 16 Bremen attacked by U.S.A.F. in daylight; 18 German air convoy smashed off Tunisia; Spezia bombed.

May 7 Tunis and Bizerta captured; 12 All organised resistance by the enemy in Tunisia ceased and 291,000 prisoners have been taken; 13 Dams in the Ruhr breached by the R.A.F.; great flooding and devastation; 18 Japanese submarine sinks the Australian hospital ship *Centaur* with a loss of 268 lives; 22 Moscow dissolved the Comintern; 23 Dortmund receives 2,000 tons of bombs.

June 3 French Committee for National Liberation formed in Algiers; 4 Pantellaria bombed by sea and air.

July 5 German forces attack the Orel, Kursk and Byelgorod sectors; 7 Russian forces holding German attacks; 10 Sicily invasion successfully begun; 11 Ten Sicilian towns taken; 14 Ragusa, Floridia and Augusta taken; 15 Russians change over to the offensive near Orel; 19 Military targets in Rome bombed. 21 Allied forces capture Enna in the centre of Sicily; 23 Palermo and Western Sicily in Allied hands; 25 Mussolini, the Dictator of Italy resigns; 26 All Italy under Martial Law; 28 Fascist Party in Italy dissolved.

August 1 Ploesti oilfields bombed by American aircraft; 4 Russians take Orel; 5 Byelgorod captured by the Russians; Catania falls to the 8th Army; 17 Sicily in Allied hands; Peenemünde, Regensburg and Schweinfurt bombed 215 Japanese planes destroyed in the Pacific. 21 Kiska Island occupied; 30 Taganrog captured; Germans take over full control of Denmark.

September 3 Italian mainland invaded; 6 Southern Calabria evacuated by the Germans; 8 Italy surrenders; Stalino taken by the Russians; 9 British and American troops land near Naples; 10 Rome seized by the Germans; Mariupol taken by the Russians; 12 Italian warships arrive in Malta harbour; 13 Heavy fighting at Salerno; 14 Salamaua captured from the Japanese; 17 5th and 8th Armies join up in Italy; Briansk captured; 19 Sardinia evacuated by the Germans; 23 British midget submarines penetrate Norwegian fjords and damage the German battleship *Tirpitz*; 25 Smolensk taken by the Russians; 28 Foggia captured.

October 1 Naples taken; 4 Corsica in Allied hands; 25 Russians capture Dnepropetrovsk and Dneprodzerzhinck; Berlin admits position in Southern Russia as being grave.

November 1 Russians cut retreat of Germans from the Crimea; 6 Kiev taken by the Russians; 14 Sofia raided; 22 Samos evacuated; 23 Berlin again very heavily blitzed; 26 Gomel recaptured after 2¼ years in German occupation; 27 Mr. Churchill, President Roosevelt and Marshal Stalin met in Teheran for a 4-day conference; 29 8th Army opens offensive; 30 Mr. Churchill, President Roosevelt and General Chiang Kai-shek met in North Africa.

December 2 Men between 18 and 25 to be directed to the mining industry by ballot; 6 Mr. Churchill, President Roosevelt and President Inonu conferred in Cairo; 11 American heavy bombers destroy 138 German aircraft over Emden for the loss of 20; 13 20-year treaty signed between the Soviet Union and Czechoslovakia; 19 Bangkok bombed; 26 German battleship *Scharnhorst* sunk.

1944

January 12 Russians break through Poland on a 40-mile front; U.S.A. Bombers raid Germany by day; 15 1,500 deaths in earthquake in Argentina; 21 Russians advancing on Leningrad sector; Novgorod captured; 23 Fifth Army successfully land troops at Nettuno,

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south of Rome; 28 Argentina breaks with the Axis Powers.

February 1 American forces land on the Marshall Islands; 2 Russians penetrate Estonia; 7 Plans announced for the rebuilding of Coventry Cathedral; 10 Heavy fighting in the Anzio beach-head; 22 Russians capture Krivoi Rog.

March 15 Cassino (Italy) destroyed by Allied bombers; Over 1,000 R.A.F. four-engined bombers raid Stuttgart; 17 Airborne troops land behind the Japanese in Burma; 19 Russians cross Dniester into Bessarabia; Heavy fighting for Cassino; 24 Berlin has its heaviest raid of the war.

April 3 German battleship *Tirpitz* attacked by Naval aircraft; 9 U.S.A. bombers hit targets in Poland; 11 Soviet forces advance into the Crimea; 16 Yalta taken.

May 9 Sevastopol captured; 11 Air bombardment of enemy targets in France and Belgium continued on an ever-increasing scale; 12 Fifth and Eighth Armies attack the Gustav Line; 18 Capture of Cassino and Abbey; 19 50 Allied officers shot after escaping from a German prison camp; 30 Battle for Rome commences.

June 5 Allied forces pass through Rome; King of Italy signed a decree transferring his powers to Prince Umberto, his son; 6 Invasion of Europe commenced; Masses of ships, troops and aircraft take part—all going well; 7 Operations in Normandy proceeding favourably; 8 Enemy resistance in Normandy increasing but we steadily advance; 9 Heavy fighting near Caen; 11 Normandy beach-head widened; Allied armies in Italy advancing on all fronts; Russians striking against the Finns; 12 Mr. Churchill visits Normandy beach-head; 14 Heavy fighting for Caen in progress; Gen. de Gaulle in Normandy; Japan bombed by "Super Fortresses"; 16 Flying bombs being used by the Germans; 17 The King visits Normandy; 18 Cherbourg peninsula cut by the Americans; Allies land on Island of Elba; Russians break through the Mannerheim Line; 23 Soviet forces open offensive on Central Front; 27 Cherbourg in Allied hands; Finland decides to stay in the war.

July 3 Minsk captured; 6 During the first three weeks of the "flying bomb" menace 2,754 have been launched, resulting in the death of 2,752 persons and about 8,000 detained in hospitals; 9 Caen and La Haye du Puits captured; 13 Vilna liberated; 20 Attempt on Hitler's life with high explosive; U.S.A. troops land on Guam; 24 Lublin captured; 26 Narva taken; 27 Lvov, Dvinsk and Bialystok captured; 29 Brest Litovsk, Przemysl and Yaroslav captured.

August 1 Uprising in Warsaw; Kaunas stormed; 3 Rennes occupied; 4 Myitkyina falls to Allied forces; 13 Enemy retreating on Normandy front; Florence liberated; 15 Southern France invaded by Allied forces; 17 Orleans, Chartres and Falaise captured; 21 Toulon captured; 23 Paris liberated from within; Marseilles taken; Rumania surrenders; 24 American tanks in Paris; Kishinev captured; 1,300 U.S. bombers attack oil installations in Germany; 25 General de Gaulle in Paris; Cannes and Grasse taken; Rumania declares War on Germany; 31 Amiens captured; Rouen taken; Bucharest entered.

September 1 British enter Arras; Dieppe and Verdun captured; Bulgarian Government resigns; Gothic line penetrated; 3 Allies in Belgium; Lyons, Pesaro and Pisa taken; 4 Antwerp, Brussels, Mons and Abbeville liberated; Holland entered; Finland "ceases fire"; 6 Bulgaria asks for an armistice; 7 Boulogne entered; Bulgaria declares war on Germany; 8,000 Flying bombs were launched during the attack of which 2,300 reached the London area; 8 Besançon captured; Russian troops cross the Bulgarian frontier; 9 Hostilities between Bulgaria and Russia cease; 10 American troops cross into Luxembourg; Members of the Belgian Government return to Brussels; 11 Allied forces fighting on Reich Territory; City of Luxembourg freed; Dijon captured; 12 Le Havre surrendered; U.S.A. armoured forces cross into Germany in strength; 15 Nancy, Maastricht and Eisden captured; 17 Allied air-borne troops landed in Holland; 19 The *Tirpitz* bombed again; 22 Rimini and Tallinn captured; 30 Germans counter-attacking near Arnhem; Calais surrendered.

October 3 U.S. 1st Army break through the Siegfried Line when capturing Ubach; Warsaw falls to the Germans; 5 Troops land on the mainland of Greece: 13 Riga taken; 14 Athens occupied; 15 Hungary asks for armistice terms; Petsamo captured; 20 Aachen captured by the Americans; Belgrade liberated; 25 Japanese fleet in action off the Philippines—2 Battleships, 4 Carriers, 6 Heavy Cruisers, 3 Light Cruisers and 9 Destroyers sunk, many probably sunk and damaged; 29 Breda, Holland, captured.

November 12 *Tirpitz* sunk by R.A.F. Lancasters; 21 U.S. force of 2,300 aircraft struck oil plants in Germany.

December 5 U.S.A. forces capture Saarlautern; 6 Civil war breaks out in Athens; 14 Infantry reinforcements flown to Athens; 15 U.S. forces land in Island of Mindoro; 17 German forces counter-attacking and have crossed into Luxembourg and Belgium; Faenza captured by New Zealand forces; 26 Budapest encircled; 27 German armoured columns halted near the Meuse; 31 Polish provisional Government in Lublin; Hitler said that Germany would never capitulate.

1945

January 5 Organized fighting in Athens ceased; 9 U.S. forces land on Island of Luzon; 11 Germans withdrawing from the Ardennes salient; 17 Warsaw captured by the Russians; 18 Cracow taken; 21 Tannenberg and Gumbinnen taken; Russian troops in Silesia; 23 Burma road to China re-opened; 29 Russians invade Pomerania.

February 3 Berlin bombed in daylight by more than 1,000 Fortresses; 9 Field-Marshal Montgomery moves forward; 11 Elbing taken by the Russians; 16 Tokio and Yokohama heavily bombed; 19 Americans land on Iwojima Island; 23 American forces cross the Roer; Poznan taken by the Russians; Turkey declares war on the Axis Powers.

March 1 München-Gladbach captured by the Americans; 2 The Rhine reached by U.S.A. forces; 6 Cologne captured; 20 Mainz, Worms and Kaiserlautern captured; 21 Ludwigshafen taken; 23 Gen. Patton's 3rd Army crosses the Rhine; 24 Field-Marshal Montgomery's forces across the Rhine in great strength; 27 Argentina declares war on the Axis Powers.

April 1 Germans evacuating Holland; 4 Munster occupied; Ruhr encircled; Bratislava captured by the Russians; Russians within 12 miles of Vienna; 5 Russian Government denounces the Soviet–Japan neutrality pact; Japanese Cabinet resigns; 8 Japanese battleship *Yamato*, 2 Cruisers and 3 destroyers sunk by U.S.A. carrier-borne aircraft; 9 Königsberg captured; 10 Hanover captured; 11 U.S.A. forces within 70 miles of Berlin; Brunswick and Essen captured; Russian Army enter Vienna after 7-day battle; 12 Death of President Roosevelt; Weimar and Celle captured; 16 Nuremberg entered; German battleship *Lützow* sunk; 25 Berlin surrounded by Russian troops; 26 Stettin, Bremen, Brno and Verona occupied; Goering relieved of his command of the Luftwaffe; 1,050 Rocket bombs fell on Southern England—killing 2,754 persons; 27 Russians and Americans link up; Regensburg captured; Genoa entered; 29 Mussolini executed by Italian partisans; Venice and Milan entered; Himmler offers surrender to Great Britain and the U.S.A., which was rejected.

May 1 Turin captured; Death of Hitler announced on German radio; Munich captured; 2 German armies in Italy surrender; Berlin captured by the Russians; 3 German collapse in Northern Germany; Hamburg and Trieste taken; Rangoon and Prome captured; 4 German forces in N.W. Germany, Holland and Denmark surrender; 7 German Foreign Minister broadcast to the Germans that all

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fighting troops surrendered unconditionally; 8 End of World War II against Germany officially declared to be one minute past midnight (Tuesday); VE Day; Channel Islands liberated.

June 15 Ribbentrop captured; **26** United Nations Charter signed at San Francisco.

July 5 Polish Government in Warsaw recognised by Allies; **26** Labour Party successful in General Election; **30** Tokio district bombed by over 1,000 aircraft.

August 5 Atomic bomb first used against Japan, causing terrific devastation; Hiroshima laid waste, estimated death toll 78,150; **8** Russia declares war against Japan; **9** Russia advances into Manchuria; Nagasaki target for atomic bomb No. 2, estimated 75,000 killed and wounded; **14** Japan surrenders unconditionally to the Allies; **15** VJ Day; **21** Lend-Lease terminated; **26** Russia and China sign 30-year treaty of friendship and alliance.

September 5 Singapore re-occupied.

October 9 U.S.A. to keep secret of manufacture of atomic bomb; **15** Laval executed.

November 20 Trial of major war criminals opens at Nuremberg.

December 26 French franc devalued to 480 to £.

1946

January 31 Field-Marshal Montgomery appointed Chief of the Imperial General Staff.

February 1 Mr. Trygve Lie elected Secretary-General of UNO.

April 19 League of Nations formally wound up.

June 5 Italy votes for Republic; **8** Victory Day celebrated throughout the Empire; **29** Nuremberg Trial of Nazi war leaders ends; **30** United States atom bomb tests at Bikini.

July 13 United States House of Representatives approves loan to Britain; **15** Newton tercentenary celebrations in London; **22** Bread rationing in Britain; British H.Q. in Jerusalem blown up; **24** Under-water atom bomb test at Bikini.

August 1 Peace Conference opens in Paris; **13** Death of H. G. Wells.

September 6 United Nations F.A.O. considers establishment of World Food Board; **15** Faroes vote for Republic.

October 1 Verdict and sentences on Nazi leaders announced; **16** Nuremberg sentences on Nazis carried out, Goering commits suicide; **23** General Assembly of the United Nations opens in New York.

November 4 Council of Foreign Ministers meets in New York; **10** Communists head poll in French General Elections; **14** Death of Manuel de Falla.

December 2 Agreement signed for economic fusion of British and American zones in Germany.

1947

January 1 British coal industry nationalized; **14** M. Vincent-Auriol elected first President of Fourth Republic; **30** Great Britain endures worst snow blizzard since 1894.

February 1 The Royal Family sail for South Africa in H.M.S. *Vanguard*.

March 4 Anglo-French Treaty of Alliance signed at Dunkirk; **15** Floods in England worst ever known; **24** Netherlands Government and Indonesian Cabinet sign agreement in Batavia for a United States of Indonesia; New comet discovered by Harvard Observatory, South Africa.

April 1 School leaving age raised to 15 in Great Britain.

June 5 U.S. Secretary of State, Mr. Marshall, makes important statement on economic aid to Europe.

July 9 Betrothal of Princess Elizabeth to Lieutenant Philip Mountbatten; **18** Royal Assent given to Indian Independence Act.

August 3 Dutch military action in Indonesia ends; **15** India and Pakistan assume Dominion Status; Viscount Mountbatten appointed Governor-General of India and Mr. Jinnah Governor-General of Pakistan; **26** Russian parachutist beats international record by jump from stratosphere of over 8 miles; **29** Palestine Committee agrees British Mandate should end, majority report recommends partition.

September 22 First Atlantic automatic flight in history by U.S. pilotless aircraft.

October 4 Death of Professor Max Planck; **6** Cominform, new international Communist organization, set up in Belgrade.

November 20 Princess Elizabeth and Prince Philip, Duke of Edinburgh, married in Westminster Abbey; **25** Conference of Foreign Ministers opens in London; **29** Palestine Committee of U.N. Assembly votes in favour of partition of Palestine into Jewish and Arab States.

December 14 Russia devalues rouble and ends rationing; **15** Breakdown of 4-Power Conference on Germany; **30** King Michael of Rumania abdicates and Rumania becomes a People's Republic.

1948

January 1 British Railways nationalized; **4** Burma became independent Republic; **30** Mahatma Gandhi assassinated in New Delhi.

February 1 New Malayan federal constitution comes into force; **4** Ceylon Independence Act came into force; **25** New Czechoslovak Government formed under Communist leadership.

March 10 Death of Jan Masaryk; **13** U.S. Senate passes Aid to Europe Bill; **17** Treaty of Brussels signed by 5 Western European Powers; Belgium, France, Luxembourg, Netherlands and Great Britain.

April 1 British electricity industry nationalized; **3** Foreign Aid Bill signed by President Truman; **5** First European Aid shipments sail from America; **16** O.E.E.C. established.

May 3 Mr. Rajagopalachari appointed Gov.-Gen. of India in succession to Earl Mountbatten; **14** British Mandate for Palestine ended at midnight; Jews proclaim new State of Israel; **27** Gen. Smuts loses seat in South African election.

June 7 Dr. Benes resigns; **14** Mr. Gottwald succeeds Dr. Benes as President of Czechoslovakia; **28** Yugoslavia expelled from Cominform.

July 1 American, British and French zones of Berlin supplied by air; **5** New Social Security Services come into operation; **23** Malayan Communist party outlawed; **29** Bread rationing in Great Britain ends; XIV Olympiad opens at Wembley.

August 15 Republic of Korea proclaimed; **31** Death of Gen. Zhdanov.

September 3 Death of Dr. Benes; **4** Queen Wilhelmina abdicates after a reign of 50 years; **6** Princess Juliana invested as Queen of the Netherlands; **11** Death of Mohammed Ali Jinnah; **14** Khwaja Nazimuddin sworn in as Gov.-Gen. of Pakistan; **17** Count Bernadotte, U.N. Mediator for Palestine, assassinated.

October 17 Trafalgar Square fountains floodlit; **30** Chinese Communist forces capture Mukden.

November 3 Mr. Truman elected President of U.S.A.; Chinese cabinet resigns; **12** Greek Government resigns; **14** Birth of a son to Princess Elizabeth.

December 15 Prince Charles of Edinburgh christened; **21** Republic of Ireland Bill signed in Dublin; **28** Egyptian Prime Minister, Nokrashy Pasha, assassinated.

1949

January 1 British Nationality Act came into force.

February 1 Women's Services incorporated with Regular Forces.

March 15 Clothes rationing ends in Great Britain; **31** Russia protests against Atlantic Pact.

April 1 Newfoundland becomes part of Canada; **4** North Atlantic Treaty signed in Washington.

May 1 Vesting date for Gas Industry; **3** Ten-power conference in London establishes Council of Europe; **12** Berlin blockade lifted.

June 20 Council of Foreign Ministers which met in Paris May 23 ends with minor agreement on Germany and Austria.

July 21 North Atlantic Treaty ratified by U.S. Senate.

August 24 North Atlantic Treaty comes into force.

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September 12 Professor Theodor Heuss elected first President of West German Republic; **18** Devaluation of pound from $4.03 to $2.80; **21** General Mao Tse-Tung proclaims People's Republic of China; **23** Evidence announced of atomic explosion in U.S.S.R.; **29** Russia denounces 1945 Treaty of Friendship with Yugoslavia.

October 2 Russia recognizes newly-established Chinese People's Republic; **11** Herr Wilhelm Pieck elected first President of East German Republic; **20** Yugoslavia elected to seat on U.N. Security Council.

December 8 Chinese National Government leaves mainland and sets up H.Q. in Formosa; **27** United States of Indonesia came into being.

1950

January 6 Britain recognizes Communist Government of China; **24** Dr Rajendra Prasad elected first President of Indian Republic; **26** New Constitution of Indian Republic comes into force.

February 14 30-year treaty of alliance between Russia and China signed in Moscow; **23** Labour Party wins General Election with narrow majority.

March 5 Lord Boyd Orr warns world that communism spreads where hunger prevails; **22** First of U.S. super-fortresses arrive in Norfolk.

April 1 Italy takes over from Britain administration of Somaliland; **13** First shipment of military aid to France under N.A. Pact unloaded at Cherbourg.

May 1 New Chinese marriage law abolishes polygamy and child marriages and gives both sexes equal rights; **19** Points rationing ends in Britain after 8 years; **25** Middle East Tripartite Declaration by Britain, France, and U.S.A.; **26** Petrol rationing ends in Britain.

June 25 N. Korean troops advance into S. Korea; Security Council calls for cease fire; **27** Pres. Truman orders U.S. air, and sea forces to support S. Korea and protect Formosa; U.N. Commission in Korea proposes neutral mediator; military assistance to S. Korea endorsed by Security Council; **30** Pres. Truman authorizes use of American ground troops in Korea.

July 2 American troops land in S. Korea; **8** Gen. MacArthur designated C.-in-C. of U.N. forces in Korea.

August 1 Security Council meets under chairmanship of M. Malik, the Soviet delegate; **7** American forces in Korea open offensive and halt drive on Pusan; **15** Princess Elizabeth gives birth to a daughter; severe earthquake in Assam; **17** independence Day in Indonesia.

September 6 British troops in action in Korea; **9** Soap rationing ends in Britain.

October 9 U.N. forces across the 38th parallel in strength; **19** Sir Stafford Cripps retires from public life on account of illness; Pyongyang, N. Korean capital, captured by U.N. forces; **21** Princess Anne Elizabeth Alice Louise christened; **26** New Chamber of House of Commons opened at Westminster; **29** King Gustav V of Sweden dies.

November 2 Death of George Bernard Shaw aged 94; **6** Chinese forces from Manchuria reported fighting in Korea.

December 3 Mr. Attlee flies to Washington for talks with Pres. Truman; **4** Pyongyang occupied by Chinese; **19** Gen. Eisenhower appointed Supreme Commander of West European Defence Forces set up by Atlantic Powers; **25** Stone of Scone stolen from Westminster Abbey.

1951

January 30 U.N. Assembly rejects resolution of 12 Asian and Arab nations calling for 7-nation conference for peaceful settlement of Korean question; **31** Decree confiscating property of Alfred Krupp cancelled.

February 15 Vesting date for Iron and Steel.

April 11 Gen. MacArthur relieved of all his commands by Pres. Truman and replaced by Lt.-Gen. Ridgway; **13** Coronation Stone returned to Westminster Abbey.

May 2 Persian oil industry nationalized; Germany admitted to Council of Europe; **3** H.M. the King opens Festival of Britain from steps of St. Paul's.

June 23 M. Malik, Russian delegate to the U.N., appeals for settlement of Korean war.

July 1 Colombo plan comes into force; **9** State of war between Britain and Germany officially ended; **10** Armistice negotiations open at Kaesong; **17** King Leopold abdicates in favour of his son Baudouin, who becomes fifth King of the Belgians; **20** King Abdullah of Jordan assassinated.

September 1 Tripartite Security Treaty between U.S.A., Australia, and New Zealand signed in San Francisco; **8** Japanese Peace Treaty—to which Russia, China, and India are not parties—signed at San Francisco; Security Pact between Japan and U.S.A., providing for retention of American forces in Japan, also signed; **23** H.M. the King undergoes successful operation; **30** Festival of Britain ends.

October 8 Princess Elizabeth and Duke of Edinburgh leave London Airport for Canadian tour; **15** Egyptian Parliament passes unanimously Bills abrogating Anglo-Egyptian treaty of 1936 and 1899 Sudan Condominion Agreement; **25** General Election won by Conservatives with small majority.

November 5 Mr. Attlee receives the Order of Merit.

December 17 London foreign-exchange market reopens after 12 years; **24** Libya becomes independent state; **31** I.R.O. closes down.

1952

January 2 Mutual Security Agency replaces Economic Co-operation Administration; **31** Princess Elizabeth and Duke of Edinburgh leave London on first stage of Commonwealth tour.

February 6 King George VI died at Sandringham aged 56; **7** Queen Elizabeth II and the Duke of Edinburgh arrive home by air from Kenya; **15** Funeral of King George VI at Windsor; **21** Identity cards abolished.

March 20 South African Supreme Court rules invalid Dr. Malan's Act which places Cape coloured voters on separate electoral register.

April 11 H.M. the Queen declares that she wishes her children and descendants to bear the name of Windsor; **21** Death of Sir Stafford Cripps in Switzerland; **28** Japan regains status as sovereign and independent power.

May 5 H.M. the Queen takes up residence at Buckingham Palace; **27** Treaty setting up European Defence Community signed in Paris.

June 23 Power plants along Yalu River attacked by U.S. aircraft in biggest single attack of the war.

July 7 American ship *United States* wins Atlantic Blue Riband; **19** Fifteenth Olympic Games held in Helsinki; **23** Military *coup d'état* takes place in Cairo.

August 1 Ratification of Bonn Agreement, by which W. Germany again becomes independent nation, and Treaty of Paris, which sets up the European Defence Community, approved by Government against Labour opposition; **16** Severe thunderstorms in Somerset and N. Devon cause rivers to flood; W. Lyn changes course bringing devastation to Lynmouth; **26** Passive resistance campaign against racial laws in S. Africa gains momentum.

September 2 Sir William Slim appointed Gov.-Gen. of Australia (from 1953); **8** New Egyptian Cabinet appoints Gen. Neguib military Gov.-Gen. of Egypt and approves land reforms.

October 3 Britain's first atomic weapon exploded in Monte Bello Islands, off N.W. Australia; **5** Tea derationed and decontrolled; **20** State of emergency declared in Kenya as a result of Mau Mau activities.

November 1 Reported explosion of U.S. hydrogen bomb at Eniwetok atoll in mid-Pacific; **4** Gen. Eisenhower, Republican Candidate, wins sweeping victory in American Presidential election.

December 29 Fish recently caught off Madagascar confirmed as species of the prehistoric Cœlacanth.

1953

January 20 Inauguration of General Eisenhower as 34th President of the United States; **31** Violent

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N.E. gales combined with surging high tides caused extensive flooding with loss of life along coasts of eastern England, the Netherlands, and Belgium.

February 4 Sweet rationing ended; **23** War-time deserters in Britain granted amnesty.

March 6 Marshal Stalin died, aged 74; **24** Death of Queen Mary at Marlborough House, aged 85; **31** Hr. Dag Hammarskjöld elected U.N. Sec.-Gen. in succession to Mr. Trygve Lie.

April 15 Dr. Malan's National Party again returned to power in S. Africa with increased majority; **24** Mr. Churchill created a Knight of the Garter by the Queen.

May 4 Duke of Edinburgh received his pilot's "wings"; **29** E. P. Hillary and Sherpa Tenzing of the Everest Expedition led by Colonel John Hunt reached summit of Everest (29,002 ft.).

June 2 Coronation of H.M. Elizabeth II in Westminster Abbey amid scenes of magnificent pageantry; ceremony televised; **26** Republic of Egypt accorded *de facto* recognition by Britain.

July 4 German–Austrian Expedition reached summit of Nanga Pambat in the Himalayas; **13** De-nationalisation of British steel industry; **14** Royal Assent given to Central African Federation Bill; **27** Armistice signed at Panmunjom.

August 9–12 Disastrous earthquakes in Greek Ionian Islands; **12** Explosion of Russian hydrogen bomb reported.

September 17 Bank rate reduced from 4 to 3½ per cent; **23** Royal Commission on Capital Punishment recommended that juries should decide whether death sentence or life imprisonment should be imposed on prisoners found guilty of murder, and that the M'Naghten Rules on insanity should be abrogated or amended; **26** Sugar rationing ended after nearly 14 years; **30** Professor Piccard in his bathyscaphe dived 10,000 ft. off Italian coast.

October 15 Sir Winston Churchill awarded 1953 Nobel Prize for Literature.

November 11 Great bell at Notre Dame rung by electricity for first time; **21** Piltdown skull, discovered in Sussex in 1911, found by anthropologists to be partial hoax; **23** The Queen and Duke of Edinburgh left in stratocruiser *Canopus* on first stage of 6-months' tour of Commonwealth.

December 1 Agreement signed for laying first transatlantic telephone cable; **23** M. René Coty elected Pres. of France at the 13th ballot; L. P. Beria, former chief of Soviet Secret Police, and six associates sentenced to death and shot; **25** The Queen gave her Christmas broadcast from Auckland; **31** Mildest December for 20 years, and before that for over 200 years.

1954

January 9 Self-government began in the Sudan; **12** M. Le Trouquer (Socialist) elected President of French National Assembly on retirement of M. Herriot; **16** M. René Coty became President of France in succession to M. Vincent Auriol; **31** Intense cold covered most of Europe.

February 3 The Queen and the Duke of Edinburgh arrived in Australia; First Parliament of newly formed Federation of Rhodesia and Nyasaland opened in Salisbury; **5** Britain's first "breeder" pile in operation at Harwell.

March 1 American hydrogen bomb exploded at Bikini; **22** London gold market reopened after 15 years.

April 1 The Queen and the Duke of Edinburgh left Australia; **3** Oxford won 100th Boat Race; **21** Russia joined UNESCO; **26** Conference on Far East opened in Palais des Nations, Geneva, Mr. Chou En-lai representing China; Russia joined I.L.O.

May 6 Roger Bannister ran the mile in under 4 min., the first man in the world to do so; **7** Fortress of Dien Bien Phu fell to Viet-Minh after siege of 8 weeks and final battle of 20 hours; **11** Bank rate reduced from 3½ to 3 per cent; **15** The Queen and the Duke of Edinburgh returned from their six-months' tour of the Commonwealth; **18** Liverpool Cotton Exchange re-opened

June 1 Television licence fee raised from £2 to £3 a year; **2** Mr. John A. Costello (Fine Gael) elected Prime Minister of Ireland; **17** Indo-Chinese crisis brought M. Mendès-France to power in France; **22** First all-African Cabinet in British Africa appointed in the Gold Coast; **27** First electric power station using atomic energy began working in Soviet Union; **30** Eclipse of the sun.

July 3 All food rationing ended in Britain; **8** Mr. Nehru opened the world's longest canal (Bhakra–Nangal hydro-electric project); **27** Agreement reached in Cairo for withdrawal of British troops from Suez Canal Zone; **31** K2 (Mount Godwin Austen), second highest peak in the world, climbed by Italian team led by Prof. Ardito Desio of Milan Univ.

August 5 Persian oil dispute settled; **11** Cessation of hostilities in Indo-China after 8 years of fighting.

September 14 Sheffield–Manchester electrified railway opened.

October 14 Mr. Anthony Eden created a Knight of the Garter by the Queen; **19** Anglo-Egyptian Suez Canal Agreement.

November 1 French settlements in India passed under Indian control; **22** Death of Andrei Vyshinsky; **30** Sir Winston Churchill celebrated his 80th birthday and was presented by both Houses of Parliament with a portrait of himself by Graham Sutherland.

1955

January 27 Bank rate increased from 3 to 3½ per cent; **31** Princess Margaret left for tour of W. Indies.

February 8 Marshal Bulganin succeeded Mr. Malenkov as chairman of the Soviet Council of Ministers; **15** Plans to build 12 atomic power stations in Britain during next 10 years announced; **17** Britain to proceed with manufacture of hydrogen bombs; **24** Bank rate raised to 4½ per cent and restrictions on hire purchase announced; Dr. Albert Schweitzer appointed honorary member of the Order of Merit; Turco–Iraqi pact signed at Baghdad (Britain, Pakistan, and Persia acceded later).

April 5 Sir Winston Churchill resigned as Prime Minister; **6** Sir Anthony Eden succeeded as Prime Minister; **18** Afro-Asian conference (29 nations) opened at Bandung; Death of Dr. Albert Einstein; **29** Signor Gronchi elected President of Italy.

May 5 Ratification of London and Paris agreements completed; Germany attained full sovereignty and Western European Union came into being; **26** British general election resulted in Conservative majority of 59.

June 15 U.S. and Britain agreed to co-operate on atomic energy; **16** Revolt against the Perón government in Argentina.

July 9 Leading world scientists issued appeal for renunciation of war because of possible effects of hydrogen bomb; **18** Four-Power conference opened in Geneva (Pres. Eisenhower, Sir Anthony Eden, M. Faure, Marshal Bulganin), the first meeting between heads of Government since Potsdam, 1945; **27** Austrian State Treaty came into force.

August 8 International conference on peaceful uses of atomic energy opened in Geneva (1200 scientists from 72 countries attended).

September 16 Universal Copyright convention came into force, bringing U.S. into agreement with European countries; **19** General Perón resigned after rebels threatened to bombard Buenos Aires; **22** Independent television service began.

October 2 City of London became a "smokeless zone"; **12** British and Soviet warships exchanged courtesy visits; **20** Syria and Egypt signed mutual defence treaty; **23** Referendum on Saar European Statute gave victory to pro-German parties.

November 5 Vienna State Opera House re-opened; **23** *Hamlet* played on Russian stage by British company, the first since Tsarist times.

December 7 Mr. Attlee announced his retirement and was created an earl; **12** Completion of 830-mile pipeline through Urals, crossing 6 rivers; **14** Mr. Hugh Gaitskell elected leader of the Parl. Labour Party; **18** Anglo–American offer of financial assistance to Egypt in building Aswan High Dam; **24** In Christmas broadcast

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the Pope spoke of need to suspend nuclear test explosions.

1956

January 1 Sudan proclaimed an independent republic; **27** The Queen and the Duke of Edinburgh left by air for 3 weeks' tour of Nigeria; 200th anniversary of birth of Mozart celebrated; Terrorist activity in Cyprus increasing.

February 1 Britain had coldest day since 1895; **13** Referendum in Malta resulted in vote in favour of integration with Britain; **16** House of Commons rejected by majority of 31 Government motion to retain death penalty; Bank rate increased from 4½ to 5½ per cent. (highest since 1932); **23** Remarkable sunflare caused increased cosmic radiation and long-wave radio disturbances; **25** M. Khrushchev in speech to Congress of Russian Communist Party denounced Stalin.

March 2 King Hussein of Jordan discharged Lieut.-Gen. J. B. Glubb; **5** Telephone weather forecast began; **9** Archbishop Makarios with leaders of Enosis movement in Cyprus deported to the Seychelles; **23** The Queen laid foundation stone of new Coventry Cathedral; Pakistan proclaimed an Islamic Republic within the Commonwealth.

April 6 Earl Attlee created Knight of the Garter; **11** Five-day week for Civil Servants announced; **18** Cease-fire between Israel and Egypt came into force; **29** French occupation of Indo-China ended after 80 years.

May 23 First atomic power station in Britain started working at Calder Hall; **24** 2,500th anniversary of the death of Buddha celebrated in India; **31** May was the sunniest month at Kew since 1922 and the driest since 1896.

June 3 Third-class travel abolished on British Railways to conform to continental practice; **13** Last British troops left Suez; **24** Col. Nasser elected Pres. of Egypt.

July 20 Britain joined U.S.A. in withdrawing offer to help Egypt finance Aswan High Dam; **26** Pres. Nasser announced nationalisation of Suez Canal Company.

August 30 French troops arrived in Cyprus.

September 25 Newly-laid submarine telephone cable linking Britain and America opened to public service.

October 3 Bolshoi Ballet danced at Covent Garden; **15** Duke of Edinburgh left on world tour; **16** Prime Minister left with For. Sec. for Paris meeting; **17** The Queen opened Calder Hall, the world's first nuclear power station for commercial use; **19–21** New liberalised policy adopted by Central Committee of Polish United Workers' Party; M. Gomulka elected first secretary; **23** Insurrection broke out in Budapest and spread throughout country; **28** Pres. Eisenhower called upon Israel not to "endanger the peace"; **29** Israeli forces invaded Egypt and after 5 days' fighting had control of Sinai peninsula, heavy fighting at Abu Aweigila; **30** Britain and France issued 12-hour ultimatum to Israel and Egypt to cease fighting; Britain and France vetoed US resolution in Security Council calling upon Israel to withdraw behind armistice line; **31** Anglo-French offensive launched against military targets in Egypt.

November 2 UN Gen. Assembly called for immediate cease fire in Egypt; **4** Canadian resolution calling for international UN force for Middle East adopted; Soviet forces launched attack on Budapest to crush uprising; **5** Anglo-French airborne troops landed at Port Said; **6** Seaborne troops landed at Port Said; Pres. Eisenhower re-elected President with Congress controlled by Democrats; Anglo-French forces ceased fire at midnight; **7** Egypt accepted cease fire on UN conditions; **15** UN Emergency Force left Naples for Suez; **16** Suez Canal blocked by 49 ships; **17** First refugees from Hungary arrived in Britain; **22** Duke of Edinburgh opened 16th Olympic Games in Melbourne; **23** Sir Anthony Eden flew to Jamaica for rest cure; **24** UN for third time called upon Britain, France, and Israel to withdraw troops from Egypt.

December 5 140 people arrested in S. Africa for alleged treason; Anglo-French forces began to leave Port Said; **19** Lord Radcliffe's proposals for a constitution for Cyprus published; **29** Suez Canal clearing operation by UN salvage fleet began.

1957

January 1 Anglo-Egyptian treaty of 1954 abrogated by Pres. Nasser as from October 31, 1956; Saar became tenth *Land* of German Federal Republic; Road Traffic Act came into force; **5** Eisenhower Doctrine for Middle East announced; **9** Resignation of Sir Anthony Eden as Prime Minister; **10** Mr. Harold Macmillan appointed Prime Minister; **16** Sadlers Wells Ballet group combined to form The Royal Ballet; Death of Signor Toscanini; **20** Mr. Gomulka's National Unity Front overwhelmingly returned in Polish general election; **26** Formal integration of Kashmir with India; **31** Trans-Iranian oil pipeline from Abadan to Teheran (600 m.) completed.

February 7 Bank Rate reduced from 5½ to 5 per cent; **15** Mr. Gromyko replaced Mr. Shepilov as Soviet Foreign Minister; **16** The Queen flew to Portugal on State visit and joined Duke of Edinburgh there who had just completed World tour; **22** Duke of Edinburgh granted title of Prince of the United Kingdom; **26** Indian resolution adopted by UN for "peaceful, democratic, and just solution" of Cyprus problem.

March 1 Mass protest in Tokio against nuclear weapon tests in Pacific; **5** Fianna Fail party under Mr. de Valera secured absolute majority in general election; **6** Ghana celebrated independence; Israeli withdrawal from Sinai completed; **11** Warning by WHO of genetic effects of radiation; **13** Anglo-Jordanian treaty of 1948 ended; **21** Homicide Act in force (death penalty retained only for five categories of "capital murder"); **25** European Common Market and Euratom treaties signed by France, Germany, Italy, and Benelux countries.

April 3 British Labour Party called for abolition of H-bomb tests; **4** No further call-ups for National Service after 1960; **8** The Queen and Prince Philip arrived in France on State visit; **9** Suez Canal cleared and opened to all shipping; **11** Agreement signed in London granting full internal self-government to Singapore from Jan. 1, 1958; **17** Archbishop Makarios arrived in Athens from exile; During the month appeals were made by the Pope, Dr. Schweitzer and Mr. Nehru for the banning of nuclear tests and weapons.

May 14 Petrol rationing (imposed 17.12.56) ended; **15** First British H-bomb exploded in Central Pacific near Christmas I.; **16** M. Spaak succeeded Lord Ismay as NATO Sec. Gen.; **18** The Queen and Prince Philip left for State visit to Denmark; **20** Death of Dr. Gilbert Murray.

June 1 New Copyright Act came into force; First drawing of Premium Bond prizes; **17** Historic decisions taken by US Supreme Court on matters relating to civil liberties; **19** Completion of British H-bomb tests in Pacific; **30** The IGY opened at midnight.

July 1 Women voted for the first time in Egypt's first general election since revolution of 1952; **17** Electricity Bill enacted appointing new Central Electricity Generating Board and Electricity Council in place of Central Electricity Authority; **18** President Mao Tse-tung's famous "Let 100 flowers blossom and 100 schools of thought contend" speech published; **25** Tunisia declared a republic; **31** Federation of Malaya Independence Act received Royal Assent.

August 1 Sir Christopher Hinton appointed chairman of new C.E.G.B., responsible for new nuclear power stations; **31** Royal Charter granted to Tangier by King of Morocco.

September 6 Disarmament discussions in London ended without agreement; **15** German general election (Dr. Adenauer re-elected Chancellor Oct. 22); **19** Bank Rate raised from 5 to 7 per cent.; **20** Death of Jean Sibelius, the Finnish composer; **30** Network Three introduced by B.B.C.

October 4 First earth satellite launched by Russia

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(180 lb. sphere, 23 in. diameter); **10** U.S.A. abolished fingerprinting for foreign visitors staying less than a year; **11** Largest radio telescope in world went into operation at Jodrell Bank for Manchester University; **14** The Queen opened Canadian Parliament in Ottawa; New road-rail double-decker bridge over Yangtse, one of largest in world, opened to traffic; **17** Endorsement of cheques no longer necessary save when negotiated.

November 3 Second earth satellite weighing half a ton launched into space by Russia with dog on board; **16** Russia announced construction of "scientific city" of 12 research institutes in Siberia; **20** Britain's first export order for nuclear power station for Northern Italy announced.

December 1 Latin 26-letter alphabet to be adopted in China; **4** Ninety people killed in railway accident in fog at Lewisham; **6** Attempt to launch earth satellite in the U.S.A. failed; *Sputnik I* completed its thousandth circuit of the Earth; **25** The Queen's Christmas broadcast televised for the first time; **31** The *Sputniks* were still circling the Earth, the first being expected to fall in the first days of January.

1958

January 1 Treaties establishing EEC (Common Market) and EAEC (Euratom) came into force; Metric system of weights and measures adopted throughout Japan; **3** Inauguration of West Indian Federation; Sir Edmund Hillary and New Zealand party reached South Pole; **4** *Sputnik I* disintegrated after completing 1,367 circuits of the Earth and travelling 43 million miles; **6** First non-stop flight across Antarctica by single-engine British aircraft (1,600 miles in 10 hr. 57 min.); Mr. Thorneycroft resigned from Government after disagreement in Cabinet over pruning Budget estimates; **7** Mr. Macmillan left for six-week tour of Commonwealth; **8** Summit talks proposed by Marshal Bulganin and Notes sent to 19 States; **13** Over 9,000 scientists from 44 countries petition UN Sec. Gen. to end nuclear weapons tests; **20** Dr. Vivian Fuchs, leader of Commonwealth expedition, reached South Pole; **24** Announcement that Harwell scientists working with ZETA had passed first milestone on road towards power from nuclear fusion; **28** Abolition of licensed prostitution in Italy; **31** First American earth satellite *Explorer I* (30·8 lb.) successfully launched.

February 1 Union of Egypt and Syria in the United Arab Republic; **5** Continuation of Antarctic research for at least 5 years after end of IGY announced; **8** French aircraft bombed Tunisian frontier village of Sakhiet; **14** Merger of Iraq and Jordan under name of Arab Federation; **19** Worst colliery disaster in Indian history in West Bengal; **25** Restoration plans for Stonehenge announced; Campaign for Nuclear Disarmament launched under presidency of Lord Russell.

March 2 IGY Commonwealth Trans-Antarctic Expedition, led by Dr. Vivian Fuchs, completed first crossing of Antarctic (2,200 miles in 99 days); **8** Federal union between UAR and Yemen established; **14** Birth of Prince Albert of Monaco; Small test satellite, *Beta 1958*, successfully launched by US Navy; **20** Bank rate reduced from 7 to 6 per cent; **21** Opening of London planetarium, the first of its kind in Britain; **26** Third US earth satellite, *Explorer III*, successfully launched; **27** M. Khrushchev elected Prime Minister in succession to M. Bulganin; **31** Russian resolution to suspend nuclear tests; other powers invited to follow suit.

April 1 Abolition of legalised prostitution in Japan; **4** Campaign for Nuclear Disarmament organised 50-mile protest march from London to Atomic Weapons Research Establishment at Aldermaston, Berkshire; **14** *Sputnik II* disintegrated over Caribbean, having completed 2,370 circuits of the Earth and travelled 62 million miles; **17** Nationalist Party of S. Africa returned with increased majority; Sir Grantley Adams elected first Prime Minister of the new West Indian Federation; **22** Princess Margaret opened the new Federal Parliament in Trinidad.

May 1 Intense radiation belt in outer space discovered by US *Explorer* earth satellite; **10** Anti-government disturbances in Lebanon; **13** Military and colonist insurrection in Algeria; President of Italy paid state visit to Britain; **15** *Sputnik III* launched under IGY programme; New college to be built at Cambridge University (Churchill College); **22** Further reduction in Bank Rate to 5½ per cent.; **24** Nuclear reactor at Dounreay began working; **29** General de Gaulle accepted invitation to form a "Government of national safety."

June 1 General de Gaulle became Prime Minister of France; Clean Air Act banning emission of dark smoke came into force; **9** Gatwick Airport opened by the Queen; **19** Further cut in Bank Rate from 5½ to 5 per cent.; New British plan for Cyprus announced; **20** London bus strike ended after 7 weeks; **21** Greek Government rejected British plan for Cyprus; **23** Ghana to be declared a republic.

July 1 Conference of scientists, including Russian delegation, met at Geneva to discuss ways of detecting nuclear tests; **14** Iraq monarchy overthrown, King Faisal assassinated; establishment of Republic announced; **15** US marines landed in Lebanon; **17** British troops flown to Amman in response to King Hussein's appeal; **24** First life barons and baronesses under Life Peerages Act named; **26** H.M. the Queen created her son, Charles, Prince of Wales; **31** British Prime Minister sent appeal to all Cypriots to end violence.

August 1 British Government recognised Republic of Iraq; **5** US nuclear submarine *Nautilus* surfaced after having passed under North Pole; **7** Litter Act came into force in Britain; **14** Bank Rate reduced from 5 to 4½ per cent.; **17** First attempt by America to launch moon rocket failed; Britain to resume nuclear tests on Christmas Island; **23** Bombardment by Chinese of Quemoy (Formosa Strait); **29** More American warships join Seventh Fleet in Formosa Strait.

September 1 International conference on peaceful uses of atomic energy opened in Geneva; **7** Britain successfully fired its first ballistic rocket (Black Knight) from Woomera; **15** Ambassadors of America and China met in Warsaw for discussions on Formosa crisis; **16** Relaxations in hire-purchase; **29** Referendum resulted in overwhelming victory for General de Gaulle; Lord Goddard retired as Lord Chief Justice; succeeded by Lord Justice Parker; Gen. Sir Francis Festing succeeded Field-Marshal Sir Gerald Templer as Chief of the Imperial General Staff.

October 1 India began change to metric system; **2** French Guinea proclaimed Republic of Guinea after overwhelming vote for independence in French referendum; **9** Death of Pope Pius XII at age of 82; **11** The London weeklies *John Bull* and *Illustrated* merged; US *Pioneer* space-rocket successfully launched (but failed to reach moon); **21** First women peers introduced to House of Lords; **28** State opening of Parliament and Queen's Speech televised; Cardinal Roncalli, Patriarch of Venice, elected as new Pope John XXIII at age of 76; **31** Conference opened in Geneva (Russia, Britain, and the United States) on suspension of nuclear tests.

November 20 Bank Rate reduced from 4½ to 4 per cent.; **21** Work started on Forth road bridge, the largest suspension bridge in Europe; **27** Russian plan for withdrawal of troops and demilitarised free Berlin.

December 8 Last of four nuclear reactors at Calder Hall brought into operation; **17** Chinese leader, Mao Tse-tung, to resign as chairman of Republic but to retain party office; **18** US 4-ton missile fired into orbit; Empire Day to be known in future as Commonwealth Day; **21** General de Gaulle elected President of France; **27** Partial convertibility between £ and $ announced; UAR and Russia signed agreement on Russian co-operation in Aswan high dam project; **28** General de Gaulle announced devaluation of the franc; **31** IGY officially came to an end.

A.D.

1959

January 1 Batista Government in Cuba overthrown by revolutionary movement under Dr. Fidel Castro; **2** Russia launched planet round the sun (*Lunik I*); **3** Alaska became 49th state of American Union; **4** Mr. Mikoyan, Soviet Dep. Prime Min., arrived in Washington on 16-day visit; Rioting in Leopoldville; **7** Britain recognised new Cuban Government; **8** Gen. de Gaulle installed as first Pres. of Fifth French Republic; **10** Russian proposal for conference of 28 nations to draw up German Peace Treaty; **17** First European Congress for Nuclear Disarmament met at Westminster; **20** Duke of Edinburgh left on world tour; **25** Oecumenical Council, the first since 1870, convened by Pope John XXIII.

February 1 Votes for women rejected by Swiss national poll; **9** University grants to be increased by £8 million 1960–62; New research reactor to be built at Windscale, Cumberland; **11** M. Vincent Auriol resigned from French Socialist Party; **19** Four-year dispute over Cyprus settled at London round-table conference; **20** Disturbances in Nyasaland; **21** Mr. Macmillan arrived in Moscow on official visit; **23** Archbishop Makarios returned to Cyprus after 3-year exile; Cyprus to become a republic with Greek Pres. and Turkish Vice-Pres.; **26** State of emergency declared in Southern Rhodesia; **27** Riots in Malta dockyard due to dismissal of workers.

March 3 American *Pioneer IV* went into planetary orbit round sun; State of emergency declared in Nyasaland; British scientists isolated basic molecule of penicillin; Northern Nigeria became self-governing; **17** Uprising in Lhasa against Chinese rule; Flight of Dalai Lama to India; **24** Iraq withdrew from Baghdad Pact.

April 5 Panchen Lama arrived in Lhasa to take over local government of Tibet; **8** Chair of Criminology founded at Cambridge; **14–16** Worst flood disaster of century in S. America; **15** Resignation of J. Foster Dulles as Sec. of State; succeeded by Mr. Christian Herter; **23** British heart specialists in Moscow to demonstrate heart surgery; **25** St. Lawrence Seaway, linking Great Lakes to North Atlantic, opened to ocean-going vessels; **27** Liu Shao-ch'i succeeded Mao Tse-tung as Chairman (President) of Chinese People's Republic.

May 1 Opening of Rajendra Bridge (6,074 ft.) over Ganges at Hathidah (Bihar); **2** First Scottish nuclear power-station opened at Chapelcross; **7** Local elections in Britain showed Conservative gains; **11** Foreign Ministers' Conference opened in Geneva; **15** Jodrell Bank radioed message to United States via moon; **16** Cambridge Univ. to abolish Latin and Greek as compulsory entrance subjects; **28** Opening of Mermaid Theatre in City of London; **30** Auckland Harbour Bridge officially opened; **31** World's population (2,800 millions) increasing at rate of 45 millions a year.

June 3 Self-government in Singapore; **8** U.S. Post Office made first successful delivery of mail by guided missile; **15** British printing strike began; **17** Mr. de Valera elected Pres. of Rep. of Ireland; Serious riots in African townships in Durban; **18** Five-year plan for Scottish Highlands announced; **23** Iraq withdrew from Sterling Area; **24** World record price (£275,000) paid at Sotheby's for Rubens' *The Adoration of the Magi*; **26** St. Lawrence Seaway formally opened by the Queen and Pres. Eisenhowever; **28** Restoration of Iona Abbey celebrations in Scotland; **29** Norwegian Halden nuclear reactor in operation; **30** U.K. hire purchase debt for June record (£763 million).

July 3 Italy to build nuclear submarine *Guglielmo Marconi*; Tancarville road bridge near Le Havre, longest suspension bridge in Europe, opened; **4** Transatlantic record flight set up by Vickers *Vanguard* turbo-prop airliner (2,500 m. in 5½ hrs.); **5** Recovery in good condition of 3 animals from outer space; **7** Litter Act passed making it an offence to drop litter (fine up to £10); **21** Launching of first nuclear merchant ship *Savannah* by Mrs. Eisenhower; **23** Vice-Pres. Nixon of U.S. arrived in Moscow on visit; **28** £100 tax-free annuity for V.C. holders.

August 16 The Street Offences Act came into force; **21** Baghdad Pact renamed Central Treaty Organisation; **22** First round-the-world service by British airliners inaugurated; **23** Announcement of plan for oil-pipeline network between Soviet Union and East European countries (completion 1963); **27** Pres. Eisenhower in Britain on 5-day visit; Mr. Nehru reported seizure of Indian outposts by Chinese forces; **30** Dalai Lama appealed to U.N.

September 7 Governments of Britain, France, America, and Russia decided to set up new 10-Power disarmament committee to meet at Geneva in March 1960; **11** British loan made available for Malta dockyard; New England to France cross-Channel record set up by Brazilian (12 hr. 49 min. 40 sec.); **13** Russia launched *Lunik II* which landed on moon; **15** Soviet atomic icebreaker *Lenin* made maiden voyage into Baltic; Mr. Khrushchev arrived in New York on 2-week visit; **25** Mr. Bandaranaike, Prime Min. of Ceylon, assassinated; **27** Typhoon in W. Japan (5,000 killed and missing, 1,000,000 homeless); **30** Mr. Khrushchev in Peking for 10th anniversary of Chinese revolution.

October 4 Russia fired *Lunik III*, which took photographs of back of moon; **8** General Election returned Conservatives with 100 overall majority; **10** End of one of longest droughts ever recorded in Britain; **24** Opening of new airport for Wellington, N.Z.; **29** Britain repaid American loan of $250 million 5 years ahead of time; Dublin's famous Abbey Theatre to be rebuilt (destroyed by fire 1951); **30** Soviet Union to spend equivalent of £3,000 million on scientific research in 1960.

November 1 Basic travel allowance for British tourists ended (foreign currency up to £250 a year and further amounts on application to Bank of England); **2** First section of London–Yorkshire motorway (M1) opened to traffic; **5** Philip Noel-Baker awarded Nobel Peace Prize; **8** Sudan and U.A.R. signed agreement on distribution of Nile waters; **17** Announcement of discovery by American scientists of submarine plateau in Arctic Ocean; **19** Bank of England announced introduction of new series of bank notes (10*s*., £1, £5, £10); **12** National Gallery to lend Dublin the Lane pictures; **14** Dounreay fast breeder reactor went into operation; **17** Dr. Adenauer in London for talks; **21** British book exhibition opened in Moscow; **24** CERN's proton synchrotron at Geneva went into full operation generating 24,000 million electron volts (24 GeV.); **27** Duke of Edinburgh opened Ghana's Academy of Learning in Accra; **28** Naval dockyard at Hong Kong closed after 80 years; **30** Inauguration of Italy's first nuclear research reactor; Pink Zone traffic plan went into operation in London.

December 1 Anglo-Russian cultural agreement signed in London; 12-power treaty on Antarctica signed in Washington; State of emergency in Cyprus ended; Bursting of dam at Fréjus killed 384 people; Pres. Eisenhower began tour of Europe, Asia, and Middle East; **5** Opening of 400-mile Sahara pipeline by French Prime Minister; **6** Inauguration of Panchet Hill Dam on Damodar R., Bihar; **9** Diplomatic relations between Britain and Egypt resumed at level of chargés d'affaires; **10** Raising of school-leaving age to 16 recommended by Crowther Report; **13** Poland elected member of Security Council for 1960; **14** Archbishop Makarios elected first Pres. of Cyprus; **15** New world speed record of 1,520 m.p.h. set up by U.S. Air Force pilot; **21** Marriage of Shah of Persia to Miss Farah Diba; **22** Purchase by Japan of British nuclear reactor; **26** Soviet Antarctic expedition reached South Pole; **28** Jugoslavia's first nuclear reactor went into operation; Tokyo reported that in 1959 38 people died in hospital from 1945 Hiroshima atomic bomb attack; **30** East–West summit conference fixed for May 16, 1960.

HISTORICAL CALENDAR (1961)

JANUARY

1 New Year's Day. Circumcision. Elizabeth Blackwell admitted to British Medical Register, the first woman to be so, 1859. Federation of Australia, 1901. Old Age Pensions inaugurated, 1909. Horizontal left to right printing adopted in Chinese newspapers, 1956.

2 Russian rocket launched to become first artificial planet of the sun, 1959.

3 Federation of The West Indies created, 1958.

4 Burma became a Republic, 1948. Trans-Mongolian Railway completed, 1956.

5 Eisenhower Doctrine for the Middle East promulgated, 1957.

6 Epiphany. Twelfth Day. Joan of Arc b. 1412.

7 Britain lost Calais to the French, 1558. First balloon crossing of English Channel, 1785. First telephone service, New York to London, 1927.

8 Galileo d. 1642.

9 Davy miners' safety lamp in use, 1816. Metropolitan Railway opened, the first underground, 1863. Shackleton reached the then "furthest south," 1909.

10 Rowland Hill's scheme of penny postage adopted in Britain, 1840. League of Nations founded, 1920.

11 Ezra Cornell, philanthropist and founder of Cornell University, b. 1807.

12 Aeronautical Society of Great Britain formed, 1866.

13 Hirakud Dam, longest in world, opened, Orissa, 1957.

14 Dr. Albert Schweitzer b. 1875.

15 British Museum opened, 1759. London University degrees opened to women, 1878. Medical benefit under National Insurance Act began, 1913.

16 Prohibition introduced in United States, 1920.

17 John Ray, "father of English natural history," d. 1705. Benjamin Franklin b. 1706.

18 Captain Scott reached South Pole, 1912.

19 Sir Vivian Fuchs reached South Pole, 1958.

20 Simon de Montfort summoned first representative assembly of Parliament, 1265.

21 American atomic submarine, *Nautilus*, launched, 1954.

22 First mail steamer, Calais to Dover, 1822. First (minority) Labour Government, 1924.

23 First use of radio message at sea, following collision of vessels off Nantucket, 1909.

24 Beginning of Boy Scout Movement, 1908. Naval Battle of Dogger Bank, 1915.

25 Conversion of St. Paul. Robert Burns b. 1759.

26 Foundation Day, Australia, 1788. Death of General Gordon at Khartoum, 1885. India proclaimed a Republic, 1950.

27 Mozart b. 1756. Verdi d. 1901.

28 Official announcement on nuclear fusion, 1958.

29 Victoria Cross instituted, 1856.

30 Charles I executed, Whitehall, 1649. Early lifeboat launched at South Shields, 1796. Hitler became German Chancellor, 1933. Assassination of Mahatma Gandhi, 1948. Demonstration of colour television to both Houses of Parliament, 1957.

31 Jupiter C rocket, with first American earth satellite *Explorer*, launched at Cape Canaveral, Florida, 1958.

FEBRUARY

1 Publication of *New* (later *Oxford*) *English Dictionary* began, 1884. National Employment Exchanges opened, 1910.

2 Purification. Candlemas. Treaty of Guadalupe Hidalgo whereby Texas, New Mexico, Arizona, and California became members of the U.S.A., 1848. Agreement for Government to take over national telephone system, 1905.

3 First Parliament of Rhodesia and Nyasaland opened, 1954.

4 Ceylon Independence Day (1948). Yalta Conference (America, Britain, and Russia), 1945.

5 First "breeder" pile in operation at Harwell, 1954.

6 George VI d., Elizabeth II succeeded, 1952.

7 Charles Dickens b. 1812.

8 Mary, Queen of Scots, executed at Fotheringhay, 1587.

9 Nevil Maskelyne, astronomer royal, d. 1811.

10 Samuel Plimsoll, "the sailors' friend," who introduced the Plimsoll mark, b. 1824. Rt. Hon. Harold Macmillan b. 1894.

11 Inaugural meeting for the formation of London University, 1826.

12 Charles Darwin b. 1809. Abraham Lincoln b. 1809. China became a Republic, 1912.

13 Massacre at Glencoe, 1692. Mersey Tunnel opened, 1885.

14 Shrove Tuesday. St. Valentine's Day. First aerial post established in India, 1911.

15 Ash Wednesday. Court of International Justice opened at the Hague, 1922. Singapore surrendered to the Japanese, 1942.

16 Li Hung Chang, Chinese statesman, b. 1823.

17 Tamerlane the Great, Tartar conqueror, d. 1405.

18 Niccolo Paganini, famous violinist, b. 1784.

19 Announcement of discovery of Dead Sea Scrolls, 1948.

20 Luca della Robbia, Italian sculptor, d. 1482.

21 Verdun, 1916. Nikolai Vasilievich Gogol, Russian writer, d. 1852.

22 George Washington b. 1732. Hinkler completed his 16-day London–Australia flight, 1927.

23 Samuel Pepys, diarist, b. 1633.

24 Simplon Tunnel completed, 1905.

25 Capture of Vincennes, Indiana, by George Rogers Clark, leading to opening-up of North-West Territory, 1779.

26 Napoleon escaped from Elba, 1815. Wren d. 1723.

27 First wireless message, England to France, 1899. British Labour Party came into existence (known as Labour Representation Committee), 1900.

28 Relief of Ladysmith, Boer War, 1900.

MARCH

1 St. David's Day.

2 First crossing of Antarctic continent completed by Sir Vivian Fuchs, 1958.

3 Ghana Independence Day (1957).

4 Bank of England began to issue £1 notes, 1797. Forth Bridge opened, 1890.

5 Thames Tunnel completed, 1843. Josef Stalin d. 1953.

6 Michelangelo b. 1475.

7 Alexander Graham Bell received first patent for telephone, 1876.

8 Germans occupied Rhineland, 1936.

9 Amerigo Vespucci, from whom the American continent took its name, b. 1451.

10 Bakerloo line opened, 1906. Air speed record of 1,132 m.p.h. attained, 1956.

11 Hitler entered Austria, 1938. Lease Lend Act, 1941. Sir Alexander Fleming, discoverer of penicillin, d. 1955.

12 Russian Revolution, 1917.

13 Aid to Europe Bill passed American Senate, 1948.

14 Albert Einstein b. 1879.

15 Ides of March. Abdication of Nicholas II of Russia, 1917. Assassination of Julius Caesar, 44 B.C.

16 First meeting of Port of London Authority, 1909. Hitler occupied Czechoslovakia, 1939.

17 Brussels Treaty (Benelux countries, Britain and France), 1948. U.S. Navy vessel, *Vanguard*, put small test satellite into orbit, 1958.

18 Rudolf Diesel, German engineer, b. 1858.

19 Tolpuddle workers sentenced to transportation for trade-union activity, 1834. Sydney Harbour Bridge opened, 1932.

20 Independence of Tunisia recognised by France, 1956.

21 Thomas Cranmer burnt at the stake, 1556. Napoleonic Civil Code established, 1804. First meeting of L.C.C., 1889. New Homicide Act in Great Britain, 1957.

22 Goethe d. 1832.

23 Islamic Republic of Pakistan proclaimed, 1956.

24 Elizabeth I d., James I succeeded; Union of crowns of England and Scotland, 1603. Queen Mary d. 1953.

25 Annunciation. Lady Day. Greek Independence Day (1821). Bill for abolition of slavery introduced in Parliament, 1807. European Common Market and Euratom treaties signed at Rome, 1957.

26 Beethoven d. 1827. Suez Canal reopened to ships of up to 10,000 tons, 1957.

27 Palm Sunday. M. Khrushchev became Russian Prime Minister, 1958.

28 Surrender of Madrid to Spanish Fascist forces, 1939.

29 Act for the creation of Dominion of Canada passed, 1867.

30 Sicilian Vespers, 1282. U.S.A. purchased Alaska from Russia, 1867.

31 Good Friday. Caxton's first book in England published, 1474.

APRIL

1 R.A.F. formed, 1918. School-leaving age raised to 15 in Britain, 1947. Newfoundland became part of the Dominion of Canada, 1949.

2 Easter Sunday. Hans Christian Andersen, writer of fairy tales, b. 1805.

3 First "pony express" riders left Sacramento for St. Joseph and *vice versa*, 1860. Aeroplanes flew over Mount Everest, 1933.

4 North Atlantic Treaty signed, 1949.

5 British troops forced the Khyber Pass, 1842.

6 Commander Peary reached the North Pole, 1909. U.S.A. declared war on Germany, 1917.

7 World Health Organisation founded, 1948.

8 Ganges Canal between Ganges and Jumna rivers opened, 1854. *Entente cordiale* between Britain and France established, 1904.

9 National Gallery opened, 1838. Surrender terms agreed, American Civil War, 1865. Rt. Hon. Hugh Gaitskell b. 1906. Suez Canal opened to all shipping, 1957.

10 Copyright Act, 1710. Chartists' petition presented at Westminster, 1848.

11 Treaty of Utrecht, 1713.

12 Battle of the Saints, 1782. F. D. Roosevelt d. 1945.

13 Handel's *Messiah* first performed, Dublin, 1742. Catholic Emancipation Bill received royal assent, 1829. Fort Sumter surrendered, beginning of American Civil War, 1861.

14 Pan-American Union set up, Washington, 1890. *Titanic* disaster off Cape Race, 1912.

15 Abraham Lincoln died from assassin's shot, 1865. O.E.E.C. set up, 1948.

16 Israel State Day (1948). Prince Charles Edward defeated at Culloden, 1746. Albert Schweitzer arrived at Lambaréné to begin great medical work, 1913. George Cross awarded to Malta, 1942.

17 Syria National Day. M. Khrushchev b. 1894.

18 Paul Revere's ride, 1775. Eire became a Republic, 1949. Einstein d. 1955.

19 Battle of Lexington, beginning of War of American Independence, 1775. Darwin d. 1882.

20 *Mayflower II* sailed from Plymouth, 1957.

21 H.M. Elizabeth II b. 1926. Texas became independent of Mexico, Battle of San Jacinto, 1836.

22 Battle of the Imjin River, Korea, 1951. West Indies Federal Parliament inaugurated, 1958.

23 Shakespeare b. 1564, d. 1616. First photo-finish camera used on race-course, 1947.

24 Publication of *Boston News Letter* began, reputed first American newspaper, 1704.

25 St. Mark. Anzac Day (1915).

26 Björnstjerne Björnsen, Norwegian writer, d. 1910.

27 Charter of Department of Scientific and Industrial Research renewed, 1928.

28 Botany Bay discovered by Captain Cook, 1770. First book of Newton's *Principia* presented at the Royal Society, 1686.

29 Women admitted to examinations at Oxford, 1885. H.M. Elizabeth II inaugurated Owen Falls Dam, Uganda, making Lake Victoria largest reservoir in world, 1954.

30 George Washington became first President of U.S.A., 1789. Oil industry in Iran nationalised, 1951.

MAY

1 SS. Philip and James. Sir Christopher Wren appointed architect of St. Paul's Cathedral, 1675. Union of England and Scotland, 1707. Death of Hitler announced, 1945.

2 Authorised Version of the Bible published, 1611. Hudson's Bay Company charter, 1670. First jet passenger service opened, London to Johannesburg, 1952. Leonardo da Vinci d. 1519.

3 Poland National Day. London Library opened, 1841.

4 General Strike began in Britain, 1926.

5 Council of Europe formed, 1949. West German Federal Republic became sovereign power, 1955.

6 R. G. Bannister ran the first under-four-minute mile, 1954.

7 *Lusitania* sunk, 1915. Bank of International Settlement established, 1929.

8 Joan of Arc raised siege of Orleans, 1429. End of World War II against Germany, 1945.

9 Liberation Day, Jersey (1945). Richard Evelyn Byrd flew over North Pole, the first to do so, 1926. Parliament House, Canberra, opened, 1927.

10 Indian Mutiny began at Meerut, 1857. Central Pacific Railway opened, 1862. Winston Churchill became Prime Minister, 1940.

11 Ascension. Garibaldi landed with "the thousand" on Sicily, 1860.

12 Women admitted to London University degrees, 1874.

13 End of War in North Africa, surrender of enemy forces, 1943.

14 Liberation Day, Guernsey (1945). First vaccination against smallpox by Dr. Edward Jenner, 1796. Sir Frank Whittle flew his first jet aircraft, 1941.

15 L.C.C. electric tramways inaugurated, 1903. Austria became a sovereign state again, 1955. First British hydrogen bomb test, 1957.

16 W.V.S. formed, 1938.

17 Norway Constitution Day (1814). R.A.F. breached the Ruhr dams, 1943. Racial segregation in American schools declared illegal, 1954.

18 Present Eddystone lighthouse opened, 1882.

19 Shakespeare received patent to build a theatre, 1603.

20 Vasco da Gama reached Calicut on the Malabar coast, 1498.

21 Whitsun. Manchester Ship Canal opened, 1894. Summer Time daylight saving introduced, 1916. Charles Lindbergh flew Atlantic alone, 1927.

22 Sir Arthur Conan Doyle, creator of Sherlock Holmes, b. 1859.

23 Federal Republic of West Germany established, 1949.

24 Toleration Act, 1689. John Wesley called to his great evangelical work, 1738. S. F. B. Morse transmitted first telegraphic message, 1844. Brooklyn Bridge opened, 1883. Amy Johnson reached Darwin after 20 days' flight, 1930.

25 Argentine National Day, 1810. Bank Holiday Act, 1871. Mount Kangchenjunga climbed by Charles Evans and party, 1955.

26 Zuider Zee dyke completed, 1932.

27 Habeas Corpus Act, 1679. First Atlantic crossing by American plane, NC 4, 1919. Professor Piccard reached stratosphere, 1931.

28 Treaty to transfer French possessions in India to Republic of India, 1956.

29 Fall of Constantinople, 1453. Charles II b. 1630, re-entered London, 1660. Summit of Everest reached, 1953.

30 Joan of Arc burnt at the stake, 1431.

31 Union Day, South Africa, 1910. Big Ben clock first brought into use, 1859. Battle of Jutland, 1916.

JUNE

1 "Glorious 1st of June," commemorating British naval victory off Ushant, 1794. Clean Air Act, 1958.

2 Marconi took out his first wireless patent, 1896. C. S. Rolls flew to France and back without landing, 1910. Coronation of Elizabeth II, 1953.

3 Evacuation of British troops from Dunkirk, 1940. Atomic reactor at Harwell came into use, 1948.

4 Henry VIII met Francis I of France at Field of Cloth of Gold Conference, 1520.

5 Denmark Constitution Day.

6 First crusade reached Jerusalem, 1099. D Day, 1944.

7 Royal Exchange founded by Sir Thomas Gresham, 1566. Parliamentary Reform Act, 1832. Margaret Bondfield became first woman Cabinet Minister, 1929. Television service resumed in Britain, 1946.

8 Robert Schumann, composer, b. 1810.

9 Charles Dickens d. 1870.

10 Duke of Edinburgh b. 1921. First Oxford–Cambridge Boat Race, 1829.

11 St. Barnabas. Kamehameha Day, Hawaii. First World Children's Day, 1958.

12 Captain Cook reached England after circumnavigating the globe, 1771. Rotherhithe Tunnel opened, 1908.

13 St. Anthony. Mutiny at the Nore ended, 1797.

14 Battles of Naseby, 1645, and the Dunes, 1658.

15 Magna Carta signed at Runnymede, 1215. Benjamin Franklin proved that lightning is electricity while flying a kite, 1752. Oregon Treaty defined the boundary (49th parallel) between Canada and the U.S.A., 1846. Act to abolish newspaper stamp duty, 1855. Alcock and Brown flew across the Atlantic, 1919.

16 R.S.P.C.A. founded, 1824. First modern Olympic Games, 1894. H.M. submarine, *Andrew*, crossed Atlantic without surfacing, 1953.

17 Iceland Independence Day.

18 Battle of Waterloo, final overthrow of Napoleon, 1815. Winston Churchill's "finest hour" speech, 1940.

19 Professor Curie lectured in Paris on results of his experiments with radium, 1903. Death of Mallory and Irvine on Everest presumed, 1924. *Skylark* rocket launched at Woomera, reaching a height of 103 miles, 1958.

20 Black Hole of Calcutta, 1756.

21 W. Friese-Greene applied for patent for his cinematograph camera, 1889. Kiel Canal opened, 1895. Scuttling of German fleet at Scapa Flow, 1919.

22 Court decision that a slave who set foot in Britain became free, 1772. Haakon crowned first king of independent Norway, 1906. Germany invaded Russia, 1941.

23 William Penn's treaty of friendship with the Indians, 1683.

24 St. John Baptist. Midsummer Day. John and Sebastian Cabot discovered Newfoundland, 1497. Battle of Bannockburn, English defeated by Scots, 1314.

25 Outbreak of war in Korea, 1950.

26 United Nations Charter signed at San Francisco, 1945.

27 League of Nations Union Peace ballot, 1935.

28 Assassination of Archduke Francis Ferdinand at Sarajevo, 1914. Peace of Versailles, 1919. Berlin air-lift began, 1948. Poznan revolt in Poland, 1956.

29 SS. Peter and Paul. Press Association founded, 1868. Trade unions legalised, 1871.

30 American atom-bomb test at Bikini, 1946.

JULY

1 Dominion Day, Canada (1867). Charles Darwin read paper on Evolution to Linnean Society, 1858. Universal Postal Union founded, 1875.
2 Wiley Post and Harold Gatty flew round the world in eight days, 1931. Women enfranchised on same basis as men in Britain, 1928.
3 Founding of Quebec by Champlain, 1608.
4 Independence Day, U.S.A. (1776). Pioneer omnibus service, Paddington to Bank, 1829. First Cunard vessel, *Britannia*, began maiden voyage, 1840. Independence of Philippines, 1946.
5 Tynwald Day, Isle of Man. Thomas Cook conducted his first excursion, 1841. National Health organisation set up, 1948.
6 First all-talking picture shown in New York City, 1928.
7 Sir Thomas More executed, 1535. U.S.A. annexed Hawaii, 1898.
8 N.S.P.C.C. founded, 1884. Shelley d. 1882.
9 Argentine declared independent of Spain, 1816.
10 Howard Hughes made flight round the world in four days, 1938.
11 Robert Bruce, King of Scotland, b. 1274.
12 Orangeman's Day, Northern Ireland. C. S. Rolls, great pioneer airman, killed, 1910.
13 Public television by Baird process, 1930. Queen Elizabeth, the Queen Mother, laid foundation-stone of multi-racial University College for Central Africa, Salisbury, 1953.
14 Destruction of the Bastille, beginning of French Revolution and overthrow of *ancien régime*, 1789.
15 National Insurance Act, 1912. Family allowances began in Britain, 1945.
16 Roald Amundsen, Norwegian explorer, b. 1872. First atomic bomb detonated experimentally, 1945.
17 Bridgwater Canal, first of many in Britain, opened, 1761. Air speed record of 1,132 m.p.h. broken by prototype of English Electric P 1, 1957.
18 Secret Ballot Act, 1872. Kellogg Pact to outlaw war, 1928.
19 First woman's rights convention in the U.S.A., 1848.
20 Colombia Independence Day.
21 Belgian Independence Day (1831). U.S. atomic submarine, *Seawolf*, launched, 1955.
22 St. Mary Magdalen. Plimsoll made violent protest in Parliament on the load line for shipping, 1875. Bretton Woods Agreement completed following International Monetary and Financial Conference, 1944.
23 Prince Charles Edward landed in Scotland, 1745.
24 Capture of Gibraltar by British, 1704. Window tax repealed, 1851.
25 SS. James and Christopher. George Stephenson's first successful engine, 1814. Louis Blériot flew across English Channel, 1909.
26 Nationalisation of Suez Canal announced, 1956.
27 Bank of England established, 1694. Truce of Panmunjom, 1953.
28 Peru Independence Day (1821).
29 Spanish Armada dispersed, 1588. Puerto Rico became first American commonwealth, 1952.
30 First American Parliament met, Jamestown, 1619.
31 End of League of Nations, 1947.

AUGUST

1 Lammas. End of slavery in British possessions, 1834.
2 British Caribbean Federation Day. Death of President Hindenburg led to Hitler becoming Führer, 1934.
3 English Electric P 1 (supersonic in level flight) made its first flight, 1954.
4 H.M. the Queen Mother b. 1900. World War I broke out, 1914. American atomic submarine, *Nautilus*, passed under North Pole, 1958.
5 Sir Humphrey Gilbert took possession of Newfoundland in Queen's name, 1583. Atlantic cable completed, 1858. Atomic bomb dropped on Hiroshima, 1945.
6 Transfiguration. Motion for compulsory installation of Plimsoll mark passed, 1875. Gertrude Ederle, first woman to swim the Channel, 1926. Herbert Elliott (Australia) ran the mile in 3 min. 54.5 sec., new record time, 1958.
7 American offensive in Korea began, 1950.
8 Battle of Britain began, 1940.
9 Ashburton Treaty defining Canada–U.S. frontier, 1842. Elementary Education Act, leading to compulsory education in Britain, 1870. Atom bomb dropped on Nagasaki, 1945.
10 Greenwich Observatory founded, 1675. Smithsonian Institution, Washington, founded, 1846. First of present series of Promenade Concerts, 1895. Captain W. P. Odom flew solo round the world in 73 hours, 1947.
11 Fulton's steamship, *Clermont*, went from New York to Albany, 1807. Atlantic Charter, 1941.
12 Thomas Mann, German novelist, d. 1955.
13 Battle of Blenheim, Marlborough's first great victory, 1704.
14 Pakistan National Day (1947). First automatic telephone exchange in Britain opened at Newport, 1915. Surrender of Japan to Allies, 1945.
15 Assumption. India Independence Day (1947). Princess Anne b. 1950. Dr. Robert Koch isolated tuberculosis germ, 1881. Panama Canal opened, 1914.
16 Peterloo massacre, 1819.
17 Indonesia Independence Day, 1950.
18 British naval victory of Lagos, 1759.
19 James Watt, pioneer in the use of steam engines, d. 1819.
20 Edward Evans, 1st Baron Mountevans, Antarctic explorer with Captain Scott, d. 1957.
21 Princess Margaret b. 1930. Opening of Conference at Dumbarton Oaks leading to formation of UNO, 1944.
22 Royalist standard raised at Nottingham, beginning of Civil War, 1642. Geneva Convention for the protection of the wounded, 1864.
23 William Wallace, Scottish leader, executed, 1305.
24 Liberia created a free state, 1847. Communist party outlawed in U.S.A., 1954. Bellot Strait, North-West passage, discovered in Arctic Circle, 1957.
25 Matthew Webb swam the English Channel, 1875.
26 Battle of Crécy, 1346.
27 Heinkel jet-propelled plane flew, 1939. Russia announced successful firing of inter-continental ballistic missile, 1957.
28 First Dover–Calais submarine cable laid, 1850. First American petroleum well discovered, 1859. Inauguration of Palace of Peace at the Hague, 1913.
29 Alaska Highway, Alberta–Fairbanks, opened, 1942.
30 First announcement of Zeta regarding thermonuclear reactions, 1957.
31 Malaya Independence Day, 1957.

SEPTEMBER

1 First cable sent, Britain to America, 1858.
2 Great Fire of London, 1666.
3 Cromwell d. on anniversary of his victories at Dunbar (1650) and Worcester (1651), 1658. World War II broke out, 1939.
4 Faraday's first electric motor, 1821. First England–Australia broadcast, 1927. Wolfenden Report published, 1957.
5 First Continental Congress, Philadelphia, 1774. Singapore reoccupied, 1945.
6 Pilgrim Fathers left Plymouth, 1620.
7 *Black Knight*, first British ballistic rocket, launched, Woomera Range, 1958.
8 Malta National Day, 1565. S.E. Asia Collective Defence Treaty signed, 1954.
9 Berne Copyright Convention, 1886. First air post in Britain, 1911.
10 Battle of Pinkie, Scots defeated by English, 1547.
11 General Smuts d. 1950.
12 Henry Hudson discovered Hudson River, 1609.
13 Battle of Heights of Abraham, Quebec, death of Wolfe and Montcalm, 1759.
14 Gregorian Calendar adopted in Britain and America, 1752. Napoleon occupied Moscow, 1812. Russian *Lunik* rocket landed on moon, 1959.
15 Opening of Manchester–Liverpool Railway, 1830. Russia proclaimed a Republic, 1917.
16 Post Office Savings Bank system began, 1861.
17 Arnhem Day, 1944.
18 Dr. Samuel Johnson b. 1709.
19 Battle of Poitiers, 1356. Siege of Paris, 1870.
20 Methodist Union completed, 1932. Sibelius, Finnish composer, d. 1957.
21 St. Matthew. People's Republic of China proclaimed, 1949.
22 Sir Philip Sidney d. at Zutphen, 1586. President Lincoln proclaimed abolition of slavery in southern states, 1862. American pilotless plane crossed Atlantic by radio control, 1947. Commercial television began in Britain, 1955.
23 Japanese fisherman, first victim of hydrogen bomb tests, d. 1954. Freud d. 1939.
24 Giffard's flight in steam-driven airship, 1852. George Cross instituted, 1940. Federal troops sent to Little Rock, Arkansas, 1957.
25 Balboa, Spanish explorer, reached Pacific, 1513.
26 Dominion Day, New Zealand, 1907. British Association for the Advancement of Science founded, 1831.
27 Stockton–Darlington Railway opened for public use, 1825.
28 Battle of Marathon, 490 B.C. Landing of William of Normandy on Sussex coast, 1066. Pasteur d. 1895.
29 St. Michael and All Angels. Munich Conference seeking appeasement ended, 1938.
30 Metropolitan Police began duty, 1829. Professor Piccard descended 10,000 feet in his bathyscaphe in Mediterranean, 1953.

OCTOBER

1 London University opened, 1828.
2 Mahatma Gandhi b. 1869.
3 Britain's first atomic weapon tested, Monte Bello Islands, North-West Australia, 1952. William Morris d. 1896.
4 First Russian *Sputnik*, 1957. First Atlantic jet passenger flight in British Comet IV, 1958. Rembrandt d. 1669.
5 S. F. Cody's famous flight at Farnborough, 1908. First trans-Pacific non-stop flight, 1931.
6 William Tyndale, early translator of the Bible into English, burnt at the stake, 1536. U.S. atomic submarine surfaced after record time of 60 days submerged, 1958.
7 Battle of Lepanto at which the Christians beat the Turks, 1571. German Democratic People's Republic set up in Russian zone, 1949.
8 Professor W. C. Röntgen performed experiment which led to discovery of X-rays, 1895.
9 Cervantes b. 1547.
10 Alexei Tolstoy, Russian writer, d. 1875.
11 Jodrell Bank radio-telescope came into operation, 1957. American space rocket, *Pioneer*, launched in attempt to circle the moon, 1958.
12 Columbus discovered the New World, 1492. Nurse Edith Cavell shot by the Germans, 1915.
13 Beginning of U.S. Navy, first vessel ordered, 1775. Greenwich meridian time adopted universally, 1884. Successful helicopter flight at Farnborough, 1925.
14 Battle of Hastings, 1066. Pres. Eisenhower b. 1890.
15 New style calendar adopted in Papal countries, 1582.
16 Bishops Ridley and Latimer burnt at the stake, Oxford, 1555. Ether first used in American hospital, 1846. Harper's Ferry raid by John Brown, 1859.
17 Calder Hall atomic power station opened, 1956.
18 St. Luke. Revocation of Edict of Nantes, 1685.
19 First Bradshaw time-table published, 1839. Lord Rutherford d. 1937.
20 Battle of Navarino, 1827.
21 Battle of Trafalgar and death of Nelson, 1805. House of Lords admitted peeresses, 1958.
22 Parachute used for descent from balloon, 1797.
23 Bill to enable women to become M.P.s, 1918. Anti-Communist revolt in Hungary, 1956.
24 United Nations Day.
25 St. Crispin. Battle of Agincourt, 1415. Charge of the Light Brigade, 1854. Last London horse bus journey, 1911.
26 Erie Canal opened, 1825. First photograph of far side of moon taken by Russian moon rocket released, 1959.
27 August Wilhelm von Gneisenau, Prussian field-marshal, b. 1760.
28 SS. Simon and Jude. Harvard College founded, 1636. Statue of Liberty dedicated, 1886. First televised opening of Parliament, 1958.
29 Turkish National Day, 1923.
30 Caledonian Canal completed, 1922.
31 Hallowe'en. Martin Luther nailed his 95 theses to the door of the Church of Wittenberg, 1517.

NOVEMBER

1 All Saints. H.M.S. *Amethyst* arrived back in English port after exploits in River Yangtse, 1949.
2 All Souls. London-to-Birmingham motorway (M1) opened to traffic, 1959. G. B. Shaw d. 1950. B.B.C. television service began, 1936.
3 Sir Francis Drake returned to England after circumnavigating the globe, 1580. Second Russian *Sputnik*, with dog, launched, 1957.
4 First use of chloroform by Professor Simpson at Edinburgh, 1847. UNESCO founded, 1946.
5 Gunpowder Plot, 1605. William of Orange landed at Brixham, 1688. Florence Nightingale arrived in Scutari, 1854.
6 Passchendaele captured by the Canadians, 1917.
7 Communism established, Russian revolution under Lenin and Trotsky completed, 1917.
8 Canadian Pacific Railway opened, 1885. Milton d. 1674. Tolstoy d. 1910.
9 Lord Mayor of London's Day.
10 Stanley found Livingstone at Ujiji, 1871. Height of 13.7 miles reached in balloon by Stevens and Anderson, 1935.
11 Martinmas. Armistice Day, 1918.
12 First automatic telephone exchange in London opened, 1927.
13 Prince Henry the Navigator d. 1460.
14 Prince of Wales b. 1948. B.B.C. instituted, 1922. Statute of Westminster, defining Dominion status, 1930. Coventry blitz, 1940.
15 Brazil National Day. Rye lifeboat disaster, 1928.
16 U.S. Atomic Energy Commission announced that H-bomb had been exploded at Eniwetok Atoll, Marshall Islands, 1952.
17 Suez Canal opened, 1869.
18 Economic sanctions applied by League of Nations against Italy, 1935.
19 Lincoln made famous speech on democratic government at Gettysburg, 1863. Schubert d. 1828.
20 Jamaica Constitution Day (1944). Marriage of Elizabeth II and Prince Philip, 1947.
21 Faraday began first series of lectures, *Experimental Researches in Electricity*, 1831.
22 St. Cecilia. U.S. Congress moved to Washington, 1799.
23 First meeting of British Medical Council, 1858. Department of Scientific and Industrial Research received charter, 1916.
24 Abel Tasman discovered Van Diemen's Land, now Tasmania, 1642. Darwin's *On the Origin of Species* published, 1859.
25 Evacuation Day, New York, marking evacuation of the town by British, 1783.
26 First street railway in the U.S.A., at New York, 1832. Britain bought Suez Canal shares from the Khedive of Egypt, 1875.
27 Tehran Conference (Britain, America, Russia), 1943.
28 Magellan passed through the strait named after him, 1520. Foundation of the Royal Society, 1660. Cardinal Wolsey d. 1530.
29 John Harvard, founder of Harvard University, b. 1607.
30 St. Andrew. Sir Winston Churchill b. 1874. First photograph transmission by wireless, London to New York, 1924. Byrd flew over South Pole, 1929.

DECEMBER

1 Lady Astor became first woman M.P., 1919.
2 John Brown, pioneer of movement to free slaves in America, executed, 1859. Monroe Doctrine proclaimed, 1823. Enrico Fermi (univ of Chicago), achieved first nuclear chain reaction, 1942.
3 Advent. Mary Baker Eddy, founder of Christian Science, d. 1910.
4 Napoleon entered Madrid and abolished Inquisition, 1808.
5 Preston by-pass opened, 1958. Mozart d. 1791.
6 St. Nicholas. Treaty giving Home Rule to Ireland signed, 1921.
7 Japanese attack on Pearl Harbour, 1941.
8 England–Australia air-mail established, 1934. Chinese Nationalist Government transferred to Formosa, 1949.
9 John Milton b. 1608.
10 Royal Academy instituted, 1768. Declaration of Human Rights subscribed to by many nations, 1948.
11 Abdication of Edward VIII, 1936.
12 Marconi transmitted wireless signals across Atlantic, 1901.
13 Dr. Samuel Johnson d. 1784.
14 Women voted for first time in Britain, 1918. Amundsen reached South Pole, 1911.
15 Izaak Walton, author of *The Compleat Angler*, d. 1683.
16 Dingaan's Day, South Africa and Swaziland. Boston Tea Party, 1773. Beethoven b. 1770.
17 Wilbur and Orville Wright made their first flight, 1903. U.S. inter-continental ballistic missile successfully launched, 1957.
18 Antonio Stradivarius, maker of violins, d. 1737.
19 Albert Abraham Michelson, physicist, b. 1852.
20 South Carolina seceded from the Union, the first state to do so, 1860.
21 St. Thomas. Landing of Pilgrim Fathers, 1620. General de Gaulle became President of 5th French Republic, 1958.
22 George Eliot, novelist, d. 1880.
23 Evacuation of Walcheren Island after disastrous landing, 1809.
24 Peace of Ghent between Great Britain and America, 1814.
25 Christmas Day. Vasco da Gama landed in Natal, 1497.
26 St. Stephen. Boxing Day. Russian expedition reached South Pole, fourth party to do so, 1959.
27 St. John Evangelist. United States of Indonesia set up, 1949.
28 Holy Innocents. Tay Bridge disaster, 1879. Opening first section Aswan High Dam, 1959.
29 Thomas à Becket murdered, Canterbury, 1170. Cœlacanth caught off Madagascar, 1952. Second Fire of London, 1940.
30 Josephine Butler, social reformer, d. 1906.
31 Hogmanay. East India Company incorporated, 1600. Government took over national telephone system, 1912.

Story of 1959

THE fifties seemed to culminate with brighter hope in 1959, the last year of the decade. The cold hostility between East and West began to thaw. It was movement which cracked the old rigidity—movement of planets into space and movement of statesmen round the globe.

A Soviet planet was launched round the sun and two Luniks were fired, one of them televising back to earth photographs of the far-side of the moon. This gave the Russian leaders a mounting confidence in their technology, and this confidence seemed to impart a novel geniality into their parleys. Technical progress in both Western countries and in Russia was matched by movement of statesmen, hitherto content to be static, inditing endless Notes. Mr. Macmillan led the way by going to Russia, Mr. Eisenhower came to London, and Mr. Khrushchev went to the United States. After that, political gyrations accelerated—Mr. Eisenhower went to Paris and flew to about a dozen countries, including India.

Thus the politicians began to meet but not yet at the Summit Conference which had been talked about for a couple of years. By the end of the year, however, the date of such a meeting had been fixed for May 1960. The delay was due partly to French hesitations. In January General de Gaulle had been installed as first President of the Fifth Republic of France, and he was anxious to make his own State visits before the Conference and to receive Mr. Khrushchev.

During the year the concept of a Summit Conference was transformed. Instead of an occasion for a once-for-all agreement it was thought more feasible, perhaps, to introduce a new era of periodical summit meetings. The new circulation of statesmen and the geniality which began to be engendered took effect. Indeed, Mr. Eisenhower said he would visit Russia immediately after the first summit meeting.

A further hopeful feature of the year was the growing dislike by the smaller Powers of nuclear tests. They united to call on the nuclear Powers to continue their "voluntary discontinuance of tests." There were indeed, so far as can be known, no tests in 1959; but Mr. Eisenhower declined, at the end of year, to renew his pledge not to resume tests while the negotiations were continuing at the Geneva Conference. France had not yet made her promised (or threatened) atomic explosion in the Sahara.

Fear of war shifted to the East, where difficulties between China and India arose on Tibet and in the Himalayas. Fighting had broken out in March between Tibetans and Chinese in Lhasa, and Tibet declared itself independent. But the Chinese dissolved the Tibet Government, and the Dalai Lama flew to India for asylum. The tragic anomaly continued whereby China was excluded from the United Nations.

After bitter and costly strife the three parties to the Cyprus dispute suddenly saw the blessedness of conciliation, but in two other areas differences were aggravated. Representative government was suspended in Malta; and in Nyasaland emergency powers were taken by the Government after riots in which thirty-six Africans were killed and Dr. Hastings Banda arrested.

At home there was a dramatic turn both in industry and in politics. Unemployment fell to its normal post-war level of about 2 per cent and production increased. Mr. Macmillan chose the autumn for a General Election, and amidst a babel of mass-opinion pollsters the Conservatives were victorious for the third consecutive time, with a majority of 100 seats over all. There was a small but significant drop in the Labour vote, Scotland and the industrial north-west of England withstanding the general trend.

One of the aspects of the election which puzzled observers was the apparently slight impact on the mind of the electorate of the events in Nyasaland and the deaths caused by violence in Hola Camp in Kenya. *The Times* wondered whether this was due, in part, to an atrophy of public conscience. Does increasing well-being bring with it an indifference to the welfare of the far less fortunate? Before answering one should recall the response given to the appeal on behalf of refugees during the World Refugee Year, which began in the summer.

Certainly the year marked the end of a decade of considerable material progress. Ten years earlier Britain was still struggling out of the aftermath of war, and food was still rationed. At the end of the decade motor cars, television sets, refrigerators, and washing machines were being increasingly acquired. More importantly, the expectation of life at birth rose from 68 in 1949 to 70·5 in 1959.

Oxford University gave their women's colleges equal status with the men's. But a proposal for votes for women in Swiss Federal elections was rejected on a referendum. Two members of an all-women expedition died on Cho Oyu, a Himalayan Peak.

The Queen gave Marlborough House to the nation as a Commonwealth Centre in London; and Mr. Isaac Wolfson gave £150,000 to found a Chair of Criminology at Cambridge.

A *Daily Mail* prize for the quickest journey from Marble Arch, London, to the Arc de Triomphe, Paris, was won by Squadron-Leader Maughan in 40 minutes 44 seconds.

Among those who died during the year was a distinguished scholar who had the rare gift of being able to make technical problems clear to ordinary men and women—Professor G. D. H. Cole of Oxford. His death was a particular loss to *Pears*, for which he had contributed an outline of the economic problems of the day. Among artists who died were Sir Matthew Smith, Sir Stanley Spencer, and Sir Jacob Epstein, perhaps the greatest sculptor of the age. Literature lost Laurence Housman, a man of unusual moral courage. Grock the clown died, and the whole world recalled his skill.

Grumblers were silenced for a time by a glorious summer from early May to early October, and they soon forgot to lament that Australia had won back the Ashes. The prolonged sunshine helped to soften the difficulties and misgivings of a politically distracted world.

On Christmas eve, however, a Cologne synagogue was desecrated by anti-Semites. Followed as it was by similar outrages elsewhere, the incidents caused considerable foreboding. It was a disturbing note for the year to die upon.

Prominent People

Lives and leading achievements of distinguished
men and women of all ages and countries

Prominent People

A

Abbot, George (1562–1633), Archbishop of Canterbury in 1611, and one of the translators of the authorised version of the Bible.

Abdullah ibn Husein (1882–1951); King of Jordan; made ruler under the British mandate in 1921 and proclaimed King in 1946 when Transjordan (renamed Hashimite Kingdom of the Jordan in 1949) was created an independent state by treaty with Britain. His assassination in 1951 removed a friend of Britain and a wise and constructive statesman of the Arab world.

A'Becket, Thomas. (*See* **Becket, Thomas A'**.)

Abelard, Peter (1079–1142), mediæval philosopher and divine, born near Nantes, pupil of William of Champeaux, the most celebrated dialectician of the day. Unrivalled in philosophy, he acquired great popularity as a teacher and attained great scholastic glory. His romance with Heloïse, niece of Canon Fulbert, has been much written about and will be familiar to most readers. The Canon had Abelard castrated and they retired from the world, he to the monastery at St. Denis and she to a nunnery at Argenteuil. The correspondence between Abelard and Héloise has been published. Their remains now lie in one tomb at Père la Chaise, to which they were removed after the Revolution.

Abercrombie, Lascelles (1881–1938), English poet and critic. Professor of English Literature at London University, 1929–35; Lecturer in Poetry at Queen's University, Belfast, 1931–32. Author of many noteworthy publications.

Abercrombie, Sir (Leslie) Patrick, M.A., F.S.A. F.R.I.B.A. (1879–1957), architect and town-planner. Brother of the above. Lever Prof, of Civic Design at Liverpool, 1915–35; Prof. of Town Planning at University College, London. 1935–46. Consulted on the replanning or Plymouth, Hull, Bath, the Clyde Valley, Dublin, Addis Ababa, Colombo, and Cyprus. Produced the famous plan for Greater London, 1943.

Acheson, Dean Gooderham, A.B., LL.B. (b. 1893), U.S. Secretary of State in the Truman Administration, 1949–52.

Acton, John Emerich Edward Dalberg, 1st Baron, K.C.V.O., D.C.L., LL.D. (1834–1902), English historian and brilliant scholar; Professor of Modern History at Cambridge, 1895–1902.

Adam, Robert (1728–1792), one of four Scottish brothers, all distinguished architects. Developed a characteristic style in planning and decoration and designed many important public and private buildings and interiors. His achievements include the great aristocratic houses of Harewood, Yorks; Osterley, Middlesex; Syon, Middlesex; Kedleston, Derbyshire.

Adams, John (1735–1826), succeeded Washington as President of the United States, and was the first of the Republic's ambassadors to England.

Adams, John Couch, F.R.S. (1819–92), English mathematician and astronomer. Shared credit for discovery of the planet Neptune, 1846, with the French astronomer, Leverrier (1811–77).

Adams, Samuel (1722–1803), American statesman, known as the "American Cato," who worked all his life for American Independence and signed the Declaration (1776). He organised the "Boston Tea Party."

Addams, Jane, B.A., M.A. (1860–1935), famous American sociologist who founded Hull House, Chicago, in 1889.

Addison, Christopher, 1st Viscount, K.G. P.C. M.D., F.R.C.S. (1869–1951). After joining the Labour Party held successive Ministerial offices in 3 Labour Governments and became leader of the House of Lords. Forsook his profession as professor of anatomy at Sheffield Univ. for a political career because of his great interest in public health and social reform.

Addison, Joseph (1672–1719), achieved fame both as a writer and a politician. Held many offices under various governments; contributed to the *Tatler* started by his friend Steele and with him founded the *Spectator*. His tragedy *Cato* was a brilliant success.

Adeler, Max (1841–1915), the famous American humorist who wrote, among other works, *Out of the Hurly Burly* (1874) and *Elbow Room*.

Adenauer, Dr. Konrad (b. 1876), Chairman of the Christian Democratic Union and its founder in 1945; Chancellor of the West German Federal Republic since 1949.

Adler, Alfred (1870–1937), Austrian physician and psychiatrist and founder of the school of individual psychology. An earlier pupil of Freud, he broke away in 1911, rejecting the emphasis on sex, and regarding man's main problem as a struggle for power to compensate for feelings of inferiority.

Adrian, Edgar Douglas, 1st Baron, O.M., M.A., M.D., F.R.S., F.R.C.P. (b. 1889), Prof. of Physiology, Cambridge Univ. 1937–51; Master of Trinity Coll., Cambridge, 1951; Pres. of the Royal Society 1950–55; Pres. of the British Association, 1954; Installed as Chancellor of Leicester University, 1958. Nobel Prize for Medicine, 1932.

Æschylus (525–456 B.C.), father of Greek tragic drama. Composed seventy plays and gained the prize for dramatic excellence thirteen times.

Æsop, name famous for the fables preserved principally through Babrius (2nd century A.D.). About him nothing is known; according to legend he was a Greek slave in the 6th century B.C. who had a number of wild adventures.

Aga Khan, Sultan Sir Mahomed Shah, P.C., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O. (1877–1957), spiritual head of the Ismailis, an Islamic sect scattered over Asia and Africa. Direct descendant of the prophet Mohammed and third holder of the title "Aga Khan." He was a great lover of the turf, and was the owner of five Derby winners. Succeeded by his grandson, Prince Karim (b. 1936).

Agassiz, Louis Jean Rodolphe (1807–73), Swiss-American naturalist and authority on ichthyology. He was the author of a five-volume work on *Researches on Fossil Fishes* (1833–43), and his scientific investigations into the movements of glaciers resulted in *Studies on Glaciers* (1840). His great work, *Contributions to the Natural History of the United States*, was left unfinished.

Agricola, Gnæus Julius (A.D. 37–93), became Roman Consul of Britain A.D. 78. Strengthened the power of the Romans in this country, correeted many abuses, and did much to encourage trade and industry. Remained in Britain 7 years.

Agrippa, Marcus Vipsanius (63–12 B.C.), the greatest military commander of Rome after Julius Cæsar.

Aird, Sir John, Bart. (1833–1911), contracting engineer of eminence, associated with many great undertakings in different parts of the world, the Aswan Dam on the Nile, completed in 1902, being one of his most remarkable achievements.

Airy, Sir George Biddell, K.C.B., F.R.S. (1801–1892), Astronomer Royal (1835–1881) at Greenwich Observatory, where his brilliance and industry led to many important researches.

Akbar, Jalal-ud-din Mohammed (1542–1605), the greatest and wisest of the Mogul emperors and one of the great figures of history. He initiated economic and social reforms and succeeded in unifying his vast empire. His courts at Delhi and Agra were centres of culture and learning.

Alanbrooke, Field-Marshal Viscount, K.G., G.C.B., O.M., G.C.V.O., D.S.O. (b. 1883). Chief of Imperial General Staff, 1941–46; Chan. Queen's Univ., Belfast. Pub. *Turn of the Tide* and *Triumph in the West, 1943–46* (War Diaries edited by Sir Arthur Bryant).

Alaric I (376–410), the famous chief who led the Visigoths against the Romans, and afterwards invaded both Greece and Italy. He took Rome in 410, died the following year, and was buried with a vast treasure in the bed of the River Busento, and so that the Romans might not discover his remains, the slaves who buried him were put to death.

Alban, St., who flourished in the latter part of the 3rd century, was born at Verulamium (where St. Albans now stands) and served as a soldier under Diocletian at Rome. Later he was converted to Christianity, and was for a time a renowned preacher of that religion, finally suffering martyrdom. Offa, king of the Mercians, built a monastery to his memory near Verulamium, four or five hundred years later. St. Alban's Day in the Calendar of the Roman Church is June 22nd, and in that of the Anglican Church June 17th.

Albani, Madame (1852–1930), stage name of Marie Louise Emma Lajeunesse, Canadian operatic soprano. Made her first appearance in England at Covent Garden in 1872 and was for many years a leading prima donna, achieving great celebrity as Elsa in *Lohengrin*.

Albert, Prince Francis Augustus Charles Emmanuel, Consort of Queen Victoria (1819–1861). On his marriage with the Queen in 1840 Parliament granted him an income of £30,000 a year. The prince adapted himself with considerable success to the difficulties of his position, and gradually secured the confidence and esteem of statesmen and public alike. The great Exhibition of 1851 owed much of its success to his efforts. He died of typhoid fever in December, 1861. The Albert Memorial forms a national tribute to his memory.

Albertus Magnus, St. (1206–80), Dominican scholastic philosopher, b. Bavaria, one of the great mediaeval university teachers and the most learned man of his time. St. Thomas Aquinas was his favourite pupil. Took scientific interest in nature and made notable botanical observations.

Alcibiades (*c.* 450–404 B.C.), treacherously killed in battle at Melissa, Phrygia, was the celebrated Athenian statesman and general, pupil and friend of Socrates.

Alcock, Sir Walter Galpin, M.V.O., Mus. Doc., F.R.C.O. (1861–1947), English musician, eminent both as organist and composer of church music. He played at the Coronations of King Edward VII, King George V and King George VI. Organist to Salisbury Cathedral, 1916–47, and Professor of Organ at Royal College of Music, 1893–1939.

Alcott, Louisa May (1832–88), American authoress; the charm and naturalness of her writings made her a favourite among children's authors, and her books are still read on both sides of the Atlantic. Her most famous book, *Little Women*, appeared in 1868.

Alcuin (735–804), scholar and ecclesiastic, was a leader of the Carolingian Renaissance. His works include poems and historical and theological writings.

Aldred (d. 1069), a powerful ecclesiastic of the 11th century in great favour with the Conqueror, whom he crowned. Bishop of Worcester (1044–60), and Archbishop of York (1060–1069).

Alekhine, Dr. (Aljechin) Alexander (1892–1946), world chess champion, 1927–35, 1937–46.

Alembert, Jean le Rond d' (1717–1783), a Parisian mathematician and philosopher who achieved great eminence by his numerous scientific works, including the *Theory of the Winds* and the *Precession of the Equinoxes*.

Alexander of Hillsborough, Viscount, P.C., C.H. (b. 1885), Chan. of Duchy of Lancaster, 1951; Min. of Defence, 1946–50; First Lord of the Admiralty, 1929–31 and 1940–46.

Alexander of Tunis, Field-Marshal Earl, P.C., K.G., G.C.B., O.M., G.C.M.G., D.S.O. (b. 1891), soldier and statesman. Commander of 1st Div. at Dunkirk; C.-in-C. Southern Command, 1940–42; G.O.C. in Burma, 1942, when he conducted a masterly retreat; C.-in-C. Middle East, 1942–43, when he was largely responsible for driving the enemy out of North Africa; C.-in-C. Allied Armies in Italy, 1944; and Supreme Allied Commander, Mediterranean, 1944–45, when he successfully led a force drawn from many different nations. Gov.-Gen. of Canada, 1946–52; Min. of Defence, 1952–54.

Alexander II. of Russia (1818–1881), succeeded his father, the Emperor Nicholas, in 1855. In 1861 he emancipated 23 millions of serfs. On March 13, 1881, was assassinated by bombs thrown beneath his carriage in St. Petersburg by Nihilists.

Alexander the Great (356–323 B.C.). King of Macedon, succeeded his father Philip in 336 B.C., and from the first showed himself fitted for mighty military exploits. He conquered in turn the Thebans, the Persian Satraps, overthrew Darius, overran Syria and Phœnicia, possessed himself of all the cities along the Mediterranean, conquered Egypt, founded Alexandria, and finally retired upon Babylon, where he died eleven days later.

Alexandra, Queen (1844–1925), d. of Christian IX. of Denmark, married to the Prince of Wales (afterwards Edward VII.) on March 10,1863. Queen from Jan. 22, 1901, to May 6, 1910.

Alfieri, Count Vittorio (1749–1803), the Italian poet, was the author of twenty-one tragedies and six comedies.

Alfonso the Wise (1221–1284), a celebrated King of León and Castile, founder of the legal code which became the basis of Spanish jurisprudence, a liberal patron of literature and science, particularly of astronomy; dethroned by his son Sancho in 1282.

Alfred the Great (849–99), king of Wessex, son of Aethelwulf; succeeded his brother as king in 871 and found himself in conflict with the Danes from the outset. After six years of unsuccessful effort he took refuge in the Isle of Athelney, but the following year defeated the Danes in great force at Edington (Ethandun). Later, the Danes again invaded the country, and the rest of Alfred's reign was occupied in conflict. Besides being a great warrior he was a man of letters, a philosopher, and a very able legislator and administrator. He was buried at Winchester.

Allenby, Field-Marshal Viscount, G C.B., G.C.M.G., G.C.V.O. (1861–1936), brilliant cavalry soldier. Served on Western front, 1914–16; commanded in Palestine, 1917–18, capturing Jerusalem on December 9th, 1917. High Commissioner for Egypt, 1919–25.

Alleyne, Edward (1566–1626), a famous actor, contemporary of Shakespeare and founder of Dulwich College.

Alma-Tadema, Sir Lawrence, O.M., R.A. (1836–1912), the son of a Netherlands notary, he came to England in 1869, where he soon made a name for himself as a painter of classical pictures of great beauty of colour and delicate design.

Ampère, André Marie (1775–1836), a celebrated French mathematician who devoted himself successfully to the study of electricity and magnetism, and was the first to propound the electro-dynamic theory.

Amundsen, Captain Roald (1872–1928). Norwegian explorer, the first to navigate the North-west Passage and the first to reach the South Pole. Sailing in the fishing smack *Gjöa*, he negotiated the North-west Passage in the 3 years, 1903–6. In 1911 he sailed south in the *Fram* and reached the Pole on December 14th, 1911, a month before his English rival Scott. He failed to complete a flight across the North Pole in 1925, but succeeded the next year. He lost his life in the Arctic while attempting to rescue Nobile, who had crashed in the *Italia*. *See also* **Antarctic Exploration**, Gen. Inf.

Anacreon (*c.* 560–475 B.C.), the celebrated Greek poet whose Odes hold a high place in poetic literature.

Anaxogoras (488–428 B.C.), Greek philosopher of Ionia who came to Athens 464 B.C. He inspired Pericles and the poet Euripides with his great love of science, and is said to have been the teacher of Socrates, who, however, differed from him.

Anaximander (611–547 B.C.), Greek philosopher of Miletus in Asia Minor, pupil of Thales. He was the first among the Greeks to make geographical

maps, and to speculate on the origin of the heavenly bodies; he introduced the sun-dial from Babylon or Egypt.

Andersen, Hans Christian (1805–1875), perhaps the most gifted writer of fairy tales the world has known. *Mit Livs Eventyr* (The Story of My Life) is as interesting as his fairy tales, which include *The Ugly Duckling, The Little Mermaid, The Emperor's New Clothes, The Little Match-seller*. Born and died in Denmark.

Anderson, Elizabeth Garrett, M.D. (1836–1917), one of the first English women to enter the medical profession. Practised in London for many years. In 1908–9 was Mayor of Aldeburgh, her native town, and the first woman to be a mayor.

Andrea del Sarto (1487–1531). This celebrated son of a Florentine tailor was one of the great Italian artists of his time, known as the "faultless painter." Most of the famous galleries of the world contain examples of his magnificent fresco and other painting, mainly dealing with religious subjects.

Andrée, Salomon August (1854–1897), a Swedish explorer who attempted in 1897 to reach the North Pole by balloon, but, except for a message by pigeon despatched two days after his ascent, was not heard of again until in August 1930 a Norwegian scientific expedition led by Dr. Gunnar Horn discovered the remains of the Andrée expedition on White Island. The discovery included a log-book, sketch maps and the diaries kept by Andrée. A translation of these was published in England in 1931.

Andrew, Saint, one of the apostles of Jesus, brother of Simon Peter, whose festival is observed on November 30th. He became the patron saint of Scotland in the eighth century.

Angelico, Fra (1387–1455), a famous Italian painter of religious subjects, mostly in the form of frescoes, of which the best examples are at Florence.

Angell, Sir Norman (b. 1874), author and publicist, whose works include *The Economic Chaos* and *The Peace Treaty* (1919), *The Great Illusion* (1910) and *The Money Game* (1928). Nobel Prize for Peace 1933.

Angström, Anders Jonas (1814–74), Swedish physicist, whose life was devoted to the study of heat, magnetism and spectroscopy, and in all three he contributed greatly to scientific knowledge. The unit used for measuring the wavelength of light was named *Angstrom* in his honour.

Anne, Queen (1665–1714), Queen of Great Britain and Ireland from 1702 to the time of her death, was a daughter of James II., and succeeded William III., her cousin. During her reign England, in alliance with Austria, Holland, Prussia, Savoy, and Portugal, entered upon the War of the Spanish Succession. Anne's reign has been called the Augustan Age of Britain because of the many eminent men of letters who flourished during that period. She was the last of the Stuarts to occupy the British throne. The most important domestic event of her reign was the passing of the Act of Union with Scotland in 1707.

Anouilh, Jean (b. 1910), most successful contemporary playwright in France; writes in the French classical tradition of happiness, conflict, and suffering. Several plays have been translated into English, including *Roméo et Jeannette* (Fading Mansion), *Eurydice* (Point of Departure), *L'Invitation au Château* (Ring Round the Moon), and he has made a number of films, including *M. Vincent* and *Pattes Blanches*.

Anselm St. (1033–1109), Archbishop of Canterbury, was a native of Aosta, and succeeded Lanfranc as English Primate. He was in serious conflict with William Rufus on the question of ecclesiastical rights, and for a time suffered exile. Under Henry I., he regained power, making a compromise with that monarch which enabled him to carry on his theological work in comparative harmony. He died at Canterbury, and was canonised in 1494, his day being celebrated in the Roman Church on April 21st.

Anson, George, 1st Baron (1697–1762), a navigator of great eminence, whose *Voyage round the World* is still a popular book of adventure. He won many victories, obtained a peerage, rose to full Admiral's rank in the Navy, and served two terms as First Lord of the Admiralty.

Antoninus Pius (86–161), Emperor of Rome from A.D. 138 to 161, was the successor of Hadrian, and formed an agreeable contrast to most of the Roman Emperors, in that he endeavoured to govern more with an eye to the public well-being than his own personal pleasure. It was during his reign that the wall between the Forth and Clyde was built.

Antonius Marcus or **Mark Antony** (*c.* 83–30 B.C.), celebrated Roman Triumvir and General; a warm supporter of Cæsar; but engaged in intrigues after the latter's death, and was opposed by Brutus and Cassius. His association with the Egyptian Queen Cleopatra is the subject of Shakespeare's play. Committed suicide after defeat by Octavian.

Antony, St. (or **Anthony**) (*c.* 251–356), was a native of Upper Egypt, and according to his own account spent much time in conflict with the devil. He is one of the best-known saints of the Roman calendar, and his festival is on January 17th. He was believed to give relief to those who appealed to him when suffering from erysipelas, from which tradition the name St. Anthony's Fire is given to the disease.

Apelles, Greek painter, the most celebrated of antiquity, who flourished in the 4th century B.C. at the time of Alexander the Great. His most famous pictures, which have not survived, are of Alexander wielding the thunderbolts of Zeus and of Aphrodite rising from the sea.

Appert, Nicholas (1752–1841), sometimes known as François Appert, invented the method of preserving animal and vegetable foods by means of hermetically sealed cans or tins. He had no scientific training, but his painstaking work and countless experiments bore the mark of a true scientist. His revolutionary methods paved the way for the creation of a vast world industry which cans millions of tons of food a year.

Appleton, Sir Edward Victor, G.B.E., K.C.B., D.Sc., F.R.S. (b. 1892), physicist. From 1920 worked under Rutherford at Cambridge. His researches into the propagation of wireless waves led to a great advance in this branch of science. Awarded Nobel Prize for Physics in 1947; Pres. Brit. Ass., 1953.

Aquinas, Thomas St. (1225–1274), the "Father of Moral Philosophy," was a native of Southern Italy and came of a noble family. In 1243 he joined the Dominicans, and the remainder of his life was spent in religious pilgrimages and disputations. In 1263 he visited London. He left behind him numerous theological and philosophical writings of great power. He was canonised in 1323.

Arago, Dominique François Jean (1786–1853), a French astronomer and natural philosopher of great eminence, whose researches added much to our knowledge of electricity and magnetism. His expositions of the polarisation of light did much to advance that branch of science.

Archer, Frederick James ("**Fred**") (1857–1886), a favourite jockey for several years, winner of many leading races, his first Derby falling to him in 1877. Rode 2,748 winners during his turf career.

Archimedes (287–212 B.C.), Greek mathematician, physicist, and inventor, to whom we are indebted for his discoveries in mechanics (notably the lever), hydrostatics (floating bodies), and for the invention of the famous Archimedean screw. He lived most of his life in Syracuse, and was killed there during the siege by the Romans under Marcellus.

Argand, Aimé (1755–1803), inventor of the lamp bearing his name, which for the first time introduced a current of air to permeate and increase the power of the flame, by using a chimney glass and circular wick. He was a Swiss physician.

Ariosto, Ludovico (1474–1533), the author of *Orlando Furioso*, was one of the most celebrated of the Italian poets. In addition to his famous epic he wrote many comedies, satires and poems.

Aristeides (or **Aristides**), a Greek writer, and founder of the school of prose romance; flourished in the 2nd century B.C. His *Milesian Tales* are among the most celebrated works of fiction.

Aristides (530–467 B.C.) the Athenian general, was of noble descent, and first achieved fame at the battle of Marathon, 490 B.C. He was renowned no less for his valour than for his scrupulous

honesty and a desire to do justice to others; hence he was surnamed "the Just."

Aristippus (*c.* 435–356 B.C.), founded the Cyrenaic school of philosophy, which taught that sensual pleasure was the only happiness. He was a native of Cyrene, in Africa, but became a pupil of Socrates, and settled in Athens.

Aristophanes (*c.* 444–*c.* 385 B.C.) was one of the foremost Athenian play-writers and the greatest of the Greek comic poets. He is said to have composed fifty-four plays in all. Eleven of these only have survived. They are full of satire, and deal unsparingly with the people and institutions of his time.

Aristotle (384–322 B.C.), Greek philospher, pupil of Plato, after whose death in 347 he left Athens to become tutor to the young prince Alexander of Macedon. Subsequently at Athens he established his famous school in the garden known as the *Lyceum*, where he lectured in the *peripatos* (cloister) which gave it its name *Peripatetic*. He took the whole field of knowledge as his subject, giving it unity, and providing a philosophy which held its own for 2,000 years.

Arkwright, Sir Richard (1732–1792), was a native of Preston, and in early life a barber and travelling hairdealer. Becoming interested in mechanical problems, he set himself the task of inventing an improved cotton-spinning machine. Hargreaves' spinning-jenny was then the leading machine, but the yarn it produced could only be used for weft; it was not compact enough for warp threads. Arkwright therefore experimented until, by adopting an arrangement of rollers that moved with different velocities, he succeeded in perfecting his "spinning-frame," which successfully produced a yarn that could be used for warp as well as for weft. He took out his first patent in 1769, and entering into partnership with Mr. Jehediah Strutt, of Derby, became a manufacturer on a large scale, in 1771 establishing the first spinning-mill worked by water-power.

Arne, Dr. Thomas Augustine (1710–1778), English composer of considerable merit and of great popularity in his day. He composed numerous ballad operas, and at Drury Lane, Covent Garden, and Vauxhall organised the chief performances for long periods. His best-known opera was *Artaxerxes*, and his most popular songs were *Rule, Britannia!* and *Where the Bee Sucks*.

Arnold, Matthew (1822–1888), son of Dr. Thomas Arnold, achieved a high reputation as poet and critic. As the propounder of the principles of "sweetness and light," as well as by his graceful verse, he secured a high place amongst the literary men of the Victorian era.

Arnold, Thomas, D.D. (1795–1842), headmaster of Rugby from 1828 to his death. His influence at Rugby was such as to give that institution a supreme position among English public schools. A man of intense spiritual feeling, of a sympathetic and lovable nature, yet possessed of all the necessary attributes of scholarship, he was greatly esteemed and venerated.

Arrhenius, Svante August (1859–1927), Swedish chemist, one of the founders of modern physical chemistry. Received 1903 Nobel Prize for originating the theory of electrolytic dissociation (ionisation). Director of the Nobel Institute, 1905–27.

Arrol, Sir William (1839–1913), well-known contractor and engineer, whose firm built the Tay, Forth, and London Tower Bridges as well as the Manchester Ship Canal. Originally a piecer in a cotton-mill, and later a working blacksmith.

Artaxerxes was the name borne by several ancient Persian kings, some of whom achieved great distinction. The first Artaxerxes was the son of Xerxes, and reigned from 464 B.C. for 40 years; he was succeeded by Darius II. (424–404 B.C.), who in turn was followed by Artaxerxes II., who reigned until 358. Artaxerxes III, the last to bear the name, was a cruel and treacherous man and was poisoned in 338.

Arthur, fabled Celtic warrior of *c.* A.D. 600, the first reference to whom is in the 9th-cent. chronicle of Nennius, who speaks of his 12 victorious battles against the invading Saxons. His legend developed into a vast literature in mediaeval times, which was welded together by Sir Thomas Mallory in his great work *Morte d'Arthur*.

Arundel, Thomas, Archbishop of Canterbury (1353–1414), in the reigns of Richard II, and Henry IV, previously Bishop of Ely and Archbishop of York, and for a time Lord Chancellor. An active politician and bitter enemy of heresy.

Ashfield, Lord, P.C. (1874–1948), President Board of Trade, 1916–19; M.P. Ashton-under-Lyne, 1916–20; appointed first Chairman of the London Passenger Transport Board created in 1933.

Aske, Robert, the leader of the Pilgrimage of Grace, directed against the Reformation; executed 1537.

Asoka (273–232 B.C.), Emperor of India (*c.* 255–*c.* 237 B.C.), and the most powerful ruler of his time, his Empire extending from the Himalayas to what is now Madras. He was the first ruler to embrace Buddhism and accord it recognition. Becoming a Buddhist (*c.* 257 B.C.) he turned aside in disgust from the thought of his earlier military conquests, and attempted by missionary propaganda to spread Buddhism throughout his lands. There are some 35 valuable and interesting inscriptions on rocks and pillars, etc., mainly of religious or moral import. He gave great impetus to Buddhism by organising it as the state religion.

Asquith, Herbert Henry, 1st Earl of Oxford and Asquith (1852–1928), Liberal statesman; Home Sec. in Gladstone's 1892–95 government; Chancellor of the Exchequer in Campbell-Bannerman's government; introduced first provision for old-age pensions and succeeded as Prime Minister in 1908, which office he held until 1916. Resigned leadership of Liberal Party in 1926. His second wife, Margot (Tennant) Asquith, who died in 1945, held a high position in London society for her wit and brilliance.

Asser, a Welsh monk of the tenth century, author of a remarkable life of King Alfred.

Astor, John Jacob (1763–1848), the founder of the Astor family of millionaires, was a native of Heidelberg, and emigrating to America, went out to the North-West and began trading in furs, soon building up a large fortune, which he wisely invested in New York real estate, which rapidly increased in value.

Astor, Nancy Witcher, Viscountess, C.H. (b. 1879), widow of the 2nd Viscount Astor (1879–1952). First woman M.P. to take her seat in the House of Commons, an American by birth.

Atatürk, Kemal (1881–1938), builder of modern Turkey. A fine soldier, he defended the Dardanelles against the British in 1915 and drove the Greeks out of Turkey in 1922. President of the Turkish Republic, and virtually dictator 1923–38.

Athanasius, St. (296–373), was Bishop of Alexandria. He spent much of his time in bitter theological controversy, and was driven from Alexandria; taking refuge in the desert, he wrote numerous letters in support of Christian doctrine, and under Julian was recalled to Alexandria. The Athanasian creed is supposed to reflect his belief.

Athelstan (895–940), grandson of Alfred the Great, was crowned King of England in 925, and was the first ruler of all England.

Atherstone, William Guybon (1813–98), South African geologist and an originator of the South African diamond industry. He drew attention to the possibility of diamonds near Kimberley and in 1867 identified a crystal found near the Vaal River, thus helping to start mining development. Was for many years a member of the Cape Parliament.

Attila (406–453), King of the Huns, was a warlike leader, who achieved many conquests over the Roman forces, committing great ravages and laying large tracts of country waste. He marched through Germany and Gaul, and died as he was preparing for another invasion of Italy.

Attlee, Clement Richard, 1st Earl, O.M., K.G., P.C., C.H. (b. 1883), Prime Minister in two successive Labour Governments, 1945–51; served as Deputy Prime Minister to Mr. Churchill, 1942–45. He was educated at Haileybury and University Coll., Oxford. Called to the Bar in 1905; tutor and lecturer in social science at the London School of Economics, 1913–23. Became Mayor of Stepney in 1919, Labour M.P. for Limehouse in 1922, and Parliamentary

Leader of the Labour Party, 1935–55. During his Premiership the welfare society was established and the freedom and independence of India granted. Responsible for the system of Cabinet committee organisation. Retired in 1955 and created an Earl. His autobiography, *As it Happened*, was published in 1954.

Auber, Daniel François Esprit (1782–1871), a distinguished French composer of light operas, *Masaniello*, *Fra Diavolo*, *Le Domino Noir*, etc.

Auchinleck, Field-Marshal Sir Claude J. E., G.C.B., G.C.I.E., D.S.O. (b. 1884), Indian Army officer who was C.-in-C. Middle East, 1941–42, and the last British C.-in-C. in India, 1943–46.

Auden, Wystan Hugh (b. 1907), influential modern poet, born in England and naturalised an American. His work includes verse plays as well as poems and he edited *The Oxford Book of Light Verse*. Succeeded C. Day Lewis as Prof. of Poetry, Oxford Univ., 1956.

Auer, Leopold (1845–1930), the famous Hungarian violinist and teacher of the violin, among his pupils being Mischa Elman and Jascha Heifetz. Was Professor of the violin at the St. Petersburg Conservatory for nearly fifty years (1868–1917).

Augustine, St., of Hippo (354–430), was born at Tagaste in Africa of a pagan father and a Christian mother, but went to Rome, and under the influence of St. Ambrose became deeply religious, writing much upon doctrinal subjects. His works include *The City of God* and *The Confessions*.

Augustine, St., was the missionary monk who was sent to Britain by Gregory the Great in 597. He succeeded in converting King Ethelbert, after which he made good progress with the people generally, and became the first Archbishop of Canterbury. He died in 604.

Augustus, Caius Octavianus (63 B.C.–A.D. 14), was the first Emperor of Rome, succeeded Julius Cæsar. After a triumvirate of twelve years, in which he was associated with Mark Antony and Lepidus, he became supreme ruler and for forty-five years exercised a beneficent and powerful sway. He was a devoted patron of Horace and Virgil. The Augustan Age is still held among the most memorable in the history of letters.

Aurelius, Marcus Antoninus. *See* **Marcus Aurelius Antoninus.**

Auriol, Vincent (b. 1884), French politician. Voted against surrender in 1940, was interned and escaped to London in 1943. President of the French National Assembly, 1946, and of the Fourth Republic, 1947–54.

Aurungzib (1618–1707), the last of the Great Moguls, Emperors of Hindustan; succeeded his father Shah Jehan in 1658 and reigned until his death. He was a ruler of ability, and greatly extended his empire by conquest, but his zeal for Mohammedanism aroused the hatred of the Hindus, and when he died the disruption of the vast Mogul territory followed rapidly.

Austen, Jane (1775–1817), author of *Emma*, *Mansfield Park*, *Northanger Abbey*, *Persuasion*, *Pride and Prejudice*, and *Sense and Sensibility*. Though confining herself to the personal relations of the English middle classes, she combined artistry, accuracy, imaginative power, satiric humour, sense, and genuine feeling with the ability to create a vast range of living characters, and is often considered the most perfect English novelist.

Austin, 1st Baron, K.B.E. (1866–1941), was the well-known English motor manufacturer. He was the pioneer of the small car—the 7-horse-power car—which he put on the market in 1921.

Avenzoar (Ibn Zuhr) (*c.* 1090–1162), a Moslem physician, born in Seville, the greatest of his time. His chief work was the *Tasir*.

Averroës (Ibn Rushd) (1126–98), Arab philosopher and medical writer, born in Córdova, last and most famous thinker of Moslem Spain. He studied philosophy, theology, mathematics, medicine, and jurisprudence. His greatest works are his commentaries on Aristotle. He was a friend of Avenzoar.

Ayrton, William Edward, F.R.S. (1847–1908), English electrical engineer, inventor of a number of electrical measuring instruments. His first wife, **Matilda Chaplin Ayrton** (1846–83), was one of the first woman doctors and his second wife, **Hertha Ayrton** (1854–1923), became known for her scientific work on the electric arc and sand ripples and for her work for woman suffrage.

B

Baber or Babar (Zahir ud-din-Mahomet) (1483–1530), founder of the Mogul dynasty which ruled Northern India for three centuries, and a descendant of Tamerlane.

Bach, Johann Sebastian (1685–1750). Born at Eisenach, Germany, he became one of the greatest composers in history and has been called the father of modern music. During his appointment as organist at the Thomaskirche, Leipzig, he composed all his great devotional music, including the wonderful *St. Matthew Passion*, *The Passion according to St. John* and the Mass in B Minor. His incessant labour affected his eyes, and in 1749 he became totally blind. His family was connected with music for seven generations, of which his was the fifth.

Bach, Carl Philipp Emanuel (1714–88), third son of Johann Sebastian Bach. He is important in the history of music as founder of the symphony and sonata.

Backhaus, Wilhelm (b. 1884), a German pianist who made early and highly successful appearances as a virtuoso, and first appeared in London in 1901. One of the most gifted of present-day pianists, he became Professor of the Piano at the Royal College of Music, Manchester, 1905.

Bacon, Francis, Lord Verulam, and Viscount St. Albans (1561–1626), was one of the greatest of English philosophers and statesmen, who was Attorney-General to Elizabeth, and under James I. became Lord Chancellor. His political career was tarnished by certain acts of corruption, for which he paid the penalty, but his writings were marked by keen insight, brilliancy of language, and a depth of thought which place them in the first rank of philosophical literature. His *Novum Organum* and his *Essays* are splendid monuments of learning and wisdom.

Bacon, Roger (1214–1294), the Franciscan friar, was a man of remarkable gifts, of great learning and inventive power. In an age of darkness he was the first to insist on the importance of experiment and can claim the title of founder of experimental science. Optics, explosives, engines, mechanical flight came within the range of his researches. The invention of gunpowder has been attributed to him, but without adequate evidence. For a long time he was looked upon as an alchemist and sorcerer, though of late his discoveries have been more truly appreciated.

Baden-Powell, Lt.-Gen. Lord, O.M., G.C.M.G., G.C.V.O., K.C.B. (1857–1941), brilliant cavalry soldier, famous for his defence of Mafeking in the South African War. Founded the organisation of Boy Scouts (1908) and Girl Guides (1910) to promote good citizenship in the rising generation. Chief Scout of the World, 1921–41.

Baer, Karl Ernst von (1792–1876), Estonian biologist, founder of the science of embryology, and discoverer of the mammalian ovum.

Baffin, William (1584–1622), navigator and explorer who in 1616 discovered the bay which separates the north-east coast of British North America from Greenland, which bears his name.

Bagehot, Walter (1826–77), English economist and journalist. Editor of the *Economist*, 1860–77. Wrote three books of lasting importance, *The English Constitution*, 1867, *Physics and Politics*, 1872, and *Lombard Street*, a description of the Money Market, 1873. He was among the first to advocate the creation of Life Peers to strengthen the House of Lords.

Baird, John Logie (1888–1946), Scottish television pioneer; inventor of the televisor and the noctovisor.

Baker, Sir Benjamin, K.C.B., K.C.M.G., F.R.S. (1840–1907), an eminent engineer. He was consulting engineer to the Egyptian Government for the Aswan Dam, joint engineer with Sir John Fowler of the Forth Bridge, and engineer of the Central London Tube Railway.

Baker, Sir Herbert, K.C.I.E., R.A. (1862–1946) was an eminent architect who designed the

Bank of England, Rhodes House, Oxford, and, with the late Sir E. Lutyens, New Delhi.

Bakst, Léon (1868–1924), Russian painter who designed scenery and costumes for the Russian Ballet of Serge Diaghilev.

Balboa, Vasco Nuñez de (1475–1517), Spanish explorer, who was the first European to set eyes upon the Pacific Ocean. As a discoverer he ranks second only to Columbus.

Baldwin of Bewdley, 1st Earl, K.G., P.C. (1867–1947) (as Mr. Stanley Baldwin) was the leading Conservative politician between the two world wars and Prime Minister, 1923–24, 1924–29, and 1935–37.

Balfour, Arthur James, Earl of, K.G., O.M., P.C. (1848–1930), statesman, scholar, and philosopher. Entered Parliament as a Conservative in 1874. Prime Minister, 1902–5. He also served as First Lord of the Admiralty under Asquith and as Foreign Secretary under Lloyd George. His most notable action was issuing the Balfour Declaration on Palestine.

Balliol, John de, English baron whose widow in 1269 founded the college at Oxford which bears his name. Fought for Henry III. against Simon de Montfort. Died in exile in 1269.

Baliol, John (1249–1315), son of the above, competed with Robert Bruce for the Scottish throne, and Edward I. decided in his favour. Only reigned four years, when Edward deposed him, committing him to the Tower, and finally banished him from the country. He retired to Normandy. His son, Edward Baliol, recovered his father's kingdom in 1332, and was upheld by Edward III. whilst very unpopular by reason of his having given up the south of Scotland to the English. He renounced his title and throne in 1356, and retired to England on an annuity.

Ball, John (d. 1381), English priest and a leader of the Peasants' Revolt, after which he was excuted. Author of the couplet *When Adam delved, and Eve span, Who was then the gentleman?*

Balzac, Honoré de (1799–1850), one of the greatest of French novelists, and the author of over eighty novels to which he gave the covering title of *La Comédie Humaine*, depicting the appetites and passions of the new social class born of the revolution and Napoleon.

Bampton, John (1689–1751), an eminent divine, who founded the Oxford Bampton Divinity lectures.

Bancroft, Sir Squire (1841–1926), one of the best-known actor-managers of the later Victorian period. Managed the old Prince of Wales Theatre in London, in conjunction with Marie Wilton (Lady Bancroft), for many years, producing there the popular Robertsonian comedies.

Bandaranaike, Hon. Solomon West Ridgway Dias, B.A. (1899–1959). Prime Minister of Ceylon, 1956–59; leader of the socialist M.E.P. (People's United Front Party). Assassinated Sept., 1959.

Banks, Sir Joseph, Bt., F.R.S. (1743–1820), was president of the Royal Society for upwards of forty years. As a naturalist he was one of the most eminent men of his time, and encouraged science in every form. When Captain Cook made his voyage to the South Seas in 1768, Sir Joseph accompanied him for the purpose of observing the transit of Venus. He left very valuable botanical collections to the British Museum.

Bannister, Dr. Roger Gilbert, C.B.E. (b. 1929), British athlete who set up a new world and British record for the mile at Oxford on May 6, 1954, in 3 min. 59·4 sec., the first mile ever run in under 4 min.

Banting, Sir Frederick Grant, K.B.E., M.C., D.Sc., M.D., F.R.S. (1891–1941). Canadian physician and discoverer of insulin. Prof. of Medical Research, Toronto University, 1923–41.

Bantock, Sir Granville, Mus. Doc.(1868–1946), Professor of Music at Birmingham University 1908–34; Chairman of Trinity Coll. of Music, London. He wrote songs, orchestral music, and much choral music.

Barbirolli, Sir John, F.R.A.M. (b. 1899), Conductor of the Hallé Orchestra since 1943. Relinquished post as permanent conductor in Sept. 1958, to become principal conductor. Succeeded Toscanini as conductor of the New York Philharmonic Symphony Orchestra, 1937–42.

Barbarossa (Red Beard), name given to **Frederick I** (*c.* 1122–90), greatest of the mediæval Holy Roman emperors who struggled (1159–77) to free the Empire from the domination of the Pope. The two brothers who were Barbary pirates also had this name: **Uruj** (*c.* 1482–1518) was killed by the Spaniards, and **Khaireddin** (*c.* 1482–1546) conquered Tunis for the Turks in 1534 and died in Constantinople.

Barbusse, Henri (1874–1935), noted French author and writer of the famous war novel *Le Feu*, which is one of the most remarkable and realistic of all war books, and portrays in a starkly vivid way the experience of the common soldier.

Barker, Dame Lilian, D.B.E. (1874–1955), governor of the Borstal Institution for Girls at Aylesbury, 1923–35; Ass. Comm. of Prisons, 1936–43.

Barnado, Dr. Thomas John (1845–1905), the founder of the well-known homes for orphan-waifs, for some forty years devoted himself to the protection, education and advancement of destitute children.

Barnum, Phineas Taylor (1810–1891), America's most famous showman, originator of Barnum and Bailey's "Greatest Show on Earth."

Barrie, Sir James Matthew, Bt, O.M. (1860–1937), popular Scottish author and playwright. Among his novels are *A Window in Thrums* and *The Little Minister*, while his plays include *Quality Street*, *The Admirable Crichton*, *Dear Brutus*, *Mary Rose*, *Shall We join the Ladies?* and the children's classic, *Peter Pan*. His work is clever and entertaining and is tinged with mysticism.

Barrow, Isaac (1630–1677), a famous divine, mathematician, Greek scholar, and tutor of Sir Isaac Newton. His "Sermons" are amongst the finest in the language.

Barry, Sir Charles, R.A. (1795–1860), architect of the Houses of Parliament at Westminster which took twenty years to build. Knighted in 1852, and buried in Westminster Abbey. His son:

Barry, Sir John Wolfe Wolfe-, K.C.B., F.R.S. (1836–1918), an eminent engineer, designed and carried out some of the most prominent undertakings of the time, including Barry Dock and Tower Bridge.

Bartok, Bela (1881–1945), Hungarian composer and musician. Early compositions influenced by Brahms and Liszt. From an early age deeply interested in folk-song which inspired him in his researches into Hungarian and Rumanian peasant music. His compositions include string quartets, violin sonatas, concertos, orchestral music, a ballet and an opera, and a collection of over 7,000 melodies. Professor at Budapest Conservatory, 1907–12, when he retired into private life as a result of the opposition his compositions aroused.

Bartolommeo, Fra (1469–1517), the distinguished Florentine painter and friend of Savonarola, at whose death he became a monk.

Bartolozzi, Francesco, R.A. (*c.* 1728–1815), a Florentine engraver who came to England in 1764, and for many years was engaged upon engravings, of which he produced an enormous number, many of them of great artistic merit and highly valued by collectors to-day.

Baruch, Bernard Mannes (b. 1870). American economist. Assisted U.S. Government in both world wars, and in 1946 was chairman of the United Nations Atomic Energy Commission.

Bashkirtseff, Marie (1860–84), Russian painter and writer of a famous autobiographical diary.

Bates, Herbert Ernest (b. 1905), novelist and short-story writer. Author of *Fair Stood the Wind for France*, *The Bride Comes to Evensford*, *The Purple Plain*, and *Jacaranda Tree*.

Batten, Jean Gardner, C.B.E. (b. 1909); the famous New Zealand airwoman who made aviation history by her record solo flight from England to Australia in 1934.

Baudelaire, Charles Pierre (1821–67), French poet of startling originality and great sensitivity, he is best known for his book of verse *Les Fleurs du Mal*. He was also a brilliant critic, and his influence is still felt. He was inordinately attached to his mother and allowed his life to be ruined by poverty, despair, and ill-health.

Bax, Sir Arnold Edward Trevor, K.C.V.O., F.R.C.M., F.R.A.M. (1883–1953), Master of the King's Musick, 1942–52; Master of the Queen's Musick, 1952–53. His work includes numerous piano compositions, songs, and chamber works.

Baxter, Richard (1615–91), a great Nonconformist divine, remarkable for the ability and boldness of his writings. His *Saint's Everlasting Rest* is a masterpiece.

Bayard, Pierre du Terrail, Chevalier de (1475–1524), a French knight of exemplary conduct and remarkable for his chivalry. Fell at the Battle of Sesia, and was named "Le Chevalier sans peur et sans reproche."

Baylis, Lilian Mary, C.H. (d. 1937), manager of the Old Vic theatre from 1898 and of Sadler's Wells from 1931. Did great work for the British stage.

Beaconsfield, Benjamin Disraeli, Earl of, K.G., P.C. (1804–81). Son of Isaac D'Israeli (*q.v.*). Statesman and novelist; with Burke (*q.v.*) exercised most influence on Conservative political theories. His first novel, *Vivien Grey*, published when he was only twenty-one, was a brilliant success and the author was able to enter Society. *Coningsby* and *Sibyl*, published twenty years later, helped to rouse the social conscience to the evils of industrial life and of the deplorable relations existing between rich and poor (the "two nations"). Disraeli entered Parliament in 1837, but had only short periods of office before his terms as Prime Minister in 1868 and 1874–80. The second period was marked by the purchase of the Suez Canal shares, by the conferment on the Queen of the title, Empress of India, and by a diplomatic triumph at the Congress of Berlin, abroad, and by a continuation of measures for social reform, at home. He was a gifted orator, the rival and antithesis of Gladstone and the friend of Queen Victoria, who favoured his policies, honoured his wife, and called him "Dizzy."

Beardsley, Aubrey Vincent (1872–98), black-and-white artist, whose illustrations in the *Yellow Book* aroused much controversy.

Beatty, 1st Earl, Admiral of the Fleet, P.C., G.C.B., O.M., G.C.V.O., D.S.O. (1871–1936). First Sea Lord, 1919–27. From 1912 to 1916 Commander of Battle Cruiser Squadron. From Nov. 1916 to 1919 succeeded Lord Jellicoe as Admiral of the main British Fleet. On Aug. 28, 1914, fought the German fleet in the Heligoland Bight. On May 31, 1916, Lord Beatty with his battle cruisers was engaged in a great sea fight with the Germans off Jutland, for which he was granted £100,000 and an Earldom in 1919.

Beaumont, Francis (1584–1616), and **Fletcher, John** (1579–1625), joint authors of many plays, including *The Maid's Tragedy* and *Philaster*. Beaumont was buried in Westminster Abbey, and Fletcher interred in St. Saviour's, Southwark. Thought by some to be authors of plays attributed to Shakespeare.

Beaverbrook, Lord, P.C. (b. 1879) (William Maxwell Aitken). British newspaper proprietor and politician. A Canadian by birth and a man of tremendous energy and will-power, who rendered great service as Minister of Aircraft Production in the crucial years, 1940–41. His papers have sponsored various political campaigns, notably the Empire Free Trade Movement,and have achieved a very large circulation.

Becket, Thomas A' (1118–1170), Archbishop of Canterbury under Henry II. A powerful and ambitious prelate who boldly supported the authority of the Pope against the dictates of the King, and was assassinated in Canterbury Cathedral December 29th, 1170, being canonised two years later.

Becquerel, Antoine Henri (1852–1908), French physicist who in 1896 discovered radioactivity in uranium. Shared with the Curies the 1903 Nobel Prize in Physics.

Bede, "The Venerable" (673–735), a monk of great influence and ability whose historical works cover a great range and are valuable in the outline they give of the early history of this country

Beecham, Sir Thomas, Bt., C.H. (b. 1879), conductor and impresario. Founded the London Philharmonic Orchestra in 1931; introduced into England the operas of Richard Strauss, Russian operas, and the Diaghilev ballet; championed the music of Delius. Recognised as one of the world's greatest conductors, especially in the interpretation of Mozart and Wagner. Conductor of the Royal Philharmonic Orchestra since 1946. Pub. Frederick Delius biography (1959).

Beecher, Henry Ward (1813–1887), an eminent American preacher and lecturer, whose church at Brooklyn was for many years the most popular in the United States. Brother of Mrs. H. B. Stowe.

Beerbohm, Sir Max (1872–1956), brilliant critic and caricaturist who contributed to the *Saturday Review* during his "twelve years' bondage to dramatic criticism" (1898–1910).

Beethoven, Ludwig van (1770–1827), one of the world's greatest musicians and composers, born at Bonn of a poor but musical family, his father being a tenor singer in the service of the electoral prince at Bonn. As a child he was already remarkable for his playing of the harpsichord and violin and for his power of extemporization. Some of his compositions, sonatas, songs and pianoforte variations were published when he was only 13. At 17 he visited Vienna and played before Mozart who promptly recognised his genius. When he was about 30 he began to suffer from the worst malady that could possibly have befallen him: he became deaf. He faced his fate with indomitable courage and perhaps more than any other artist continued to develop until he reached the loftiest pinnacle of musical fame. Between the years 1805 and 1808, Beethoven composed some of his greatest works: the oratorio *Mount of Olives*, the opera *Fidelio*, and the *Pastorale* and *Eroica* symphonies besides a number of concertos, sonatas and songs. He composed four overtures to *Fidelio* at different periods: *Leonore No. 2* (1805), *Leonore No. 3* (1806), *Leonore No. 1* (1807) and *Fidelio* (1814). The *Mass in C* was first performed in 1810 and the *Mass in D* was written between the years 1819 and 1822. The symphonies, nine in number, rank as the greatest ever written and the pianoforte sonatas and string quartets are unequalled in beauty. He died at Vienna at the age of 56.

Behring, Emil von (1854–1917), German bacteriologist and father of the science of immunology. Awarded Nobel Prize in 1901.

Behring, Vitus (1680–1741), Danish navigator who entered the Russian service and in 1728 discovered Behring's Strait, afterwards being wrecked on Behring's Island, where he died.

Belisarius (505–565), famous Roman general under Justinian. His defeats of the Goths and Vandals, and of the Persians were great achievements.

Bell, Alexander Graham, LL.D., Ph.D., D.Sc., M.D. (1847–1922), born in Edinburgh, went to America in 1870, became Professor of Physiology in Boston University. In 1876 exhibited an invention which was developed into the telephone. Invented the photophone, and devoted much attention to the education of deaf-mutes.

Bell, Gertrude Margaret Lowthian, C.B.E. (1868–1926), the "uncrowned Queen of Arabia," was a famous traveller in the East, especially in Arabia. Was an authority on Asia Minor and Iran and an associate of "Lawrence of Arabia" during the Great War.

Bellamy, Edward (1850–1898), American journalist and author of *Looking Backward*, a utopian novel in which he foretells of many changes that have since come to pass.

Bellini, Gentile (*c.* 1429–1507), a celebrated Venetian painter, whose "Preaching of St. Mark at Alexandria," in St. Mark's College, Venice, is one of the renowned pictures of the world.

Bellini, Giovanni (*c.* 1430–1516), brother of the last-named, and a more celebrated painter.

Bellini, Vincenzo (1801–35), Italian operatic composer; born in Sicily, the son of an organist. His graceful vocal melodies were much admired by his friend Chopin and he enjoyed successes in Paris and London. His best-known operas are *I Capuleti ed i Montecchi*, *La Sonnambula*, and *Norma*.

Belloc, (Joseph) Hilaire (Pierre) (1870–1953), a writer of great versatility whose works include *The Bad Child's Book of Beasts*, *The Path to Rome*, *Hills and the Sea*, *Cautionary Tales*, and historical studies of Danton, Robespierre and Richelieu.

Belzoni, Giovanni Battista (1778–1823), a renowned explorer of Egypt who settled in England at the beginning of the 19th century. After a precarious existence began to turn his

attention to hydraulic experiments, and went to Egypt with a view to getting the Government to sanction a scheme of his for raising the water of the Nile. He was then attracted to the study of Egyptian antiquities, and engaged in highly successful researches.

Benedict, St. (480–544), built twelve monasteries, and founded the Order of the Benedictine Monks, at Monte Cassino, near Naples.

Benes, Dr. Eduard (1884–1948), Czechoslovak statesman; co-founder with Thomas Masaryk of the Czech Republic; Foreign Minister, 1918–35, and President 1935–38 and 1940–48. An all-party ministry was overthrown by a communist *coup d'état* in February 1948, and Benes, in failing health, resigned the Presidency in June, dying in September.

Benavente y Martinez, Jacinto (1866–1954), one of the greatest of Spanish dramatists. Author of *Los Intereses Creados* and other famous plays. Nobel Prizewinner, 1922.

Ben-Gurion, David (b. 1886), Zionist leader. Educated at Istanbul University. Helped to organise the Jewish Legion in 1918, and was prominently connected with the Labour movement in Palestine in between the world wars. Prime Minister of Israel since 1948.

Bennett, Enoch Arnold (1867–1931), author and journalist. His stories of the Pottery Towns, where he was brought up, are of high merit. *The Old Wives' Tales*, *Clayhanger*, and *Hilda Lessways* are among his most successful novels. He also wrote plays, including *Milestones*, *The Great Adventure*, and *Mr. Prohack*.

Bennett, James Gordon (1841–1918), proprietor of the *New York Herald*, and a famous yachtsman and motorist. He sent out Stanley on the expedition which resulted in the finding of Livingstone.

Bennett, Sir William Sterndalo (1816–1875), an English composer of eminence, who did much for the advancement of musical art in this country. Schumann pronounced him to be "a thorough Englishman, a glorious artist, and a beautiful and poetic soul." The work of his that is best known is the oratorio *The Woman of Samaria*.

Bentham, Jeremy (1748–1832), the founder of the school of political philosophy, the tenets of which were extended by John Stuart Mill. His works on *Government*, *Usury*, and *The Principles of Morals and Politics*, expound the Utilitarian system with great lucidity.

Bentley, Richard (1662–1742), an eminent classical scholar and critic, for long Master of Trinity College, Cambridge. He was a formidable controversialist and did pioneer work in textual criticism.

Benz, Karl (1884–1929), German engineer whose motor car produced in 1885 was one of the first to be driven by an internal-combustion engine.

Béranger, Jean Pierre de (1780–1857), was the most popular song-writer that France has produced. His songs were often written to serve some passing political purpose, and were invariably in harmony with popular sentiment.

Beresford, William Carr Beresford, Viscount (1768–1854), British General. Participated in capture of Cape Colony and of Buenos Aires. Reorganised Portuguese Army. Master-General of Ordnance in Wellington administration.

Berg, Alban (1885–1935), Austrian composer whose best known work is the three-act opera *Wozzeck*, based upon a drama by Büchner (*q.v.*), which has become a modern classic.

Bergson, Henri Louis (1859–1941), French philosopher, exponent of the theory of vitalism and the life force. Member of French Academy, 1941; Nobel Prize for Literature, 1927. Author of *Matter and Memory* (1896) and *Creative Evolution* (1907).

Bériot, Charles Auguste de (1802–70), Belgian violinist, whose first wife was the great operatic contralto Malibran. His son **Charles Wilfrid de Bériot** (1833–1914) was a fine pianist and the teacher of Ravel.

Berkeley, George, D.D., Bishop of Cloyne (1685–1753), the propounder of the philosophy that the only things that are real are our ideas of what is presented to our senses. In support of this philosophy he wrote several works of great ingenuity of argument, chief amongst them being his *Alciphron, or the Minute Philosopher.*

Berlin, Irving (b. 1888), American composer of popular songs, and the pioneer of both ragtime and jazz music; his songs including *Alexander's Rag-time Band*, *Always*, *What'll I Do?* were the beginning of popular jazz.

Berlioz, (Louis) Hector (1803–69), composer, born in S.E. France, the son of a country doctor; eccentric, highly-endowed, he was the greatest figure in the French romantic movement. His outstanding dramatic works are *La Damnation de Faust* and the *Roméo et Juliette* symphony. His first wife was an Irish actress, Harriet Smithson, for whom he formed a romantic attachment while she was appearing in Shakespearean parts in Rome.

Bernadotte, Count Folke (1895–1948), nephew of the late King Gustav of Sweden. As head of the Swedish Red Cross arranged for the exchange of prisoners in the second world war. In April 1945, he was the intermediary through whom Himmler attempted to capitulate. Appointed United Nations mediator for Palestine in 1947 and brought about a truce between the Arabs and Jews, but was assassinated by Jewish terrorists.

Bernadotte, Jean Baptiste (1764–1844), was a French commander of great distinction who served under Napoleon, and in 1810 was chosen heir to the throne of Sweden. In 1818 he succeeded as Charles XIV., and was a capable ruler.

Bernal, John Desmond, M.A., F.R.S. (b. 1901), Professor of Physics, Birkbeck College, since 1938. Author of *The Social Function of Science*, *Science in History*, *World Without War*, and of many other works on scientific and social subjects, notably crystallography, poison gases, and post-war housing.

Bernard of Menthon (923–1008), patron saint of mountaineers. Founded the alpine hospices of Saint Bernard on the famous Great Saint Bernard Pass between Switzerland and Italy.

Bernard, Saint, of Clairvaux (*c.* 1090–1153), famous French abbot of the monastery of Clairvaux whose sermons and letters had very great influence in Western Europe.

Bernhardt, Sarah (1845–1923), the most renowned tragedienne of her time. Became a member of the Comédie Française after the Siege of Paris, and thereafter occupied a specially prominent position as an actress. Her first performance in London was in 1879. Among her most conspicuous successes are *Théodora*, *Fédora*, and *La Tosca*, while she also appeared as Hamlet with distinction.

Berthelot, Marcellin Pierre Eugène (1827–1907), French chemist and politician, and the first to produce organic compounds synthetically.

Berzelius, Jöns Jakob (1779–1848), Swedish chemist, whose researches laid the foundations for modern chemical science. He devised the system of chemical symbols in use today and discovered several elements.

Bessemer, Sir Henry, F.R.S. (1813–1898), famous for his invention of the well-known process of converting cast-iron direct into steel. His invention entirely revolutionised steel manufacture, greatly reducing the cost of production and making it possible to utilise steel in many directions where previously iron only had been used.

Bevan, Rt. Hon. Aneurin, M.P. (b. 1897), Minister of Health 1945–51 and responsible for introducing the National Health Service which came into operation in 1948; Minister of Labour, Jan.–Apr. 1951. Married to a fellow Socialist M.P., Miss Jennie Lee.

Beveridge, Lord, K.C.B. (b. 1879), British economist. Director of the London School of Economics, 1919–37, and Master of University College, Oxford, 1937–44. Drew up the Beveridge Plan, published in 1942, which formed the basis of the present Health and Insurance Schemes.

Bevin, Rt. Hon. Ernest, M.P. (1881–1951), Secy. of State for Foreign Affairs 1945–51; Minister of Labour and National Service, 1940–45. A British Trade Union Leader who became prominently associated with the Dockers Union, of which he was Assistant General Secretary and of the Transport and General Workers Union of which he was still General Secretary when he entered the Coalition Government as Minister of Labour. He was Chairman of the General Council of Trades Union Congress, 1937.

Bichat, Marie François Xavier (1771–1802), French physiologist who founded the study of general anatomy, on which he wrote several important works. In one of these he showed the important connexion between the brain, heart and lungs.

Biddle, John (1615–62), the first English Unitarian. He was fined, imprisoned and banished for his publications attacking the Holy Trinity. Under a general Act of Oblivion in 1652 he resumed his teachings, which led to further imprisonment, and as a result he died of fever.

Binyon, (Robert) Laurence, C.H. (1869–1943), a poet, art critic and Orientalist; Assistant Keeper of Dept. of Prints and Drawings, British Museum, 1909–13; Deputy Keeper in charge of Sub. Dept. of Oriental Prints and Drawings, 1913–32; Keeper of Prints and Drawings, 1932–33.

Birch, (Samuel John) Lamorna, R.A. (1869–1955), English landscape painter in oils and water-colours, well known for his charming Cornish landscapes and sea studies. His pictures are hung in all the principal galleries of England.

Bird, Cyril Kenneth, C.B.E., B.Sc. (*nom de plume* Fougasse) (b. 1887), humorous artist who edited *Punch* from 1948 to 1952. His witty drawings, many under the title *The Changing Face of Britain*, enlivened the pages of *Punch* for many years and the "Careless Talk Costs Lives" series of the second world war were his creation.

Birkbeck, George (1776–1841), physician, philanthropist, and philosopher. A Yorkshireman who settled in London in 1804, and became the chief founder of Mechanics' Institutes.

Birkenhead, 1st Earl of, P.C., G.C.S.I. (1872–1930), Sec. for India, 1924–1928. Lord Chancellor, 1919–1922, Attorney-General 1915 to 1919. M.P. for the Walton Divn. of Liverpool from 1906 to 1918, and West Derby Divn. thereof from Dec. 1918 to Jan. 1, 1919.

Birkett, 1st Baron (William) Norman, Q.C. (b. 1883), one of the ablest and most prominent members of the English Bar. Lord Justice of Appeal, 1950–7; Judge King's Bench Div. 1941–50; British Mem. (Deputy) Int. Mil. Tribunal at Nuremberg 1945–46; M.P. (L.) for East Nottingham, 1923–24 and 1929–31.

Bishop, Sir Henry Rowley (1786–1855), composer of many popular ballad operas and songs. *Maid Marian*, *Guy Mannering* and *The Miller and his Men*, are his best-known operas. He was also a very successful glee-writer, and was the composer of *Home, Sweet Home*. Was the first musician to be knighted in 1842.

Bishop, Air Marshal William Avery, V.C., C.B., D.S.O., M.C., D.F.C. (b. 1894), Canada's greatest airman. Officially credited with the destruction of seventy-two enemy aircraft in the first world war.

Bismarck, Prince Otto Eduard Leopold von (1815–1898), the most prominent and capable of the German statesmen of the 19th century, entered the diplomatic service in 1851, and filled positions in succession at Vienna, Petrograd, and Paris. In 1862 he was appointed Minister of Foreign Affairs, from which time dates the strong Bismarckian policy which was destined to achieve so much for Prussia. As Imperial Chancellor he may be said to have directed the destinies of his country down to the death of the Emperor William in 1888, when Emperor William II. began to assume a direct control, which Bismarck resented, and in 1890 the "old pilot" was dropped, to use a figure of speech made memorable by one of Tenniel's cartoons. Bismarck retired to his country estates, and did not again interfere seriously in political affairs. Made Count in 1865 and Prince in 1871. Germany has over two hundred monuments to him. He presided at the famous Berlin Conference of 1878. His son, Count Herbert von Bismarck (1849–1904), was appointed German Foreign Minister in 1885, but like his father before him, did not get on well with William II.

Bizet, Georges (1838–75), properly Alexandre César Léopold, French composer who gave the operatic stage several operas full of charming melody and whose immortal *Carmen* from the story by Mérimée was his greatest achievement. He also wrote some orchestral works, piano music, and songs. He died too young to enjoy popularity.

Björnson, Björnstjerne (1832–1910), the Norwegian poet, dramatist, and novelist is one of the great names in modern European literature, his poems, plays, and stories being marked by a strong intellectuality and a rich imagination.

Black, Joseph (1728–99), Scottish chemist. Prof. of anatomy at Glasgow (1756–60) and of medicine and chemistry at Edinburgh (1760). Specially known for discoveries of carbon dioxide (he called it "fixed air") and latent heat. His original work earned him the title father of quantitative chemistry.

Blackett, Patrick Maynard Stuart, F.R.S., M.A. (b. 1897), Professor of Physics, Imperial College of Science and Technology, 1953; Manchester University, 1937–52. Author of *The Military and Political Consequences of Atomic Structure* (1948), *Atomic Weapons and East–West Relations* (1956). Awarded Physics Nobel Prize 1948 for his work in developing the Wilson cloud chamber method of tracing tracks of swift atomic particles. President of the British Association, 1957.

Blackmore, Richard Doddridge (1825–1900), a novelist who in 1869 made a great reputation with his romantic story of *Lorna Doone*.

Blackstone, Sir William (1723–1780), was a Justice of the Court of Common Pleas. His great work, *Commentaries on the Laws of England*, became one of the British classics.

Blackwood, Algernon, C.B.E. (1869–1951), British author. As a young man, farmed in Canada and worked on New York newspapers. Then, from 1906, produced a steady flow of books, plays, and short stories of high quality.

Blair, Robert (1699–1746), a noted Scottish poet, whose poem, *The Grave*, entitles him to a place in all collections of British poetry.

Blake, Robert (1599–1657), Parliamentary general and an admiral in the Cromwellian navy in the Dutch and Spanish wars.

Blake, William (1757–1827), painter, poet, and mystic, whose *Songs of Innocence* and scriptural drawings reveal an intense spirituality. He was a highly independent and original thinker and has been called "the great teacher of the modern western world."

Bland-Sutton, Sir John, Bt., M.D. (1855–1936), an eminent surgeon, whose association with the Middlesex Hospital is commemorated by the Bland-Sutton Institute of Pathology.

Blasco-Ibáñez, Vicente (1867–1928), a Spanish man of letters who wrote *The Four Horsemen of the Apocalypse* and other novels which made him world-famous.

Blériot, Louis (1872–1936), French airman; the first to fly the English Channel from Calais to Dover, July 25, 1909.

Blind, Karl (1826–1907), was a native of Mannheim, and in 1847 associated himself with the German revolutionary movement, but was arrested and imprisoned. Gaining his liberty, he resided in Brussels for a time, and afterwards settled in London, remaining in close touch with men like Mazzini and Louis Blanc, and by pen and speech constantly advocating political freedom.

Bliss, Sir Arthur (b. 1891), English composer, succeeded Sir Arnold Bax as Master of the Queen's Musick in 1953. His best known works are the *Colour Symphony* (1922), *Morning Heroes* (1930) and his ballet *Checkmate* (1937). Mus. Dir. B.B.C., 1941–44.

Bloch, Ernest (1880–1959), composer, whose music is characterised by its Jewish and oriental themes. He was born in Geneva, Switzerland, and became a naturalised American citizen.

Blomfield, Sir Reginald, R.A., M.A., F.S.A. (1856–1942); was a prominent architect, designer of gardens and country houses.

Blondin, Charles (Jean François Gravelet) (1824–1897), a famous French rope performer, who crossed Niagara Falls on a tight-rope.

Blücher, Field-Marshal Gebhard Leberecht von (1742–1819), was the famous Prussian commander who, after a long and brilliant military career, joined forces with Wellington in the final campaign against Napoleon, and materially helped to win the great victory of Waterloo by advancing to Wellington's support.

Blum, Léon (1872–1950), statesman and architect of French socialism. Led a "popular front" government in 1936 and a "caretaker" govern-

ment for a brief period 1946–47. Served as vice-premier 1937–38. During 1940–45 was interned in Germany.

Blunden, Edmund Charles (b. 1896), English poet who was Prof. of Literature at Tokyo University 1924–27. Gained the Hawthornden Prize in 1922 for his poem, *Shepherd*. Fellow and Tutor in English Literature, Merton College, Oxford, 1931–43. Prof. of Literature Hong Kong University, 1954– .

Blunt, Wilfrid Scawen (1840–1922), best known for the part he took in Egyptian affairs in 1881–1882 and his continued support of what is called the Egyptian national movement. He was a devoted admirer of Arabi Pasha, and spent much money in his defence. In 1907 he published his *Secret History of the English Occupation of Egypt*, which aroused much controversy. He married a granddaughter of Lord Byron.

Boadicea, queen of the Iceni tribe of Britons, who raised an army against and defeated the Roman invaders, but was afterwards vanquished by Suetonius and committed suicide in 62.

Boccaccio, Giovanni (1313–1375), an Italian author who has often been called the father of the novel. He had a lively imagination and a graceful style, and his famous *Decameron*—condemned by two Popes and by the Council of Trent—has been a fount of inspiration to poets and story-tellers from Shakespeare to Keats.

Boccherini, Luigi (1743–1805), Italian composer, contemporary of Haydn, who first gained fame as a 'cellist. Settled in Madrid in 1769 as composer to the Chapel of the Infante, which position he held until 1785. Was appointed composer to the Court of Frederick William II. of Prussia, but returned to Spain in 1797, and died in poverty in Madrid.

Bode, Johann Elert (1747–1826), German astronomer remembered mainly for his law (known as Bode's Law) for the calculation of the relative distances of the planets from the sun.

Boehm, Sir Joseph Edgar, Bt., R.A. (1834–90), British sculptor. Executed several famous monuments and statues including that of Carlyle on the Chelsea Embankment, the monument to Dean Stanley in Westminster Abbey, Darwin in the Natural History Museum, Kensington, and the equestrian statue of the Duke of Wellington at Hyde Park Corner.

Bohr, Niels Henrik David (b. 1885), famous Danish physicist who has received universal recognition and fame by his experiments in atomic structure. With Lord Rutherford applied the quantum theory to the study of atomic processes. Awarded Nobel Prize for Physics, 1922.

Boieldieu, François Adrien (1775–1834), French composer whose masterpiece, *La Dame Blanche*, was published in 1825. Composed many works in collaboration with Cherubini and Mehul. Succeeded Mehul as Professor of Composition at the Conservatoire, Paris, in 1817.

Boileau-Despréaux, Nicolas (1636–1711), literary critic and French poet who was contemporary with Molière, Racine, and La Fontaine. He wrote many classical imitations and is famous for his *Satires*.

Boito, Arrigo (1842–1918), Italian poet and composer. He wrote the libretti of *Otello* and *Falstaff* for Verdi, and for his own operas of *Mefistofele* and many others.

Boleyn, Anne (1507–36), queen of Henry VIII and mother of Queen Elizabeth. Originally maid-in-waiting to Catharine of Aragon and her successor when Catharine's marriage was annulled. She failed to produce a male heir and was beheaded on a charge of adultery.

Bolivar, Simón (1783–1830), the first President of Venezuela and subsequently Dictator of Peru; commonly called the Washington of South America.

Bonaventura, St. (1221–1274), a Franciscan monk of great learning and piety, and a leading Schoolman. He was called "the Seraphic Doctor."

Bondfield, Rt. Hon. Margaret Grace, C.H. (1873–1953), Min. of Labour, 1929–31. Represented Northampton, 1923–24. Wallsend, 1926–31. First woman member of a British Cabinet.

Bone, Sir Muirhead (1876–1953), Scottish artist, famous for his drawings and etchings of architectural subjects. Excelled in dry-point and drawings of intricate scaffolding. His son **Stephen Bone**, painter and critic, died in 1958 at the age of 53.

Bonheur, Rosa (1822–1899), a native of Bordeaux, and one of the most noted animal painters of the 19th century.

Boniface, St. (*c.* 675–754), a Benedictine monk, native of Devon, original name Wynfrith. Sent by Pope Gregory II. on missionary work in Germany; appointed archbishop of Mainz, 746. Attacked and killed with over 50 companions by pagans in Friesland.

Booth, Edwin (1833–93), American Shakespearean actor, son of Junius Brutus Booth, the English tragedian, and brother of John Wilkes Booth, who assassinated President Lincoln.

Booth, William (1829–1912), founder and first general of the Salvation Army, b. Nottingham. He entered the Methodist New Connexion and was from the first interested in evangelical work. In 1865, with the help of his wife, Catherine Booth, he began mission work in the East End of London which led to the creation in 1878 of the Salvation Army on military lines. His zeal and organising ability developed it into a great religious military organisation with branches in many parts of the world. His son Bramwell (*d.* 1925) and his daughter Evangeline were among his successors.

Borgia, Cæsar (1476–1507), the masterful and unscrupulous son of Pope Alexander VI., who paved his way to power by the murder of those who stood in his way, and aided by Louis XII. of France, became ruler of Romagna, the Marches, and Umbria. Pope Julius II. banished him from Rome, and he was imprisoned in Spain, but escaped to find a soldier's death in the Army of Navarre in the invasion of Castile.

Borodin, Alexander Porfyrievich (1834–87), Russian composer who was a professor of chemistry and founded a school of medicine for women. In a busy professional life he wrote two symphonies, three string quartets, the symphonic sketch *In the Steppes of Central Asia*, some beautiful songs, piano music, and the immortal opera *Prince Igor*, left unfinished at his death but completed by his friends Rimsky-Korsakov and Glazunov.

Borotra, Jean (b. 1898), famous French lawn tennis champion, known as "the bounding Basque." A popular figure at the Wimbledon championships before and after the second world war.

Borrow, George Henry (1803–81), English author, for many years agent for the British and Foreign Bible Society; in the course of his wanderings studied gypsy life and wrote of his experiences in *Lavengro*, *Romany Rye*, *Bible in Spain*.

Bose, Subhas Chandra (1897–1945), Indian nationalist leader; killed in aeroplane crash.

Boswell, James (1740–1795), made himself famous by writing *The Life of Dr. Johnson*, spending some years in close intimacy with the great lexicographer, and producing what is probably the finest biography in the language. His own journals and letters, collected together by Yale University and published in 1949 as *The Boswell Papers*, are among the greatest literary collections ever assembled.

Botha, General the Rt. Hon. Louis (1862–1919), the Boer general who succeeded Joubert in command of the Transvaal forces in the Boer War 1899–1902. On parliamentary government being granted to the Transvaal in 1907 he became the first Prime Minister, and attended the Imperial Conference in England the same year. In 1910 made first Premier of the South African Union. After the outbreak of war with Germany took the field at the head of a Union force and, in addition to putting down a rebel movement engineered by Germany, conquered a large portion of German African Territory.

Bottesini, Giovanni (1821–89), Italian double-bass player, also famous as an opera conductor and composer.

Botticelli, Sandro (*c.* 1444–1510), Italian painter and disciple of Savonarola, the democrat. Produced many notable pictures, and assisted in the decoration of the Sistine Chapel. His illustrations to Dante's *Divine Comedy* are world-famous.

Bottomley, Horatio (1860–1933), politician, journalist, financier, and for many years one of the most notorious characters in England

A brilliant speaker, he was twice M.P. for South Hackney. Altogether 260 petitions in bankruptcy were presented against him, mostly without effect; he was constantly in the law courts, defending himself with skilful audacity against famous K.C.s. Millions of pounds passed through his hands, much of it obtained from small investors, but he died in poverty after serving seven years' penal servitude for fraud.

Boughton, Rutland (b. 1878), English composer who has also written on the history and philosophy of music. His opera *The Immortal Hour* has enjoyed great success.

Boult, Sir Adrian C., Kt., M.A., D.Mus., F.R.C.M. (b. 1889). Chief conductor London Philharmonic Orchestra, 1950–57, which he took to Russia in 1956. Conductor of the B.B.C. Symphony Orchestra, 1930–50, and Musical Director B.B.C., 1930–42.

Bowdler, Thomas (1754–1825), a pious English physician, who issued expurgated editions of Shakespeare and Gibbon, eliminating all expressions offensive to good taste. Hence the term "bowdlerise."

Boyce, William (1710–79), famous London organist, composer of church music, songs and cantatas, and master of the orchestra of George III.

Boyd Orr, John, 1st Baron, F.R.S., M.D., D.Sc. (b. 1880), Scientist, farmer and nutritional expert. Prof. of Agriculture, Aberdeen University, 1942–45; Director-General, World Food and Agricultural Organisation, 1945–48, now Chancellor of Glasgow University. Awarded Nobel Peace Prize, 1949.

Boyle, Hon. Robert, F.R.S. (1627–1691), English scientist who with Robert Hooke laid the foundations of the modern sciences of chemistry and physics. He established "Boyle's law," which states that the volume of a gas varies *inversely* as the pressure upon it, provided temperature be constant.

Bradley, General of the Army Omar N. (b. 1893), distinguished American soldier who was appointed chairman of the Joint Chiefs of Staff in succession to Gen. Eisenhower in 1949. Commanded 2nd U.S. Army Corps in Tunis and Sicily, the American Assault Forces in Normandy in 1944, and later the 12th U.S. Army Group. Retired 1953.

Bradman, Sir Donald George (b. 1908), Australian cricketer and one of the world's best batsmen. Captained Australia in Test matches against England, 1936–48.

Bragg, Sir Wm. (Henry), O.M., K.B.E., F.R.S., M.A., D.Sc. (1862–1942), was a brilliant scientist. Nobel Physics Prize, 1915. Was Director of the Royal Institution of Great Britain; Fullerian Prof. of Chemistry, Royal Institution, and Director of Davy-Faraday Research Laboratory, 1923–42; President of British Association, 1928. President of the Royal Society, 1936–40.

Bragg, Sir (William) Lawrence, O.B.E., M.C., F.R.S. (b. 1890), succeeded Lord Rutherford as Cavendish Prof. of Experimental Physics, Cambridge Univ., 1938–53. Dir. Royal Institution, 1954– . Shared with his father (Sir Wm. H. Bragg) the 1915 Nobel Prize for research work on X-rays and crystal structures.

Brahe, Tycho (1546–1601), a celebrated Danish astronomer, and fellow-worker of Kepler. With large sums of money put at his disposal by Frederick II. of Denmark, he built an observatory called Uraniborg on the island of Hveen, near Copenhagen, where for over 20 years he carried out a vast programme of accurate and systematic observations of the heavenly bodies and compiled tables of their motions.

Brahms, Johannes (1833–97), composer, regarded as outstanding figure of German classic-romantic school; born in Hamburg, the son of a double-bass player. His compositions are classical in form yet possess deep intensity of expression and poetic significance. He composed four symphonies which rank amongst the greatest ever written, two piano concertos, a violin concerto, a double concerto for violin and 'cello, much fine chamber music, numerous songs of great lyrical beauty, and choral work, notable among which is his *German Requiem*. Lifelong friend of the Schumanns. His life was devoted to music; he never married.

Braille, Louis (1809–52), French educationist, who, as teacher of the blind, perfected his system of reading and writing for the blind. As the result of an accident when he was three years old he was himself blind.

Bramah, Joseph (1749–1814), a Yorkshireman who devoted himself to invention, introduced numerous mechanical improvements, including the hydrostatic press, a liquid-pumping apparatus, a most ingenious series of safety locks, and bank-note printing machines.

Brampton, Lord, P.C. (1817–1907), long known to the public as Sir Henry Hawkins. Was famous as an advocate, and took part in many celebrated cases, including the Tichborne trial. His *Reminiscences*, published in 1904, was one of the books of the year.

Brandes, Georg Morris Cohen (1842–1927), Danish literary critic who exerted a vitalising influence on literature and art. He was the author of many fine critical works, notable among which were his published lectures *Main Currents in European Literature of the 19th Century* and his studies *Benjamin Disraeli, William Shakespeare, Goethe, Voltaire, Julius Cæsar*, and *Michelangelo*.

Brangwyn, Sir Frank, R.A., R.P.E. (1867–1956), artist of Welsh extraction born at Bruges; first worked for William Morris making cartoons for textiles. His first painting, "A Bit of the Esk," was exhibited at the Royal Academy in 1885. He was regarded as the greatest mural artist and etcher of his day and is also noted for his many lithographs.

Brecht, Bertold (1898–1959), German dramatist and poet, whose cynical and satirical works are characteristic of the period between the two world wars. He left Germany in 1933 for Russia and went to the United States in 1941. His plays include *Die Dreigroschenoper* (with music by Kurt Weill).

Brennan, Louis, C.B. (1853–1932), successful inventor, born in Ireland. Paid £120,000 by the British Government for his gyro-directed torpedo; also the inventor of a mono-rail locomotive on the gyroscope principle.

Brewster, Sir David, LL.D., F.R.S. (1781–1868), Scottish physicist and natural philosopher, a great experimenter and prolific writer. Noted for his researches into the polarisation of light. Reputed to be one of the founders of the British Association.

Bridges, Edward, 1st Baron, G.C.B., G.C.V.O., P.C., M.C. (b. 1892), son of Robert Bridges. Permanent Secretary to the Treasury and Head of Civil Service, 1945–56. Secretary to the Cabinet, 1938–46. Fellow of All Souls' College, Oxford, 1954. Chanc. Reading Univ., 1959.

Bridges, Robert, O.M., M.A. (1844–1930), was Poet Laureate 1913–30. Practised medicine up to 1882, thenceforward devoting himself mainly to literature. He published several volumes of poems and plays, displaying refined fancy and a broad philosophic spirit. His *Testament of Beauty* was published in 1930.

Bridgewater, Francis Egerton, 3rd (and last) **Duke of** (1736–1803). The projector of the famous Bridgewater Canal, which was the beginning of the great English canal system, and yielded his family enormous wealth; it was absorbed in 1887 by the Manchester Ship Canal Company, who paid £1,710,000 for it.

Bridgewater, Francis Henry Egerton, 8th (and last) **Earl of,** F.R.S. (1756–1829), grand-nephew of the last-named, and founder of the famous *Bridgewater Treatises*, written by the most celebrated divines and scientists of the day, and devoted to demonstrating the power, wisdom, and goodness of God, as manifested in the Creation.

Bridie, James. (pseudonym of Osborne Henry Mavor), C.B.E., LL.D., M.D. (1888–1951), Scottish author and dramatist. Educated at Glasgow Academy and University. The first of his many successful plays was *The Anatomist*, produced in 1931. Others include *Tobias and the Angel, Jonah and the Whale, Mr. Bolfrey, Dr. Angelus*.

Brieux, Eugène (1858–1932), French dramatist, whose plays are satires on definite evils of society, and deal with such subjects as divorce, legal hypocrisy, social diseases, etc. Was elected a member of the French Academy in 1909.

Bright, Sir Charles Tilstone (1832–88), English telegraph engineer, who after superintending

the laying of telegraph lines in many parts of Great Britain organised the Atlantic Telegraph Company (1856), and as Engineer-in-chief supervised the laying of the first Atlantic Cable (1858).

Bright, Rt. Hon. John (1811—1889), a famous Radical Quaker statesman and orator, one of the chief promoters of the Reform movement which led to the introduction of Free Trade.

Britten, Edward Benjamin, C.H. (b. 1913), composer of a variety of music, including *Spring Symphony, Let's make an Opera, The Rape of Lucrezia, Peter Grimes, Albert Herring, Billy Budd,* and *Gloriana,* composed to mark the occasion of the Coronation.

Broca, Paul (1824–80), French anthropologist, surgeon and pathologist. From 1867 he was Professor of Pathology, Paris. He discovered the seat of speech in what is known as convolution of Broca. He was the founder of modern anthropology and is regarded as the originator of the science of craniology.

Brock, Sir Thomas, K.C.B., R.A. (1847–1922), pupil of Foley, achieved a high reputation as a sculptor. The Queen Victoria Memorial in front of Buckingham Palace is his work.

Brogan, Denis William, M.A. (b. 1900), Prof. of Political Science at Cambridge. An authority on France, America, and Britain, and his works include *The Development of Modern France, Politics and Law in the United States,* and *The English People.*

Broglie, French noble family of Piedmontese origin who settled in France in the 17th cent. **Victor Maurice, comte de Broglie** (1671–1745) was marshal of France and fought in the wars of Louis XIV. **Louis Victor, prince de Broglie** (b. 1892) and **Maurice, duc de Broglie** (b. 1875) the eminent French physicists are his grandsons.

Brontë, Charlotte (1816–1855), one of the most gifted novelists of the 19th century. Her *Jane Eyre,* published in 1847, attracted universal notice, and her other novels, *Shirley, Villette,* and *The Professor,* are all marked by the force of strong genius. Her sisters, **Emily** (1818–48) and **Anne** (1820–49), also wrote novels and poems, Emily's *Wuthering Heights* and some of her verse showing exceptional power.

Brookeborough, Basil Stanlake Brooke, 1st Viscount, C.B.E., M.C. (b. 1888), Prime Minister of Northern Ireland since 1943. An Ulster Unionist.

Brooke, Rupert (1887–1915), a British poet who died during the first world war, whose works, though few, showed great promise and include the poems *Grantchester* and *If I Should Die.*

Brougham, Lord, P.C., F.R.S. (1778–1868), one of the chief legal luminaries of the 19th century, who made a great name by defending Queen Caroline against George IV., and afterwards rose to political eminence.

Brown, Sir Arthur Whitten, K.B.E. (1886–1948), together with Sir John Alcock (d. 1919) in 1919 made the first transatlantic flight, crossing from Newfoundland to Ireland in 16 hr. 12 min.

Brown, John, "of Ossawatomie" (1800–1859), the hero of Harper's Ferry, whose action in inciting certain negro slaves to rebel in 1859 struck the note of alarm which resulted in the Civil War. His attempt to take the Arsenal at Harper's Ferry was defeated, and he was hanged, being afterwards regarded as a martyr by the Abolitionists.

Browne, Charles Farrer (Artemus Ward) (1834–1867), was one of the most whimsical and entertaining humorists America has produced. In addition to his books he wrote and delivered exceedingly funny lectures, and was making an English tour with them when he was seized with a fatal illness, dying at Southampton.

Browne, Hablot Knight (1815–1882), best known as "Phiz," the illustrator of Dickens's novels, from the *Pickwick* period down to *Little Dorrit.*

Browne, Sir Thomas (1605–82), author of *Religio Medici,* was a London physician and antiquary.

Browning, Elizabeth Barrett (1806–1861), an English poetess of eminence who, between 1830 and 1860, wrote many poems showing great intellectual grasp and imaginative fervour. Some of her works, such as *The Cry of the Children, Lady Geraldine's Courtship, The Romaunt of the Page,* and *Bertha in the Lane,* are sure of immortality, and her *Aurora Leigh,* a novel in poetic form, is, in portions, on a high level of poetic execution. She was married to Robert Browning in 1846, and afterwards lived mostly in Italy.

Browning, Robert (1812–1889), one of the two greatest poets of the later Victorian era. His earlier poems and dramas, though marked by singular insight and power, were far from popular, mainly because of a somewhat obscure and involved style from which he only occasionally freed himself. His *Strafford* and *The Blot on the 'Scutcheon* were both produced by Macready, and attained some measure of stage success; but Browning was essentially a poet to be read, rather than acted. Some of his dramatic characterisations are of striking power. From about 1864 he published many works and knew at last what it was to be an appreciated poet. His *Men and Women, Dramatis Personæ,* and *The Ring and The Book,* contain some of the finest poetry of modern times.

Bruce, Robert (1274–1329), took part with Sir William Wallace, (*q.v.*) in the revolt against Edward I., later leading the popular cause. Achieved one victory after another, until at Bannockburn he overthrew the English army and ultimately secured Scottish independence. He reigned twenty-two years as King Robert I.

Bruch, Max (1838–1920), German composer and conductor, best known for his G minor violin concerto.

Bruckner, Anton (1824–96), Austrian composer and organist. He wrote nine symphonies, much religious music, including a *Te Deum* for chorus and orchestra, and one string quartet.

Brummell, George Bryan (1778–1840), "Beau Brummell," the fashion leader in English Society when George IV. was Prince of Wales; was a *bon vivant* and gamester whose excesses involved him in imprisonment and ultimate imbecility.

Brunel, Isambard Kingdom (1806–1859), a prominent engineer who constructed the more difficult portions of the Great Western Railways, and many other important works. He also achieved eminence as a designer of steamships.

Brunel, Sir Mark Isambard (1769—1849), father of the last-named, and constructor of the Thames tunnel, finished in 1843.

Brunelleschi, Filippo (1377–1446), Italian architect, born in Florence, pioneer of Renaissance architecture, adapting the ideals of the Roman or classic period to the conditions of his own day. Many examples of his work are to be seen in Florence—in the Pitti Palace, the Churches of San Lorenzo and San Spirito, the great cupola of the cathedral of Santa Maria del Fiore and the beautiful carved crucifix in the Church of Santa Maria Novella.

Bruno, Giordano (*c.* 1548–1600), Italian philosopher and martyr; entered the Dominican Order at Naples in his 15th year. Accused of heresy he fled from his convent and roamed over Europe. In 1592 he returned to Italy and was arrested by the Inquisition. After 7 years in prison was burned at the stake, Feb. 17, 1600. A statue to him was erected in the Campo dei Fiori, 1889.

Brutus, Marcus Jonius (85–42 B.C.), Roman Governor and one of the founders of Roman civil law.

Bryant, Arthur Wynne Morgan (b. 1899), English historian and pageant producer. Among his works are *English Saga, 1840–1940,* a life of *George V., The Story of England,* and several books on the Napoleonic war years and the Restoration period, including a balanced and informative biography of Pepys.

Buchanan, George (1506–82), Scottish humanist who spent most of his life in France lecturing and writing Latin poems, plays, and treatises. Montaigne, Mary Queen of Scots, and James VI of Scotland were his pupils at various times. He was the best Latin scholar of his age, and his most important works are *De jure regni apud Scotos* and *Rerum Scoticarum historia.*

Buchman, Rev. Frank Nathan David (b. 1878), American evangelist, leader of the movement known as "moral rearmament." Initiated in 1921 the religious fellowship known as the Oxford Group Movement.

Buchner, Eduard (1860–1917), German chemist and professor, famous for his discovery of the enzymes within yeast cells and for his work in the chemistry of fermentation. For this he was awarded the 1907 Nobel Prize for Chemistry.

Büchner, Georg (1813–37), German dramatist

whose career was terminated by his early death at the age of twenty-four, but whose limited output (principally *Dantons Tod* and the fragment *Wozzeck*) is marked by extraordinary power and maturity.

Buckle, Henry Thomas (1821–1862), the author of *The History of Civilisation in England*, one of the most vigorous productions of the 19th century.

Budge, Sir Ernest Alfred Wallis, Litt. D., D. Litt., F.S.A. (1857–1934), a distinguished archæologist who conducted many excavations in Mesopotamia and Egypt. Was Keeper of Egyptian and Assyrian Antiquities at the British Museum, 1893–1924.

Buffon, Georges-Louis Leclerc, Comte de (1707–88), French author and naturalist who devoted his life to the study of natural history and whose great work *Histoire Naturelle* in 36 volumes appeared between 1749 and 1789.

Bulganin, Marshal Nikolai Alexandrovitch (b. 1895), Prime Minister of Soviet Russia, 1955–58. Formerly Soviet Defence Minister.

Bull, John (c. 1562–1628), was organist to James I. and composed much acceptable music, including, it is supposed, our National Anthem *God save the Queen*.

Bülow, Hans Guido von (1830–94), German pianist and conductor, an outstanding figure among the musicians of his day. He married Liszt's daughter Cosima, who later left him to marry Wagner.

Bunsen, Robert Wilhelm (1811–1899), German chemist, discoverer of the metals cæsium and rubidium, and inventor of the Bunsen burner, battery, and pump. Made many important observations in spectrum analysis.

Bunyan, John (1628–1688), was originally a travelling tinker and is believed to have served in the Parliamentary army. He joined an Independent church in Bedford in 1655 and became a popular preacher. After the Restoration he was thrown into prison, and there wrote *Pilgrim's Progress*, the finest allegorical work in this or any language. Of his other works the *Holy War*, *Grace Abounding*, and *Mr. Badman* are the best known.

Burckhardt, Jacob Christoph (1818–97), Swiss historian whose *The Civilisation of the Renaissance in Italy* is one of the great classics on the subject.

Burghley, William Cecil, Lord (1520–1598), Secretary to Lord Protector Somerset, an influential statesman under Edward VI, and Queen Mary, and subsequently Queen Elizabeth's favourite Minister for forty years.

Burke, Edmund (1729–1797), the acknowledged philosopher of conservatism: son of a Dublin attorney, went to London in 1756, and made his mark in literature by his famous work on the *Sublime and Beautiful*. Later on was private secretary to the Marquis of Rockingham, then Premier, and entered Parliament, where he quickly made a name. An able and earnest debater, he took part in all the great movements of his time, and in 1795, after his retirement, was awarded a handsome pension from the Civil List.

Burnet, Bishop Gilbert (1643–1715), wrote a *History of His Own Times*, which deals with many events of which he had personal knowledge, and is a valuable legacy to historical scholars.

Burnet, Sir John James, R.A. (1859–1938), was a leading British architect, whose most important work was the King Edward VII Galleries of the British Museum, opened in May 1914. Among his many large buildings in London are Adelaide House, and the extension to Selfridge's.

Burney, Fanny (*See* **D' Arblay, Madame.**)

Burns, Robert (1759–1796), Scotland's greatest poet. Startled the world with a little book of poems in 1786 which proclaimed him a true són of the muses. With the £500 that his book yielded him he bought a farm, obtained an appointment with the Excise in 1789, and for the last five years of his life lived at Dumfries. In his career he poured forth song after song of emotional tenderness, and made his name immortal.

Burton, Sir Richard Francis, K.C.M.G. (1821–1890) explorer, orientalist, and diplomatist, who became famous after making a pilgrimage to Mecca in 1853 disguised as a Mohammedan. Later he did much exploring in Central Africa, wrote several books and made a remarkable literal translation of the *Arabian Nights* (16 vols.).

Busoni, Ferruccio Benvenuto (1866–1920), the greatest pianist of his age, and composer of 3 operas (the last, *Dr. Faust*, unfinished at his death), much orchestral and chamber music, and works for the piano. He was born in Empoli near Florence but spent much of his life in Germany.

Bustamante, Sir William Alexander (b. 1884), Jamaican labour leader and politician. When Jamaica received its new constitution in 1944 the Labour Party under his leadership gained an overwhelming electoral victory.

Butler, Joseph (1692–1752), an English divine who occupied an important place among eighteenth-century thinkers. He declined the Archbishopric of Canterbury in 1747, but in 1750 became Bishop of Durham. In 1736 he published his *Analogy of Religion*, the whole of which was a reply to the deistic attacks on revealed religion.

Butler, Dr. Nicholas Murray (1862–1947), President of Columbia University, 1902–45. A well-known publicist and internationalist and one of the most honoured and distinguished leaders in the world of education. Shared with Jane Addams (*q.v.*), the noted American sociologist, the Nobel Prize for Peace, 1931.

Butler, Rt. Hon. Richard Austen, C.H., M.P. (b. 1902), Home Sec., 1957– ; Chair. Cons. Party, 1959– ; Leader of the House of Commons, 1955– ; Chan. of the Exchequer, 1951–55; Min. of Education, 1941–45; and responsible for the Education Act, 1944. A member of the distinguished Cambridge family and son of the late Sir Montague Butler, formerly Master of Pembroke. Took leading part in the drawing-up of the various political charters setting out Conservative policy.

Butler, Samuel (1612–1680), renowned as the author of *Hudibras*, one of the wittiest poems in the language and one of the most quoted. His last years were spent in poverty, and he was buried in the churchyard of St. Paul's, Covent Garden, and given a memorial in Westminster Abbey, " that he who was destitute of all things when alive might not want a monument when dead."

Butler, Samuel (1835–1902), author of the satirical novel *Erewhon* and its sequel *Erewhon Revisited*. Other works include *The Fair Haven* (1873), *Life and Habit* (1877), *Evolution Old and New* (1879), in which he attacked Darwinism. *The Way of All Flesh* and his famous *Notebooks* were published posthumously. Butler was a man of great originality and scholarship. He studied painting and exhibited regularly in the Academy and was also a musician.

Butt, Dame Clara, D.B.E. (1873–1936), the famous English contralto, made her first professional appearance in London in 1892. Her success was immediate. She was married to Mr. Kennerly Rumford—also an able vocalist—in 1900.

Buxton, Sir Thomas Fowell, 1st Bart. (1786–1845), a philanthropist and zealous advocate of the abolition of slavery.

Byrd, Rear-Admiral Richard Evelyn (1888–1957), famous American aviator and Polar explorer. Was in command of the Macmillan Arctic Expedition, 1925; flew over the North Pole, 1926; with three companions flew across the Atlantic, 1927, and in 1929 made the first flight over the South Pole. Discovered Edsel Ford mountains and Marie Byrd Land on his first expedition to the Antarctic, 1928–30. He made a second expedition in 1933–5, a third in 1939, and a fourth in December 1946.

Byrd, William (1543–1623), English writer of keyboard music and the greatest musician of the 16th century. He wrote church music, sacred choral music, string music, vocal and instrumental music, and founded the school of English madrigalists. He was organist of Lincoln Cathedral at 20 and later of Queen Elizabeth's Chapel Royal.

Byron, George Gordon, 6th Lord (1788–1824), was the poet who exercised the greatest influence upon European thought during the early part of the 19th century. Educated at Harrow and Cambridge, he published his *Hours of Idleness* at twenty, a volume which was violently attacked by the *Edinburgh Review*

which provoked his retaliatory *English Bards and Scotch Reviewers*, which caused a great sensation because of its unsparing criticisms of the writers of the day. His *Childe Harold's Pilgrimage*, the first two cantos of which were published in 1812, at once placed him in the front rank of poets, and thenceforward to the time of his death he continued to produce poems, most of which were marked by an intense Republican sentiment, yet full of passion and charm and beauty. He made an unhappy marriage in 1815 with the daughter of Sir Ralph Milbanke, from whom he parted after a twelvemonth. He lived abroad for the rest of his life and died at Missolonghi, whither he had proceeded with a view to aiding the Greeks in their battle for national independence.

C

Cable, George Washington (1844–1925), a well-known American author, born in New Orleans, the scene of many of his best works. Among his writings were *Ole Creole Days* (1879), *Strange Stories of Louisiana* (1889), and serious sociological studies such as *The Negro Question* (1890).

Cabot, John (*c.* 1455–*c.* 1498), Genoese explorer who settled in Bristol and sailed westwards under letters-patent from Henry VII of England in 1497. Discovered Newfoundland and Nova Scotia, believing them to be part of Asia, and may have reached the mainland of America before Columbus did. His son:—

Cabot, Sebastian (*c.* 1483–1557) was born in Venice, and in 1509 sailed in search of a north-west passage to Asia. Sailed as far as the entrance of Hudson Bay. Entered Spanish service in 1512, and in 1518 was appointed chief pilot. Spent several years exploring the Plate and Parana rivers. Re-entered English service in 1548 and organised expedition to seek a north-east passage to open up trade with India, which resulted in trade with Russia. English claim to North America is founded on the voyages of the Cabots.

Cabral, Pedro Alvarez (*c.* 1467–*c.* 1520). Portuguese navigator, friend of Vasco da Gama, and discoverer of Brazil, which he named "Terra da Santa Cruz."

Cadbury, George (1839–1922), was a prominent member of the Society of Friends, a well-known Philanthropist, and ardent Liberal, and head of the firm of Cadbury Bros., Bourneville. He took the lead in the Garden City project, and the village of Bourneville may be regarded as the first enterprise of the character to be practically completed; it has an endowment of over £200,000.

Cadogan, Rt. Hon. Sir Alexander, O.M., G.C.M.G., K.C.B. (b. 1884), entered the Diplomatic Service in 1908, and succeeded Lord Vansittart as permanent Under-Secretary of the Foreign Office in 1938. Helped to draft the Charter of the United Nations Organisation, and became Great Britain's first permanent representative on the Security Council. Chairman of the B.B.C., 1952–7.

Caedmon, the first English Christian poet, lived in the seventh century and, according to Bede, was first a cowherd and later a monk at Whitby. His poetry was based on the Scriptures.

Caesar, Caius Julius (*c.* 101–44 B.C.), Roman general. Was appointed successively military tribune, quæstor in 68, ædile in 65, and pontifex maximus in 63. A year later he was prætor, and later formed one of the first triumvirate. He invaded Gaul and Britain, in the Civil War defeated Pompey, and in the Alexandrine war met Cleopatra, and established her firmly on the throne of Egypt. On his return to Rome in 44 the crown was offered to him, a circumstance which caused the aristocratic party to compass his assassination.

Caine, Sir Thomas Henry Hall, C.H., K.B.E. (1853–1931), author of numerous novels, including *The Deemster*, *The Manxman*, *The Christian*, *The Prodigal Son*, *The Woman Thou Gavest Me*, the latter being one of the fiction sensations of 1913.

Calderón de la Barca, Pedro (1600–1681), a Spanish dramatist of great eminence whose plays number nearly 200. He was writer of court spectacles for Philip IV.

Callcott, Sir Augustus Wall, R.A. (1779–1844). Attained great eminence as a landscape painter.

Calvin, John (1509–1564), one of the leading Reformers of the 16th century. Was born in Picardy and attained great popularity as a preacher in Paris, but was expelled, and subsequently lived at Geneva, where he continued to preach the new doctrine, giving it that special shape which resulted in the formation of the Calvinist body, distinguished by its greater austerity from that of the Lutherans.

Camden, William (1551–1623), an antiquary, historian, and master of Westminster School, whose researches, especially in the field of topography, have been of the greatest value. He became Clarencieux King-at-Arms, and was buried in Westminster Abbey. The Camden Society is named after him.

Cameron, Sir David Young, R.A. (1865–1945), was one of the best known of British etchers as well as an excellent landscape-painter. King's Painter and Limner in Scotland, 1933–45.

Cameron, Richard (*c.* 1648–1680), one of the Scottish 17th-century preachers who raised the standard of revolt in defence of the Solemn League and Covenant; he was, after many vicissitudes, slain in combat near Aird's Moss, Ayrshire, in 1680. The members of the Reformed Presbyterian Church were afterwards called Cameronians.

Cameron, Verney Lovett, C.B. (1844–1894), a noted African explorer who was the first to cross the African continent from east to west. Explored Lake Tanganyika, and made many valuable geographical discoveries. In 1872 went out to find Livingstone, and in 1873 met a party of natives bearing the dead body to the coast.

Camillus, Marcus Furius (446–365 B.C.), was five times Dictator of the Roman Republic, a supporter of the patrician order, and one of the most successful of the Roman generals. He died of the pestilence, 365 B.C.

Camm, Sir Sydney, C.B.E. (b. 1893), designer of the Hawker Hurricane Fighter aeroplane.

Cammaerts, Emile, C.B.E. (1878–1953), Belgian poet, critic, historian and dramatist. Born in Brussels, he settled in England in 1908, and became Professor of Belgian Studies and Institutions in the University of London. He became widely known during the war of 1914–18 for a series of Belgian poems.

Camões, Luis Vaz de (1524–1580), the author of *Os Lusiadas*, the great epic poem of Portugal, which sets forth the adventures of the discoverers of India, and celebrates the achievements of the principal personages in Portuguese history.

Campbell, Sir Colin. *See* **Clyde, Baron.**

Campbell, Sir Malcolm (1885–1948), the racing driver who held the land-speed record of 301 m.p.h. (1935) and water-speed record 141·7 m.p.h. (1939). His son **Donald M. Campbell,** C.B.E., broke his own world water-speed record on May 14, 1959, averaging 260·35 m.p.h.

Campbell, Beatrice Stella (Mrs. Patrick Campbell) (1865–1940), was a celebrated actress. Her first London appearance was in 1890 in *The Hunchback*. She made her film debut in 1930 in *The Dancers*.

Campbell, Thomas (1777–1844), Scottish poet who at 22 published *The Pleasures of Hope*. He was one of the founders of University College, London, and is chiefly remembered for his war songs and the poems *Ye Mariners of England*, *The Battle of the Baltic*.

Campbell-Bannerman, Rt. Hon. Sir Henry, G.C.B. (1836–1908), Prime Minister in the Liberal Ministry from December 1905 until shortly before his death in April 1908. His Government at once faced a General Election and obtained a very large majority. Notable events of his period of office were the Trades Disputes Act, 1906, the Deceased Wife's Sister Act, 1907, and the simmering quarrel between the Liberals and the House of Lords, while the settlement of the South African problem was to a great extent due to his efforts. His Ministry contained a galaxy of talent—Grey, Haldane, Lloyd George, Asquith, Morley, Churchill—and was mainly held together by his personal popularity.

Camus, Albert (1913–60), important French writer, native of Algiers, whose works show the influence of existentialism. The Nobel Prize was awarded him in 1957 for "his important literary work, which has with penetrating seriousness thrown light on the problems of human conscience in our times." His most well-known novels are *l'Etranger* (1942), *La Peste* (1947), *l'Homme Révolté* (1952). Killed in car crash.

Canaletto, Giovanni Antonio (1697–1768), Venetian artist who excelled in the art of architectural painting. Some of his work is in the National Gallery, and there is a fine collection at Windsor.

Canning, Rt. Hon. George (1770–1827), entered Parliament in 1793 and became a great orator and a devoted adherent of Pitt, under whom he served first as Under-Secretary of State and later as Treasurer to the Navy. He was Secretary for Foreign Affairs under the Duke of Portland, and in 1827 became Prime Minister, but died four months later.

Cannizzaro, Stanislao (1826–1910), Italian chemist who rendered great service to scientific education and whose work provided the basis of modern quantitative chemist. He was professor of chemistry at Genoa, Palermo, and Rome.

Canova, Antonio (1757–1822), an Italian sculptor, leader of the classical revival in Italy, whose works achieved the first eminence.

Canute the Great (995–1035), invaded England with a Danish force, and in 1013 succeeded in dethroning Ethelred the Unready, and setting up his own father, Sweyn, in Ethelred's stead. Sweyn dying in 1014, Canute claimed the crown, but it took him some years to establish himself firmly.

Capablanca, José Raoul (1888–1942), world's chess champion, 1921–27; defeated by Alekhine.

Čapek, Karel, Ph.D. (1890–1938), Czech author and journalist whose *R.U.R.*, *Insect Play* and *Adam the Creator* have been produced in England.

Capone, Al (1900–47), notorious U.S. gangster, uncrowned king of Chicago during the prohibition era. Suspected of instigating many murders, but evaded justice until brought to trial on Income Tax charges. Sentenced to eleven years' imprisonment in 1931, but released in 1939.

Caractacus was the name by which a Prince of ancient Britain became famed for his resistance to the Romans in the 1st century. He was ultimately captured and taken prisoner to Rome where the Emperor Claudius was so moved by his dignity of bearing that he pardoned him.

Carey, William, D.D. (1761–1834), the first Baptist missionary to proceed to India, and from 1800 to 1830 Professor of Oriental Languages at Port William College, Calcutta. Became famed as an Oriental scholar, and published twenty-four different translations of the Scriptures.

Carissimi, Giacomo (1604–74), an Italian composer who is historically important for his development of the sacred cantata and the oratorio. Was maestro at Assisi, and later at Rome. The best collection of his works are in the National Library in Paris, and in the library of Christ Church, Oxford.

Carlyle, Thomas (1795–1881), was educated at Edinburgh University, and, after passing through some years of teaching drudgery, settled in London in 1824 and began the career of a serious man of letters; but, marrying Jane Welsh in 1826, he returned to Scotland and spent the next few years on a farm at Craigenputtoch, coming to London again in 1834. His *Sartor Resartus* was published in 1833. In 1837 he gave lectures in London, and in 1839 his *Chartism* appeared. His *French Revolution*, *Past and Present*, *Life and Letters of Oliver Cromwell*, *Latter-Day Pamphlets*, and *Frederick the Great* were works of noble conception.

Carnegie, Andrew (1835–1919), b. in Dunfermline, emigrated to America with his father in 1848, and after passing through much menial employment became connected with the Pennsylvania Railroad as Divisional Superintendent at Pittsburg, and ultimately established the Carnegie iron works, from which he retired in 1901 with a fortune of many millions. His munificent gifts for Free Libraries, educational work, and charitable objects are well known.

Carnot, General Lazare Nicolas Marguerite (1753–1823), was a prominent figure in the French Revolution, and author of an important work on fortification.

Caroline, Queen, wife of George IV. (1768–1821), was married to her husband in 1795 while he was Prince of Wales. The royal couple lived together only a very short time. When George succeeded to the throne in 1820 the Queen took steps to assert her position, and the King retaliated by having a Bill introduced to dissolve the marriage; the result was the famous trial before the House of Lords, when Lord Brougham distinguished himself by a most eloquent defence of the Queen. The Bill was passed by a narrow majority, but public feeling was too strong on the side of the Queen to admit of its being enforced.

Carrel, Dr. Alexis (1873–1944), American surgeon who won the Nobel Prize in 1912 for his remarkable achievements in suturing blood vessels and in the transplantation of organs. Member of the Rockefeller Institute for Medical Research 1906–44. A Frenchman by birth.

Carroll, Lewis. (*See* **Dodgson, Charles Lutwidge.**)

Carson of Duncairn, Lord, P.C. (1854–1935), had a highly successful career first at the Irish and then at the English Bar. Solicitor General for Ireland 1892; and for England 1900–6. Attorney General 1915; First Lord of the Admiralty 1917; Lord of Appeal 1921–29. Led a semi-militant organisation against the Home Rule Bill 1912–14.

Carter, Howard (1873–1939), Egyptologist and archaeologist who was associated with the 5th Earl of Carnarvon in discovering in 1922 the tomb of Tut-Ankh-Amen in the Valley of Kings, Egypt.

Cartier, Jacques (1494–1557), 16th-century navigator, born at St. Malo, whose exploration of Canada, and especially of the gulf and river of St. Lawrence, proved of great geographical importance.

Cartwright, Edmund, D.D. (1743–1823), invented the power loom, and also a wool-combing machine. Although these inventions were developed into fortune-making instruments, they benefited their inventor but little, and in 1809 Parliament made him a grant of £10,000. In 1904 a Cartwright Memorial Hall was opened at Bradford, the gift of Lord Masham.

Caruso, Enrico (1873–1921), a celebrated tenor, was born in Naples, and made his first operatic appearance in his native city. His success was unbounded.

Carver, George Washington (1864–1943), American negro agricultural chemist of world repute.

Casabianca, Louis de (*c.* 1754–1798), captain of the French flagship *L'Orient* at the Battle of the Nile. He and his ten-year-old son died together in the burning ship, refusing to quit the vessel.

Casals, Pablo (b. 1876), the famous Spanish violoncellist and conductor, who made his first appearance in Paris and London in 1898. He exiled himself from Spain in 1938 as a protest against dictatorship.

Cassatt, Mary (1845–1926), American painter and etcher. Spent most of her life in France, greatly influenced by the Impressionists and enjoyed friendship of Degas and Manet. Motherhood was her favourite subject.

Cassini, the name of a French family of Italian origin, distinguished for their services to astronomy and geography, who through four generations (1671–1793) were heads of the Paris Observatory.

Cassius, Caius Longinus, a distinguished Roman general who opposed the Dictatorship of Julius Cæsar, and took part in his murder. He died in 42 B.C., after being defeated by Mark Antony.

Castellani, Sir Aldo, Hon. K.C.M.G. (b. 1877), Italian scientist and foremost living authority on tropical diseases. Discovered the cause of sleeping sickness and other tropical diseases.

Castlereagh, Viscount, K.G., P.C. (1769–1822), British Minister of War and Foreign Secretary during the Napoleonic wars, who incurred much unpopularity because of the disastrous condition of home affairs. Succeeded to the Marquessate of Londonderry in 1821, and ended his life by suicide the following year.

Cather, Willa Silbert (1876–1947), American author; writer of beautiful English prose in novels of rare charm. Most of her scenes are

laid in the mid-western prairies; *The Song of the Lark*, *My Antonia*, *A Lost Lady*.

Catherine, St., was the name borne by a celebrated virgin of Alexandria, who was put to death in 307 for professing Christianity, being, according to some accounts, tortured on a spiked wheel before execution, though other authorities aver that the intended torture was miraculously prevented. From this we get the term "St. Catherine's wheel." Her festival is on November 25th.

Catherine of Aragon (1485–1536), first wife of Henry VIII., was previously the wife of Arthur, Henry's elder brother, who died shortly after the marriage. She was the daughter of Ferdinand and Isabella of Spain, aunt of the Emperor, Charles V, and mother of Mary Tudor. Henry's failure to obtain papal consent to the dissolution of their marriage precipitated the Reformation crisis in England.

Catherine the Great (1729–96), Empress Catherine II of Russia. Daughter of a Prussian general, she married in 1745 the future Peter III, a weakling, later deposed and murdered. Intelligent, cultivated, autocratic, she proved herself a capable ruler for a time but was hampered and opposed by the landed interests and, despite plans for reform, her reign was marked by imperialist expansion and extension of serfdom.

Catherine de' Medici (1519–1589), wife of Henry II. of France, and a woman of commanding power and influence, especially during her Regency, which continued while her son Charles IX. was in his minority. Her antagonism to the Protestants may have led to the Massacre of St. Bartholomew. In spite of her cruelty, she was an able woman, and showed a great appreciation of art and literature.

Cato, Marcus Porcius (234–149 B.C.) a Roman statesman, soldier, and writer, of strict virtue, simplicity and wisdom, who strongly condemned the luxury of his time and carried out his duties as Censor so rigorously that he became known as "Censorious."

Catroux, Gen. Georges (b. 1879), French soldier, who saw much service with the Foreign Legion. When Gov.-Gen. of Indo-China declared adherence to the Free French, 1940, and became C.-in-C. Free French in Levant,, 1941–43. French Ambassador to U.S.S.R., 1945–46.

Catullus, Caius Valerius (87–54 B.C.), an elegant Roman poet, whose lyrics to Lesbia are amongst the finest compositions of the kind in literature.

Cavell, Edith Louisa (1865–1915), a British nurse and patriot who assisted wounded British soldiers to escape over the Dutch frontier from Belgium during the Great War. She was shot by the Germans.

Cavendish, Hon. Henry, F.R.S. (1731–1810), English chemist and physicist who made researches into the nature of gases. Is chiefly remembered for his discovery of the chemical composition of water. He also discovered hydrogen (1766).

Cavour, Count Camillo Benso (1810–1861), a distinguished Italian statesman, who, as Premier to Victor Emmanuel, did much for the unification of Italy.

Caxton, William (1422–1491), was born in Kent and employed in commerce for a time. While visiting Flanders he obtained an insight into the then new invention of printing, and afterwards set up a printing-press of his own at Westminster.

Cecil of Chelwood, 1st Viscount, P.C., Q.C., C.H. (1864–1958), third son of the third Marquess of Salisbury. Took part in the Peace Conference, 1919, and helped to draft the Charter of the League of Nations. Awarded Nobel Prize for Peace, 1937.

Cecilia, Saint, the patron saint of music, martyred in Sicily under Marcus Aurelius (*c.* 176). She became patroness of music only about the beginning of the 15th century when painters showed her with harp, organ, or other musical instruments. Her festal day is Nov. 22.

Cellini, Benvenuto (1500–71), Italian sculptor and goldsmith of the later Renaissance. Possessed remarkable talent and skill, and produced innumerable works of great accomplishment, decorative and exquisite in detail, most of which have perished. Some examples are to be found in the Vienna Museum, the Louvre, and in the Metropolitan Museum. His famous bronze statue *Perseus with the Head of Medusa* can be seen in the Loggia dei Lanzi, Florence. His fame, however, rests more on his *Autobiography*, which gives a vivid account of the period and of his own craft.

Celsius, Anders (1701–44), Swedish physicist and astronomer who became professor of astronomy at Uppsala in 1730 and worked at the new Uppsala observatory, 1740–44. He invented the Centigrade or Celsius thermometer with freezing point of water at the zero-degree and boiling point at the 100-degree point.

Cervantes Saavedra, Miguel de (1547–1616), famous throughout the world as the author of *Don Quixote*, a wonderful study of feudalism in decay in which is to be found much social science. He had a most adventurous career, taking part in many military expeditions, and not turning to literature until his retirement from the profession of arms. In spite of the great success of his work he died in poverty and two centuries went by before he was honoured.

Cézanne, Paul (1839–1906), a French painter of power and originality, and intimate friend of Emile Zola. The famous portrait known as *La Vieille au Chapelet* was purchased by the National Gallery in 1953 and the Courtauld Collection in London includes, among others, the *Montagne Sainte Victoire*, and the *Lake of Annecy*.

Chadwick, Sir James, F.R.S. (b. 1891), physicist, one of Rutherford's most brilliant collaborators in the field of atomic research. Discovered the neutron in 1932, one of the main steps in the discovery of the fission process which led to the production of the atom bomb. Member (part-time) U.K. Atomic Energy Authority, 1958– ; Master of Caius College, Cambridge; co-author of *Radiations from Radioactive Substances*.

Chaliapin, Fedor Ivanovich (1873–1938), a world-famous Russian opera singer, a bass with great dramatic gifts.

Chamberlain, Rt. Hon. (Arthur) Neville (1869–1940), son of Joseph Chamberlain by his second wife. Prime Minister, 1937–40. His appeasement policy, which culminated in the Munich Agreement of 1938, has been the subject of much criticism.

Chamberlain, Rt. Hon. Joseph (1836–1914), did much active municipal work at Birmingham. In 1876 he entered Parliament, and at first was an enthusiastic Liberal with Republican tendencies and served in various offices under Mr. Gladstone. When the Home Rule split occurred, he became the most active member of the Liberal-Unionist party. In 1895 he accepted office as Secretary of State for the Colonies under Lord Salisbury, and in that post won a great reputation, notwithstanding the fact that during his term of office he had the Boer War to contend with. In May, 1903, he caused great sensation by suddenly advocating a scheme of fiscal reform, involving a partial return to Protection. This policy was afterwards adopted as one of the leading planks of the Unionist platform.

Chambers, Sir William, R.A. (1726–1796), a British architect, who rebuilt Somerset House in 1775, He also laid out Kew Gardens and designed the Pagoda there.

Chaminade, Cécile (1857–1944), French pianist and composer of orchestral music, ballets, songs, and charming piano pieces.

Champlain, Samuel de (1567–1635), a French navigator who founded Quebec in 1608, and in the following year discovered the lake known by his name.

Chantrey, Sir Francis Legatt, R.A. (1781–1842), a renowned English sculptor who contributed many fine statues to Westminster Abbey and St. Paul's. His famous "Sleeping Children" tomb is in Lichfield Cathedral. He left a considerable fortune to the Royal Academy for the purchase of works of art executed in Gt. Britain. The collection is in the Tate Gallery.

Chaplin, Charles Spencer (b. 1889), who gained world-wide fame as a film-star comedian, was born in London and appeared on the variety stage at the age of seven, going to the U.S.A. in 1910. He first appeared on the films in 1913. His most famous films include *The Tramp*, *Shoulder Arms*, *The Kid*, *The Gold Rush*, *The Circus*, *City Lights*, *The Great Dictator*, *Modern Times*, *Monsieur Verdoux*, and *Limelight*. His art is universally appreciated. In 1953 de-

cided not to return to America but to live in Switzerland.

Chapman, Sydney, M.A., D.Sc., F.R.S. (b. 1888), mathematician and geophysicist who has made contributions of the highest importance to the kinetic theory of gases, terrestrial magnetism, and the phenomena of the upper atmosphere. Chief Prof. of Mathematics, Imperial College of Science, 1924–46; Pres. Int. Comm. which organised the International Geophysical Year.

Chapman, George (1559–1634), an Elizabethan dramatist, who acquired more fame by his translation of Homer than by his plays. Keats's sonnet *On Reading Chapman's Homer* is a splendid tribute to the old dramatist.

Charcot, Dr. Jean Baptiste Etienne Auguste (1867–1936), a famous French explorer, who in 1903–05 and 1908–10 commanded expeditions which carried out important work in mapping, sounding, etc., in the South Polar regions. Charcot Island in the Antarctic Ocean, which he discovered in 1905, is named after him.

Chares (c. 300 B.C.), Rhodian sculptor. He was the sculptor of the Colossus of Rhodes, a gigantic bronze statue of the Sun-God, and one of the Seven Wonders of the World. The statue was destroyed after 56 years, in the earthquake of 224 B.C.

Charlemagne ("**Charles the Great**") (742–814), a wise and powerful ruler, general and statesman, who from being King of the Franks became Emperor of the Romans, and governed an empire comprising Gaul, Italy, and large parts of Spain and Germany.

Charles, Jacques Alexandre César (1746–1823), French physicist, the first to use hydrogen gas in balloons and who anticipated Gay–Lussac's law of the expansion of gases on heating.

Charles Edward (Stuart) (1720–1788), the "Young Pretender" as he came to be called, grandson of James II., and the hero of 1745, lived in exile after Culloden, and his later career was mainly one of dissipation.

Charles I. (1600–1649), King of England, Scotland, and Ireland (1625–49), succeeded his father James I in 1625, and from the first was in more or less conflict with Parliament. His monetary demands and unjust taxation led to the violent opposition which resulted in the Civil War. He was beheaded in front of the Banqueting House at Whitehall, Jan. 30, 1649.

Charles II. (1630–1685), King of England, Scotland, and Ireland (1660–85), eldest son of Charles I. He was in command of the Royalist forces in the West during the Civil War, and escaped to the Continent after Naseby. Subsequently he became King at the Restoration, and, following upon the sober quietude of the Commonwealth period, formed an acceptable change to the people at large until, by his excesses, of one kind and another, he proved his unkingliness of character. He contrived to keep himself fairly popular, however, despite his extreme selfishness. Granted first Charter to the Royal Society.

Charles V. (1500–1558) was the dominating European figure for many years, being Emperor of Germany and King of Spain, at a time when his tactful policy enabled him to guard the interests of both Catholics and Protestants with considerable success.

Charles XII of Sweden (1682–1718), a brave but impulsive monarch whose reign was distinguished by the great Nordic War against Denmark, Poland, and Russia. Peter the Great decisively defeated him at Poltava in 1709. In 1718 he invaded Norway and was killed while besieging the fortress of Fredrikshald.

Chateaubriand, François René, Vicomte de (1768–1848), French writer and diplomat who in the midst of an adventurous and somewhat eccentric political career wrote a number of stories, poems, and essays which reflect the richness of his personality and give him a unique place in French literature. He was the friend of Mme Récamier for many years. His last years were spent in writing *Mémoires d'outre-tombe* (memoirs from beyond the tomb).

Chatham, William Pitt, Earl of (1708–1778), had a long and distinguished career as a statesman, and was the most eloquent Parliamentarian of his time. In the long conflict with France that preceded the American War of Independence, Chatham showed great resourcefulness and vigour, but his patriotic efforts were of little avail against the obstinacy of the King and his party, and he ultimately retired from contention, only making a last appearance in the House of Lords to urge a greater resistance to the war with the American Colonists, and, after a powerful speech, fell back in an apoplectic fit and died a few weeks later, being buried in Westminster Abbey.

Chatterton, Thomas (1752–1770), young English poet of remarkable talent, unappreciated until after his death. Unsuccessfully tried to pass off his writings as newly discovered ancient manuscripts and killed himself at the age of 17.

Chaucer, Geoffrey (c. 1343–1400). Achieved immortality by his *Canterbury Tales*, giving a most graphic description of the life and characters of his time. He was buried in Westminster Abbey.

Chekhov, Anton (1860–1904), Russian dramatist and short-story writer, whose plays include *The Cherry Orchard*, *Uncle Vanya*, *The Three Sisters*.

Cherubini, Maria Luigi Carlo Zenobia Salvatore (1760–1842), a Florentine musician, for many years director of the Paris Conservatoire and composer of operas and church music. Admired by Beethoven and Mendelssohn.

Chesterfield, Earl of, K.G. (1694–1773), the fourth Earl, and a statesman of note. His fame rests, however, upon his *Letters to his Son*, which for purity of style and grace of expression have seldom been excelled, though the moral they point is not always one that modern ideas would endorse.

Chesterton, Gilbert Keith (1874–1936), was one of the most active of our modern writers. Contributed to the *Illustrated London News*, etc., and kept himself in evidence in many literary and journalistic quarters; handled social questions, art, politics, and criticism with dexterity and audacity. Published studies of the lives and works of Robert Browning and Charles Dickens. Completed writing his own autobiography shortly before his death.

Chevalier Albert (1861–1923), English music-hall comedian of great originality; celebrated for his coster sketches and songs.

Chevalier, Maurice (b. 1889), French stage and film actor.

Chiang Kai-shek, Generalissimo (b. 1887), former President of China and member of the Kuomintang Party. Emerged from the welter of events succeeding the death of Sun Yat Sen in 1925 as the leading man in China, a position he maintained for a quarter of a century of trouble and bloodshed. The successful conclusion of the long and costly Japanese war was followed by civil war with the Communists in North China. In January 1949 he withdrew from the office of President following military defeat by the Communists and the collapse of the Kuomintang régime. Became a Christian of the Methodist confession shortly after his marriage to Soong Mei-ling the sociologist.

Chippendale, Thomas (c. 1717–1779), a celebrated designer of furniture whose examples are now highly prized and fetch big prices. He was a native of Worcestershire, but made his name in London, having a shop in St. Martin's Lane.

Chirico, Giorgio de (b. 1888), painter associated with surrealism, born in Greece of Italian parents.

Chopin, Frédéric François (1810–1849), Polish pianist and composer, son of a French father and Polish mother. He has been called "the poet of the piano" because of the originality and delicacy of his playing. His music, composed mostly for the piano, includes preludes, mazurkas, impromptus, nocturnes, études, sonatas, and a barcarolle and a berceuse. He enjoyed Paris intellectual and musical society, and played in numerous concerts all over Europe. He died of consumption and was buried in Père-Lachaise, next to his friend Bellini.

Chou-En-lai, General (b. 1898), Prime Minister of the Chinese People's Republic since 1949; Foreign Min. 1949–58. Took important part in Geneva Conference of 1954, where his talents for negotiation helped to bring to an end the 8 years' war in Indo-China and the new China into world diplomacy.

Chrysostom, St. John (347–407), a father and

saint of the Greek Church who was made Archbishop of Constantinople and was famous for his eloquent preaching and persuasive writing.

Churchill, Rt. Hon. Lord Randolph (Henry Spencer), P.C. (1849–1895), was the third son of the seventh Duke of Marlborough. Entered Parliament in 1874, and four years later became prominent on the Conservative side for his scathing attacks on what he called the "Old Gang" of his own Party, and was one of Mr. Gladstone's most severe critics. In 1885 he became Secretary for India, and in the following year was Chancellor of the Exchequer and Leader of the House of Commons, but after a few months of brilliant work resigned on some difference of opinion with his colleagues, and never again held office.

Churchill, Rt. Hon. Sir Winston (Leonard Spencer), K.G., O.M., C.H., M.P. (b. 1874), British statesman, soldier, and author, son of the last-named. Prime Min. and Min. of Defence, 1940–45. Leader of the opposition, 1945–51 and Prime Min. from 1951 until his retirement in 1955. M.P. for Woodford since 1945. M.P. for the Epping Division of Essex, 1924–45. Was with the British force during the Indian frontier troubles of 1897–98; served in the Sudan Campaign, and during the Boer War had many dramatic adventures. Became a prominent figure in Parliament, and worked heartily for the Conservatives until Mr. Chamberlain brought out his fiscal proposals, when he declared against them in the most emphatic manner, and eventually joined the Liberal ranks. Under-Secretary for the Colonies, 1905–08; President of the Board of Trade, 1908–10; Home Secretary, 1910–11. First Lord of the Admiralty, 1911–15 and 1939–40. Chancellor of the Duchy of Lancaster, 1915. Minister of Munitions, 1917; Minister of War, 1918–21; Minister of Air, 1919–21. Sec. of State for the Colonies, 1921–22. Chancellor of the Exchequer 1924–29; Lord Rector of Aberdeen University, 1914–18; Lord Rector of Edinburgh University, 1929–32; Chancellor of Bristol University, 1930; Leader of Conservative Party, 1940–55. Lord Warden of the Cinque Ports since 1941. Has exhibited in the Royal Academy, was elected Academician Extraordinary in 1948, and is the author of many famous books. Awarded Nobel Prize for Literature in 1953.

Chulalongkorn, Phra Paramindr Maha (1853–1910), great Siamese monarch whose appreciation of foreign institutions inspired him to carry out many reforms in his country.

Cibber, Colley (1671–1757), a London actor and dramatist of great repute in his day. *The Careless Husband*, and *Love's Last Shift* are the best of his comedies. Poet Laureate 1730–57.

Cicero, Marcus Tullius (106–43 B.C.), a Roman Republican orator and philosopher. His younger brother, Quintus Tullius Cicero (102–43 B.C.), was a Roman soldier of some note. Both were slain.

Cid (El Campeador) (*c.* 1035–1099), the name given to the famous Spanish knight, Rodrigo Diaz, Count of Vivar, whose exploits in battle and adventure made him the national hero. He drove the Moors out of Spain before he had completed his twentieth year.

Cierva, Juan de la (1895–1936), the Spanish engineer who invented the autogiro.

Cimabue, Giovanni (1240–1302), a Florentine painter whose real name was Cenni di Pepo, master of Giotto, and the leader of the movement which led to the formation of what is called the Florentine school. The frescoes attributed to him are of great beauty.

Cimarosa, Domenico (1749–1801). One of the earliest Italian composers whose works in his time were as popular as they were numerous. Was composer to the Russian Court from 1789 to 1792. His most popular opera during his lifetime was *Il Matrimonio Segreto*, and it is still to-day the most frequently heard of his works.

Cimon (*c.* 507–449 B.C.), Athenian statesman and general, son of the great Miltiades who commanded at Marathon. He worked for friendship with Sparta to unite forces against Persia. Decisively defeated Persian land and sea forces at the mouth of the Eurymedon in 468 B.C. Died at the siege of Citium, in Cyprus.

Cipriani, Giovanni Battista (1727–85), Florentine painter and engraver who worked in London and was one of the foundation members of the Royal Academy. Collections of his pen-and-ink drawings are in the British Museum and Victoria and Albert Museum.

Citrine, 1st Baron P.C., K.B.E. (b. 1887), English trade-union official who rose to a prominent position in the Electrical Trades Union, of which he was Asst. Gen. Sec., 1920–23; Pres. Int. Fed. of Trade Unions, 1928–45; Gen. Sec. Trades Union Congress, 1926–46; Mem. Nat. Coal Board, 1946–47; Chair. Central Electricity Authority, 1947–57; Mem. (part-time) Electricity Council, 1958– ; Mem. (part-time) U.K. Atomic Energy Authority, 1958– .

Clair, René, (b. 1898), French-film producer, whose early films which were full of wit and satire included *Sous les Toits de Paris* and *A Nous la Liberté*.

Clarendon, Edward Hyde, 1st Earl of (1609–1674), a statesman of great ability who filled the office of Lord High Chancellor under Charles II., and for a time was in high favour but, refusing to pander to Charles's whims, was dismissed and went to live in retirement. His *History of the Rebellion* is a valuable work, having the advantage of being written by one who was a witness of, and often an important figure in, the events described. His daughter Anne was the wife of the Duke of York, afterwards James II., and it was her daughter who became Queen Anne. Clarendon died in exile at Rouen.

Clark, Sir Kenneth McKenzie, C.H., K.C.B. (b. 1903), British art critic. Director of the National Gallery, 1934–45. Chairman, Arts Council of Great Britain, 1953– ; Chairman of the Independent Television Authority, 1954–57.

Clark, Wilfred Edward le Gros, M.A., M.D., D.Sc., F.R.C.S., F.R.S. (b. 1895), anatomist and anthropologist; Prof. of Anatomy, Oxford Univ. since 1934; one of the scientists to expose the forgery of the Piltdown skull.

Clarke, Marcus Andrew Hislop (1846–81), Australian novelist, born in London. Emigrated to Australia in 1863, where he became a journalist. During his stay in Tasmania he wrote *For the Term of his Natural Life*, which has become a minor classic.

Clarkson, Thomas (1760–1846), was one of the leaders of the Negro Emancipation movement, to which he devoted the main part of his life.

Claude Lorrain (1600–1682), the most famous landscape painter of his century. His real name was Claude Gelée, and he was born at Chamange in the Vosges, going from France to Rome as a lad and there laying the foundation of his worldwide celebrity. He lived in Rome most of his life.

Claudius I. (10 B.C.–A.D. 54), Emperor of Rome, who succeeded his nephew Caligula when he was murdered. He was the grandson of Tiberius Claudius Nero, erected many imposing buildings in Rome, and visited Britain. In his later years he became the tool of favourites, and was poisoned by his wife Agrippina.

Clausewitz, Gen. Carl von (1780–1831), Germany's greatest military expert. His classic book *Vom Kriege*, which expounds his theories on war, dominated Prussia in the nineteenth century, and is still studied in military schools throughout the world.

Clemenceau, Georges Eugène (1841–1929), a prominent French statesman and editor of strong Radical tendencies who supported General Boulanger for a time and then bitterly opposed him. Was still a leading exponent of French Radicalism, though he sacrificed his independent position to become Premier and Minister of the Interior in October, 1906–1909, Prime Minister and Minister for War, France, 1917–20. Was a great orator, and a sturdy defender of Dreyfus.

Clemens, Samuel Langhorne ("Mark Twain") (1835–1910). After the Civil War drifted into journalism, making himself popular as a humorist in 1869 by his *Innocents Abroad*, the result of a trip to Europe. His other works include *A Tramp Abroad*, *Tom Sawyer*, *Huckleberry Finn*, and *Pudd'nhead Wilson*.

Cleopatra (69–30 B.C.), daughter of Ptolemy XI, the sixth queen of Egypt by that name, a brilliant, ambitious woman of captivating charm. On the death of her father in 51 she became

joint sovereign with her younger brother Ptolemy XII, whom she married in accordance with Egyptian custom. She was banished to Syria, but obtaining the help of Cæsar, led a revolt and won the kingdom for herself. Cleopatra and Cæsar became lovers. In 47 she bore him a son Cæsarion (later Ptolemy XIV) and followed him to Rome. After the murder of Cæsar she returned to Egypt, where in 41 she was summoned to meet the triumvir Mark Antony. He fell in love with her and became enslaved. She bore him twins Alexander Helios and Cleopatra Selene. He deserted Octavia his wife and broke with Octavian (later Augustus), his brother-in-law, in an attempt to re-establish the power of Egypt. Antony and Cleopatra were, however, defeated at Actium in 31 B.C. and at Alexandria. Antony fell upon his sword, and Cleopatra, unable to influence Octavian, killed herself by allowing an asp to bite her. The drama of her life has been described by Shakespeare in *Antony and Cleopatra* and by Shaw in *Cæsar and Cleopatra.*

Clive, Robert, Lord (1725–1774), went out to India as a clerk in the service of the East India Company when 17, and during the diplomatic difficulties which arose between England and France attracted the attention of his superiors by some able suggestions for the curbing of the French influence. In the war that followed he was given a command and displayed such remarkable military genius that he virtually became Commander-in-Chief. In the troubles that followed with the native rulers, he was equally resourceful, and succeeded in laying the foundation of the British empire in India on a secure basis. On his return to England in 1760 he was raised to the peerage. His latter years were marked by mental disturbance and ultimately he committed suicide.

Clovis (*c.* 465–511) was the founder of the Merovingian-line of Frankish kings, and a convert to Christianity. He defeated the Burgundians and West Goths, and fixed his court at Paris.

Clyde, 1st Baron, Colin Campbell, K.C.B. (1792–(1863), a British Field-Marshal who served in the Peninsular and Crimean wars and made a great reputation as Commander-in-Chief in India during the Mutiny.

Cobbett, William (1762–1835), a politician and controversialist, who, through the medium of his *Political Register*, attacked both Radical and Tory in turn. Entered Parliament in 1832. In 1830 his *Rural Rides* were published in book form.

Cobbold, Cameron Fromanteel, P.C. (b. 1904), Governor of the Bank of England since 1948.

Cobden, Richard (1804–1865), the son of a Sussex farmer, who afterwards became a commercial traveller, and during the Corn Law Agitation came into great prominence as an advocate of Free Trade. He devoted himself so completely to this cause, that for some years he entirely neglected his business affairs and in recognition of his services a subscription of £80,000 was raised for him in 1845, and in 1860 a further sum of £40,000. He entered Parliament in 1841, and except for an interval of two years remained a member till his death. In 1860 he negotiated a commercial treaty with France which was of great benefit to the trade of this country. Titles and other honours were offered to him but declined.

Cochran, Sir Charles Blake (1872–1951), a prominent English theatrical manager and producer who began as an actor in America. Among his many successes were *Bitter Sweet*, *Cavalcade*, and a number of brilliant revues.

Cockroft, Sir John Douglas, K.C.B., O.M., C.B.E., M.A., Ph.D., F.R.S. (b. 1897), Cambridge nuclear physicist who shared with Dr. E. T. S. Walton the 1951 Nobel Prize. Dir. Atomic Energy Research Estab. at Harwell, 1946–58; Member (Research) U.K. Atomic Energy Authority, 1958–59, Member Advisory Council on Scientific Policy, 1959– ; Master of Churchill College (new college to be built at Cambridge for scientists and technologists).

Cocteau, Jean (b. 1891), French writer and artist whose achievements in widely varied forms of art have been prodigious. Elected to the Académie Française in 1955.

Cody, Samuel Franklin (1861–1913), British aviator, born in U.S.A., but became a naturalised British subject. He was the first man to fly in Great Britain—making a flight of 27 minutes in October 1908 in the first practical British flying-machine of his own make. Was killed while flying in 1913.

Cody, William Frederick (1846–1917), American showman, known as "Buffalo Bill," who in 1883 founded his great Wild West show.

Cohn, Ferdinand Julius (1828–1898), the famous German bacteriologist, of which science he was the virtual founder.

Coke, Sir Edward (1552–1634), Attorney-General under Elizabeth and Chief Justice under James I; great rival of Francis Bacon. His extensive legal erudition added many new interpretations to the Common Law system. Among his publications are his four *Institutes*, the first of which (*Coke upon Littleton*) is very famous.

Colbert, Jean Baptiste (1619–83), French statesman, who fostered new industries and encouraged commerce, endeavoured to reform the finances, and established the French Navy on a sound basis. A patron of literature, science and art.

Cole, George Douglas Howard, M.A., (1889–1959), British economist, sociologist, and writer: Chichele Professor of Social and Political Theory at Oxford, 1944–57; Chairman Fabian Society, 1939–46; Pres. Int. Society for the Study of Socialism from 1956 until his death. Among his numerous writings on social and economic problems are *The Intelligent Man's Guide through World Chaos* (1932), *The Post-War Condition of Britain* (1956), *The Case for Industrial Partnership* (1957).

Coleridge, 1st Baron (1820–94), Lord Chief Justice of England from 1880 until his death. Was a distinguished scholar, orator and barrister, his most famous case being the Tichborne trial in 1871, when his speech for the defence lasted 23 days.

Coleridge, Samuel Taylor (1772–1834), one of the great poets of the early part of the 19th century, whose *Ancient Mariner* and a few other poems stand unsurpassed for poetic beauty and originality.

Coleridge-Taylor, Samuel, A.R.C.M. (1875–1912), British composer, the son of a West African negro doctor practising in London, and an Englishwoman. He studied at the Royal College of Music where his *Hiawatha's Wedding Feast* was performed in 1898.

Colet, John (*c.* 1467–1519), humanist and divine, founded St. Paul's School, 1512. As scholar and friend of Erasmus he helped to bring the New Learning to England.

Colette, (**Sidonie Gabrielle Claudine Colette**) (1873–1954), author of a number of highly successful novels including the famous *Claudine* stories, *Chéri* and *La Fin de Chéri*. Grand Officier de la Légion d'Honneur (1953).

Collier, Hon, John (1850–1934), English painter who became highly popular for his "problem" pictures. He is best remembered, however, as a distinguished portraitist.

Collingwood, Lord (1750–1810), British admiral whose ship the *Royal Sovereign* led the fleet to battle at Trafalgar and who on Nelson's death assumed the command.

Collins, Michael (1890–1922), brilliant and daring Irishman, leading spirit of the Sinn Fein political movement. Took part in the Easter Rebellion and organised the guerilla warfare which eventually led to the breakdown of British government and to the Anglo-Irish Peace of Dec. 6, 1921. Killed in ambush by Republicans after his return from England.

Collins, William, R.A. (1788–1847), a noted landscape and figure painter, and father of Wilkie Collins.

Collins, William Wilkie (1824–1889), the novelist, was for many years associated with Charles Dickens, and wrote *The Dead Secret*, *The Woman in White*, and *No Name*.

Colt, Samuel (1814–1862), of Hartford, Connecticut, invented the revolver and patented it in 1835. It was some time before its utility was recognised, but after being used with great effect in the war with Mexico it was universally adopted.

Columba, St. (521–597), the founder of the monastery of Iona, was a native of Ireland. From his lonely island shrine he made frequent missionary journeys to the Highlands of Scotland,

where he made many converts and was greatly revered.

Columbus, Christopher (*c.* 1446–1506), the famous Italian navigator, who, prevailing upon Ferdinand and Isabella of Spain to bear the expense of an expedition of discovery, set out on his first voyage in 1492. He first discovered the Bahamas, Cuba, and other West Indian islands, and, on his third voyage, in 1498, landed on the lowlands of South America.

Colvin, Sir Sidney (1845–1927), friend of R. L. Stevenson and biographer of Keats. Was Keeper of Prints at the British Museum, 1884–1912. Author of numerous works on art and literature.

Comenius, Johann Amos (1592–1670), famous Czech educationist. Was the first advocate of the "direct" method of teaching languages, of the use of pictures in education, and of the teaching of science.

Compton, Prof. Arthur Holly (b. 1892), American physicist whose work on X-rays led to the discovery of the so-called "Compton Effect," for which he shared with C. T. R. Wilson the 1927 Nobel Prize for Physics. He has also made important cosmic-ray investigations. His brother **Karl Taylor Compton** (b. 1887) is also a physicist who has taken an important part in radar and atomic bomb research.

Compton-Burnett, Ivy, British novelist, whose books deal with family relationships and include *Men and Wives*, *A House and its Head*, *Man Servant and Maid Servant*, *The Present and the Past*, *A Heritage and its History*.

Comte, Auguste (1798–1857), a French philosopher founder of positivism, and father of social philosophy.

Condé, Louis II., de Bourbon, Prince de, "The Great Condé" (1621–1686), was a distinguished military commander. Victor of Rocroi, 1643.

Confucius (*c.* 551–479 B.C.), Chinese philosopher and sage, founder of the great world religion of Confucianism. He was not concerned with the supernatural but appealed to reason and taught love and respect of one's fellows, superiority to ambition, charity, forgiveness, and repentance.

Congreve, William (1670–1729), was a famous Restoration dramatist, whose comedies of manners reflect the grossness of his age only too closely, but are redeemed by the brilliancy of his wit. He was buried in Westminster Abbey.

Conrad, Joseph (1857–1924), English novelist of Polish birth whose parents were exiled to France for political reasons. He became master mariner in the British merchant service and began to write novels after he left the sea in 1884. He has a beautiful prose style and is acknowledged to be a significant figure in English literature. His novels include: *Almayer's Folly* (1895), *Lord Jim* (1900), *Nostromo* (1904). Biography by Jocelyn Baines (1960).

Conscience, Hendrik (Henri) (1812–83), the famous Flemish novelist who wrote in 1838 his beautiful work *The Lion of Flanders*.

Constable, John, R.A. (1776–1837), was a native of East Bergholt, Suffolk, and became one of the greatest of English landscape painters. He had long to wait for recognition, but ultimately attained high honour and exerted a strong influence in the development of landscape art.

Constant, Jean Joseph Benjamin (1845–1902), a famous French painter of Oriental subjects and portrait painter. His "Prisoners in Morocco," "The Harem," and "The Emir's Favourite," are among his more celebrated pictures.

Constantine the Great (*c.* 272–337). Emperor of Rome from 306 to his death. Transferred the Capital of the Empire from Rome to Byzantium, thence called Constantinople after his name.

Constantine I. (1868–1923), King of Greece, 1913–17, and 1920; married Princess Sophia of Prussia, sister of the Kaiser.

Cook, Captain James (1728–1779), an adventurous navigator, whose *Voyages Round the World* is a classic. He made many discoveries in the name of Great Britain, including the Sandwich (now Hawaiian) Islands. He was murdered at Hawaii by natives.

Cooper, Sir Astley Paston, Bt., F.R.S. (1768–1841), one of the greatest surgeons of his time, and the author of several important medical textbooks.

Cooper, James Fenimore (1789–1851), was a very popular American novelist, who from about 1820 to the time of his death produced a succession of stirring stories of adventure, which enjoyed much popularity, among them *The Spy*, *The Last of the Mohicans*, *The Pathfinder*, and *The Deer Slayer*.

Cope, Sir Arthur Stockdale, K.C.V.O., R.A. (1857–1940), was a well-known portrait painter.

Copernicus, Nicholas (1473–1543), founder of modern astronomy, was born at Thorn on the Vistula, then under Polish suzerainty. Studied at Cracow and in Italy, lectured on astronomy and mathematics at Rome and in 1512 settled at Frauenburg, where he was canon of the cathedral. He also practised medicine. His beliefs concerning the universe were set forth in his great book *De revolutionibus orbium coelestium*, which was not published until his death for fear of the storm his revolutionary theories would raise. In it he proved that the planets, including the earth, revolve round the sun.

Coppée, François Joachim (1842–1908), one of the most popular of modern French writers, who as poet, novelist and dramatist, was equally successful.

Coquelin, Benoit Constant (1841–1909), eminent French actor ("Coquelin aîné"), and **Coquelin, Ernest** ("Coquelin cadet"), his youngest brother (1848–1909), were leading lights of the Théâtre Français.

Corelli, Arcangelo (1653–1713), Italian composer and the first great violinist to enjoy universal fame; founded the present art of violin playing and gave definitive form to the *concerto grosso*.

Corneille, Pierre (1606–1684) the French tragic dramatist, whose *Cid*, *Polyeucte*, *Le Menteur*, and other plays marked a new era in French dramatic production.

Cornwallis, 1st Marquess (1738–1805), commander of the British forces which surrendered to the Americans, at Yorktown in 1781, thus ending the War of Independence; was twice Governor-General of India.

Corot, Jean Baptiste (1796–1875), a French landscape painter of great repute.

Correggio, Antonio Allegri da (1494–1534), the great Italian painter of the Lombard School, whose "Ecce Homo" is in the British National Gallery.

Cortes (or Cortez), Hernando (1488–1547), a Spanish adventurer who earned great renown by capturing Mexico for Spain, and held that country in subjection for ten years.

Cortot, Alfred (*b.* 1877), eminent pianist, born at Nyon, Geneva, studied at the Paris Conservatoire and became chorus director at Bayreuth. Conducted the first complete performance in Paris of Wagner's *Ring*.

Cosgrave, William Thomas (b. 1880), President of Executive Council, Irish Free State, 1922–32; Finance Min., 1923; Defence Min., 1924; Parl. Chairman Fine Gael, 1933–44.

Costello, John A., S.C. (b. 1891), Prime Minister of Irish Republic 1948–51 and 1954–57. When Attorney General, Irish Free State, 1926–32, helped to draft the Statute of Westminster.

Coty, René (b. 1882), President of the French Republic, 1954–8.

Coulton, George Gordon, Litt. D., LL.D. (1858–1947), scholar and historian of the Middle Ages, whose main claim to fame rests upon *Five Centuries of Religion*, works in which he set forth his interpretation of monastic history in England from the Conquest to the Reformation.

Couperin. A notable family of French musicians who were organists at St. Gervais, Paris, from about 1650 until 1826. **François Couperin** (1668–1733), called "Couperin the Great," is the best known today for his harpsichord music.

Cousin, Victor (1792–1867), French educationist and philosopher who founded what is called the eclectic school of modern philosophy. He was a remarkable lecturer and his writings cover nearly the whole field of philosophy.

Cousins, Samuel, R.A. (1801–1887), the greatest mezzoprint engraver of his day, whose plates after Reynolds, Millais, Landseer, and Hogarth reach the highest point of this kind of art work.

Coverdale, Miles (1488–1568), one of the early English Reformers, was born in Yorkshire, and afterwards became a monk of Norwich and later Bishop of Exeter. He collaborated with Tyndale in translating the Bible; the Psalms still used in the Prayer Book are taken from their translation.

Coward, Noel (b. 1899), a successful English playwright and actor. His works include *Hay Fever*, *Private Lives*, *Blithe Spirit*, the operetta *Bitter Sweet* and the films *In Which We Serve*, *This Happy Breed*, and *Brief Encounter*.

Cowper, William (1731–1800), an English poet imbued with much piety of sentiment and a remarkable poetic talent. His *Task* is one of the great poems of the 18th century.

Cox, David (1783–1859), an eminent landscape painter—son of a Birmingham blacksmith—whose pictures are thoroughly English in spirit and treatment.

Crabbe, Rev. George (1754–1832), a poet of rural life and scenes, noted for his faithful pictures, characterisation and soundness of his sentiments.

Craig, Edward Gordon, C.H. (b. 1872), the son of the late Dame Ellen Terry, author of several books on stagecraft. Has produced many plays in England and on the Continent.

Cranmer, Thomas (1489–1556), Archbishop of Canterbury under Henry VIII, and Edward VI.; an ardent promoter of the Reformation. On Mary's accession at first consented to return to the old faith, but when called upon to make public avowal of his recantation, refused, and was burnt at the stake. His great contributions were the English Bible and Book of Common Prayer.

Crawford, Francis Marion (1854–1909), an American novelist who obtained considerable eminence by his stories of Italian life, including *A Roman Singer*, *Saracinesca*, and *Saint Ilario*.

Crichton, James (1560–1582). Scottish adventurer who earned considerable renown for his scholarly accomplishments and charm and was called "The Admirable Crichton." He was assassinated when only twenty-two years of age in Mantua.

Cripps, Rt. Hon. Sir (Richard) Stafford, C.H., Q.C. (1889–1952), British statesman and barrister, younger son of Lord Parmoor and nephew of Beatrice Webb. In charge of post-war Britain's economic affairs. His programme was one of purposeful austerity, but his outstanding ability and masterly exposition of the economic situation won him support from all sides. He showed that liberty and planning can be reconciled in the modern world. Labour M.P. for S.E. Bristol, 1931–50. Gave up a brilliant career at the bar to enter politics. Ambassador to Moscow, 1940–42, and Min. of Aircraft Production, 1942–45. Went on missions to India in 1942 and 1946. Resigned his seat in Parliament and as Chancellor of the Exchequer in 1950 because of broken health; was taken to Switzerland for a cure, but he did not recover.

Crispi, Francesco (1819–1901), noted Italian statesman, who aided Garibaldi and was his supporter throughout. Premier 1887–91 and 1893–96. Achieved many reforms for his country.

Crispin, St., a saint of the Roman Church and patron of shoemakers. In the 3rd century he and his brother, natives of Rome, settled in Soissons, France, and there preached Christianity, supporting themselves by shoemaking. Suffered martyrdom under Diocletian in 289, by being thrown into a cauldron of molten lead; commemorated on Oct. 25.

Croce, Benedetto (1866–1952), Italian philosopher and critic and one of the great figures of the 20th century. Devoted his long life to studying and writing, and his philosophy is expounded in the four volumes of *Filosofia dello Spirito* (which has been translated into English). He founded and edited *La Critica* in 1903, a review of literature, history, and philosophy. Strongly opposed to fascism, he was described during the war as "the grand old man who kept a torch burning in Naples which even Mussolini did not dare to extinguish."

Crœsus (died c. 546 B.C.) the last King of Lydia (560–546 B.C.), who reigned fourteen years, and acquired such immense wealth that his name has ever since been proverbial. He was a wise king, whose memory still survives in his wise sayings. Solon was his friend, and it was Solon's name that he uttered thrice while standing before the pyre on which Cyrus had condemned him to be burnt. This touched Cyrus, who spared his life and made him his companion. He succeeded his father Alyattes on the Lydian throne, 560 B.C.

Crome, John (1769–1821), known as "Old Crome," from being a humble house-painter became eminent as a painter of landscape.

Cromer, 1st Earl of, P.C., G.C.B., O.M., G.C.M.G., K.C.S.I., C.I.E., F.R.S. (1841–1917), a diplomatist who won celebrity in the post of British Comptroller-General in Egypt from 1883 to 1907. It was a stupendous task that he had imposed upon him, but he resolutely devoted himself to it, with the result that Egypt was lifted from financial difficulty and internal disorder to a condition of prosperity. In 1908 published *Modern Egypt* and *Ancient and Modern Imperialism* in 1910.

Crompton, Samuel (1753–1827), was a poor cotton worker at Bolton who invented the spinning mule, which greatly increased the power of cotton production. Received little recognition.

Cromwell, Oliver (1599–1658), Lord Protector of the commonwealth of England, Scotland and Ireland, 1653–58. Born at Huntingdon, educated at Sidney Sussex College, Cambridge, and entered parliament as member for Huntingdon in 1628. With outbreak of civil war served with the parliamentary army under Essex and won renown at Edgehill (1642). Celebrated as a great general, leader of his Ironsides, for his religious toleration, and strong foreign policy. His victories include Marston Moor (1644), Naseby (1645), Dunbar (1650), Worcester (1651).

Cromwell, Richard (1626–1712), son of the foregoing, and his successor in the Protectorate.

Cromwell, Thomas (1485–1540), originally a protégé of Wolsey, rose to high office under Henry VIII, and began the suppression of the monasteries. Executed after the failure of the Anne of Cleves marriage, which was part of his policy of alliance with the Protestant princes of Germany.

Crookes, Sir William, O.M., F.R.S. (1832–1919) eminent British scientist whose researches in chemistry and physics led to many important discoveries and inventions. He discovered the metal thallium in 1861, invented the radiometer and the Crookes' tube, which was used by J. J. Thomson and others in their researches on conduction of electricity in gases. He was also an authority on sanitation. President of the Royal Society, 1913–16.

Cruikshank, George (1792–1878), a celebrated book illustrator who was for a time associated with Charles Dickens, and later on illustrated numerous works of other novelists of his day, showing great humour and power of character-delineation.

Cummings, Bruce Frederick (1889–1917), English zoologist and man of letters. Won fame with his *Journal of a Disappointed Man*.

Cunard, Sir Samuel, Bt. (1787–1865), shipowner and co-founder of the British and N. American Royal Mail Steam Packet Co. which later became the Cunard Line and as a result of a merger in 1934, the Cunard-White Star Line, owners of the two largest liners afloat—the *Queen Elizabeth* and the *Queen Mary*.

Cunningham of Hyndhope, Admiral of the Fleet, Viscount, K.T., G.C.B., O.M., D.S.O. (b. 1883), won the D.S.O. and two bars in the first world war, C.-in-C., Mediterranean, 1939–42. Allied Naval C.-in-C., North African campaign. First Sea Lord, 1943–46.

Cunningham, General Sir Alan Gordon, G.C.M.G., K.C.B., D.S.O., M.C. (b. 1887), brother of Viscount Cunningham. Directed Abyssinian campaign and commanded 8th Army, 1941. From 1945 served as the last British High Commissioner in Palestine.

Cunningham, Admiral of the Fleet, Sir John Henry Dacres, G.C.B., M.V.O. (b. 1885), C.-in-C., Mediterranean, 1943–46. First Sea Lord 1946–48.

Curie, Prof. Pierre (1859–1906) and **Madame Marie** (1867–1934) are names that have become famous as the discoverers of radium. M. Curie was a Frenchman, Mme. Curie a Pole; they were both indefatigable scientific investigators. Shared the Nobel Prize for Physics 1903, while their daughter, the late Mme. Irène Joliot-Curie, shared with her husband the 1935 Nobel Prize for Chemistry, awarded for their researches in radioactivity.

Curzon of Kedleston, Marquess, K.G., P.C., G.C.S.I., G.C.I.E. (1859–1925), statesman and administrator. As a young man gained distinction as traveller and author. From 1899 to 1905 was a vigorous and outstanding Viceroy of India. Foreign Secretary, 1919–23, when he played a dominant part in the reconstruction of the Middle East and was prominent at many conferences after the first world war.

Cuthbert, St. (635–687), a famous monk who became prior of Melrose, and afterwards of Lindisfarne. For a time he lived in seclusion on one of the Farne Islands, but from 684 was Bishop of Hexham.

Cuvier, Georges Léopold, Baron (1769–1832), a French naturalist who founded a system of classification in zoology, and originated the science of comparative anatomy.

Cuyp, Albert (1620–1691), a famous Dutch landscape painter, several of whose works are in our National Gallery.

Cyprian, St., was an eminent ecclesiastic of the 3rd century, who wrote several notable treatises on matters of Christian doctrine. He was beheaded in 258, at an advanced age, and the present English calendar commemorates him on Sept. 26.

Cyrus the Great (d. 529 B.C.), the founder of the Persian Empire who by his conquests of Media, Lydia, and Babylonia, made himself master of Asia Minor. He was a great warrior and a wise ruler and figures prominently in the Bible. He was slain in battle on the river Jaxartes.

D

Daguerre, Louis Jacques Mandé (1789–1851), a French artist, who acquired fame as the inventor of the earliest photographic process, and then devoted himself to scene-painting and became part-proprietor of the Diorama in Paris.

Daimler, Gottlieb (1834–1890), German inventor with N. A. Otto of Cologne of the Otto gas engine, and in his later years eminent as the inventor of the motor-car that is named after him.

Dale, Sir Henry Hallett, O.M., G.B.E., F.R.S., M.D., D.Sc., LL.D., F.R.C.P. (b. 1875). President, British Association, 1947, and of the Royal Society, 1940–45. Chairman of the Lister Institute of Preventive Medicine, 1942. Awarded Nobel Prize for Medicine, 1936.

Dalhousie, 1st Marquess of, P.C., K.T. (1812–1860). The tenth Earl and first Marquess of Dalhousie was one of the most famous of India's Governors-General. He controlled the affairs of India during a period of great difficulty, and annexed the Punjab after the second Sikh War; later on also annexing Nagpur Jhansi, Pegu and other States. He left India in 1856, and the following year the Mutiny broke out.

Dalton, John (1766–1844), famous chemist and mathematician, renowned for his work on the construction of matter. In 1810 published his *New System of Chemical Philosophy*, in which the atomic theory was first propounded.

Damieu, Father (Joseph de Veuster) (1840–1889), a Belgian missionary who, going out to Honolulu in 1864, and witnessing the terrible sufferings of the lepers confined on the Island of Molokai, obtained permission to take spiritual charge of the Government settlement, and remained there working nobly for this wretched community, until in 1889 he himself was stricken with leprosy and died.

Damocles, the flatterer and favourite of Dionysius of Syracuse. The legend related by Cicero concerning him is that one day after expressing envy of Dionysius, he was invited to a banquet, where he found himself sitting beneath a naked sword suspended by a single hair. Hence the familiar simile "the sword of Damocles." The incident is referred to as of the first half of the 4th century B.C.

Damrosch, Walter Johannes (1862–1950), American musician, active in the musical development of the United States. Conductor of the New York Symphony Society, 1885–1927, and composer of three operas and of incidental music to Greek plays.

Dane, Clemence, C.B.E. (Winifred Ashton), author of *Regiment of Women*, *A Bill of Divorcement*, and *Will Shakespeare*, amongst many successful novels and plays.

D'Annunzio, Gabriele (1863–1938), Italian poet, dramatist and novelist. In Sept. 1919 he led an unofficial raid on Fiume and seized the port and town; when the Treaty of Rapallo was signed in 1920, he refused to recognise the Treaty, and declared war against Italy. Fiume was attacked and D'Annunzio, after a short resistance, surrendered.

Dante Alighieri (1265–1321), the greatest Italian poet and one of the great figures of world literature, was born in Florence in a period of political upheaval caused by the strife between Guelph and Ghibelline, which had divided mediaeval Italy for over a century. Though he saw her but once or twice, he conceived an abiding love for a Florentine lady, Bice Portinari (called by Dante Beatrice), wife of Simone di Bardi, whom he first met in 1274. She died in 1290. Some of his finest work was written after he was driven from his native city in 1301. His works include the *Vita Nuova* (written 1292–93 in memory of Beatrice), his supreme masterpiece the *Divine Comedy*, begun 1308–9 and completed shortly before his death, many beautiful lyrics, and some Latin treatises.

Danton, Georges Jacques (1759–1794), a famous member of the National Convention at the period of the first French Revolution. Was made President of the Committee of Public Safety, but Robespierre attacked and supplanted him. Danton was consigned to the guillotine shortly afterwards.

D'Arblay, Madame (1752–1840), better known as Frances (Fanny) Burney, daughter of the organist Dr. Charles Burney, made a great sensation while quite young and unmarried by her novel *Evelina*, which opened the doors of Society to her and gained her the friendship of Dr. Johnson.

Darius was the name borne by three Persian kings. The first reigned from 521 to 485 B.C., and was defeated by the Greeks at Marathon. The second was a natural son of Artaxerxes Longimanus, and having obtained the crown by the murder of his brother, reigned from 424 to 405 B.C. The third Darius was the last of the Persian kings, reigning only from 336 to 331 B.C. when Alexander the Great invaded his kingdom and defeated him in two great battles. Soon after he was assassinated.

Darling, Grace Horsley (1815–1842), English heroine who by putting off in a small boat from the lighthouse on one of the Farne Islands, of which her father was keeper, saved the shipwrecked crew of the *Forfarshire*.

Darnley, Earl of (1545–1567), was married to Mary Queen of Scots—as her second husband—in 1565. Two years later, after Mary had entered into an intrigue with Bothwell, he was murdered.

Darwin, Charles Robert, F.R.S. (1809–1882), the distinguished scientist, whose *Origin of Species* first clearly formulated and elaborated the theory of evolution. His first work (1837) described a five years' cruise in the *Beagle*, which the Government had sent out for scientific purposes. His *Origin of Species* appeared in 1859, and, though defended and supported by the scientific thought of the time generally, was much attacked by theologians. In 1871 Darwin issued his *Descent of Man*, a still further elaboration of the evolution theory. His other principal works were *The Expression Of Emotion in Man and Animals* (1872), *Insectivorous Plants* (1875), *Different Forms of Flowers* (1877), and *Worms* (1881). He was buried in Westminster Abbey.

Daudet, Alphonse (1840–1897), the celebrated French humorist and novelist, all of whose works have been translated into English.

Davenant, Sir William (1606–1668), a dramatist and poet of much note in his time, who filled the office of Poet Laureate in succession to Ben Jonson. He was buried in Westminster Abbey.

David I. (1084–1153) was King of Scotland and uncle of Matilda, daughter of Henry I.; he took up arms against Stephen on his repudiation of Matilda's claims to the English crown.

David II. (1324–1371), King of Scotland from 1330 to 1370. He was the son of Robert Bruce, and

in conflict with the English Army at Neville's Cross, in 1346, was defeated and made prisoner by Queen Philippa.

David, Sir (Tannatt William) Edgeworth, K.B.E., C.M.G., D.S.O., F.R.S. (1858–1934), an Australian geologist of the first rank, who was Professor of Geology at Sydney University 1891–1924. Spent much of his time in exploration, and accompanied as geologist Shackleton's Antarctic Expedition, 1907–9, leading the party that ascended Mt. Erebus, and discovering with Sir Douglas Mawson the South Magnetic Pole.

David, Jacques-Louis (1748–1825), a celebrated French painter of classic subjects, who put his art at the service of the New Republic.

David, St., patron saint of Wales, whose festival falls on March 1st, lived in the 6th century in Wales, and founded various monasteries.

Davidson, Randall Thomas Davidson, 1st and only Baron, P.C., G.C.V.O. (1848–1930), Archbishop of Canterbury, 1903–1928. Dean of Windsor, 1883–1891; Bishop of Rochester, 1891–1895; and Bishop of Winchester, 1895–1903. Was for a long period Domestic Chaplain and Clerk of the Closet to Queen Victoria, and married in 1878 the daughter of Archbishop Tait.

Davies, Rt. Hon. Clement, Q.C., M.P., (b. 1884), lawyer and politician. Called to the Bar, 1909, took silk, 1926. He led the Liberal Party from 1945 until 1956, and has represented Montgomery since 1929.

Davies, Sir (Henry) Walford, K.C.V.O., O.B.E., Mus.D., D.Mus. (1869–1941), Master of the King's Music, 1934–41; Director of Music and Chairman of the National Council of Music, University of Wales, 1919–41, the Gresham Prof. of Music, 1924–41.

Davies, William Henry (1871–1940), was a Welsh poet who spent his early life as a tramp and odd-job man. For six years he wandered about America, where he lost a foot "train-jumping," and for eight years followed a similar life in England, tramping, peddling and stopping in common lodging-houses. His poems reveal an intimate knowledge of and love for Nature. An account of his life is given in his *Autobiography of a Super Tramp.*

Da Vinci. *See* **Leonardo.**

Davis, Jefferson (1808–1889), an American statesman, who on the breaking out of Civil War, was made President of the Confederate States After the war he was a prisoner in the hands of the Federals, put on his trial for treason, and subjected to much indignity, but was ultimately discharged and wrote (1881) *The Rise and Fall of the Confederate Government.*

Davis, John (*c.* 1550–1605), one of the great Elizabethan explorers and discoverer of Davis's Strait, the channel between the Atlantic and Arctic Oceans on the west of Greenland. Invented the backstaff, or Davis's quadrant.

Davitt, Michael (1846–1906), after a hard-working and precarious bringing up this ardent Irish Nationalist attracted much notice by the bitter speeches he made on behalf of the Fenian Brotherhood, and in 1870 was sentenced to fifteen years' penal servitude for treason-felony, but was released on ticket of leave in 1877. Was one of the founders of the Irish Land League 1879. In 1881 was sent back to penal servitude, but released again in the following year. Was elected to Parliament while a prisoner at Portland but disqualified. Succeeded in entering Parliament in 1892, and resigned in 1899.

Davy, Sir Humphry, Bt., F.R.S. (1778–1829), the inventor of the safety-lamp. Was an eminent chemist whose researches and discoveries were of great scientific importance. Was the first to employ the electric current in chemical decomposition and discovered that nitrous oxide was perfectly respirable.

Dawber, Sir (Edward) Guy, R.A. (1861–1938), English architect. As Chairman of the Council for the Preservation of Rural England, he did much to bring about the restoration of buildings throughout the country.

Dawson, (George) Geoffrey (1874–1944), editor of *The Times*, 1912–19, and 1923–41; educated at Eton and Oxford; was private secretary to Lord Milner in S. Africa, 1901–5, editor of the *Johannesburg Star*, 1905–10.

Dawson, Peter (b. 1882), British singer, born in Adelaide, South Australia, and the possessor of a magnificent baritone voice.

Deakin, Rt. Hon. Arthur, C.H., C.B.E., J.P. (1890–1955), Trade Union leader; succeeded Ernest Bevin as general secretary of the Transport and General Workers' Union in 1949 and like him was a master negotiator.

Debussy, Claude Achille (1862–1918), composer and founder of the French Impressionist School in music. Among his works are *Suite bergamasque*, containing the popular *Clair de lune*, *L'après-midi d'un Faune*, inspired by the poem of Mallarmé, and *La Mer.* He also wrote an opera *Pelléas et Mélisande* based on Maeterlinck's drama. Biography by Edward Lockspeiser (1937).

Defoe, Daniel (1660–1731), the son of a London butcher. He became a political writer and novelist, obtaining world-wide fame by his *Robinson Crusoe*, written when he was nearly sixty years of age. This was followed by several other novels, all of great merit.

De Forest, Lee (b. 1873), American inventor who was the first to use alternating-current transmission, improved the thermionic valve detector and amplifier, which revolutionised wireless and by which modern wireless and sound films (Talkies) were made possible. He designed the first high-power station for the United States Navy and has been granted over 300 patents.

De Gasperi, Alcide (1881–1954), Italian catholic politician. Founded the Christian Democrat Party and worked for European federation. Died on eve of breakdown of Brussels Conference on E.D.C. Prime Min. 1945–53.

De Gaulle, Gen. Charles André Joseph Marie, *See* **Gaulle.**

De Havilland, Sir Geoffrey, C.B.E., F.R.Ae.A. (b. 1882), a pioneer of civil and military aviation. Began flying in 1908 and was the founder of the Stag Lane Aerodrome at Hendon and the designer of the famous Moth machines. Contributed in great measure to the advance of civil aviation since the first world war. Awarded the Guggenheim Medal in 1952. His son was killed in 1946 while testing a plane in preparation for breaking world speed record.

Delacroix, Ferdinand Victor Eugène (1798–1863), French painter of great imaginative and dramatic force, of the romantic school.

De la Mare, Walter John, O.M., C.H. (1873–1956), English poet and novelist whose work has a characteristic charm. Much of it was written for children.

Delane, John Thadeus (1817–1879), the famous editor of *The Times*, who, though he did not write himself, made his paper the greatest journal in the world. He occupied the editorial chair from 1841 to 1877.

Delaroche, Paul (Hippolyte) (1797–1856), an eminent French historical painter.

Delibes, Clément Philibert Léo (1836–91), French composer of much graceful music, including several operas, of which *Lakmé* is the most famous, and ballets, among them *Coppélia.*

Delius, Frederick, C.H. (1862–1934), English composer of German parentage. Studied at Leipzig from 1886 to 1888 where his suite *Florida* was first performed. In 1899 he went to live near Paris but became crippled and blind in his later years. Highly idiosyncratic in idiom, his music was more readily received in Germany than England until Sir Thomas Beecham's inspired performances won popularity for him in his native land. He composed operas, including *A Village Romeo and Juliet*, choral works, including *Sea Drift*, orchestral pieces, of which *On Hearing the First Cuckoo in Spring* is well known, besides chamber music, concertos, and songs.

Democritus (*c.* 460–357 B.C.), the Greek philosopher to whom the conception of the atomic theory is attributed. His cheerful disposition led to his being styled "the laughing philosopher," and the tradition tells that he put out his eyes in order not to be distracted in his speculations.

Demosthenes (385–322 B.C.), the famous Greek orator, statesman and warrior who, by his *Philippics*, roused the Athenians to resist the growing power of Philip of Macedon. Sixty-

one of his orations were preserved, and are regarded as the finest examples of their kind.

De Quincey, Thomas (1785–1859), an eminent essayist and critic, the friend of Coleridge, Wordsworth, and Southey. His *Confessions of an Opium-eater* is a British classic.

De Reszke, Jean (1853–1925) and **De Reszke, Edouard** (1856–1917), Polish operatic singers, the first a tenor, the second a baritone, who achieved fame and fortune by their singing.

Derwentwater, 3rd Earl of (1689–1716), the leader of the English Jacobite movement for placing the Pretender on the English throne. The rising took place in 1715, but was completely crushed by the Battle of Preston, and Derwentwater was beheaded.

Descartes, René (1596–1650), the famous French philosopher, mathematician, and author. Unconvinced by scholastic tradition and theological dogma, he sought to get back to primary truth, to the very definition of knowledge or the reason why anything can be said to be true. The basis of his Cartesian philosophy is summed up in his own words *cogito, ergo sum* (I am thinking so I exist).

Desmoulins, Lucie Simplice Camille Benoist (1760–1794), was one of the fiercest of the French Revolutionary leaders, and from the destruction of the Bastille to the early days of the Terror was unflagging in his onslaughts upon the aristocrats and the priesthood. He fell under the displeasure of Robespierre, however, and was sent to the guillotine along with Danton.

De Valera, Eamon, LL.D. (b. New York, 1882), Pres. Rep. of Ireland, 1959– ; leader of the Fianna Fail Party; Prime Minister 1938–48, 1951–54, and 1957–59; Minister for External Affairs 1932–48. Pres. of Executive Council of Irish Free State, 1932–38; Pres. of Sinn Fein 1917–26 when Fianna Fail was founded; Delegate to Assembly and Council of League of Nations, 1932, and President thereof 1932 and 1938.

De Valois, Dame, Ninette, D.B.E. (b. 1898), Irish-born ballet dancer and choreographer. Between world wars had many triumphs as a dancer with the British National Opera company and with the Diaghilev Russian ballet. Director of the Royal Ballet School (formerly the Sadler's Wells School).

Dewar, Sir James, F.R.S. (1842–1923), physicist and chemist, a native of Kincardine. From 1875 until his death Jacksonian Prof. of Natural Philosophy at Cambridge and from 1877 Fullerian Prof. of Chemistry at the Royal Institution. Famous for his work on the liquefaction of gases and his invention of the Thermos flask. Invented, with Sir F. Abel, the explosive cordite.

Dewey, Prof. John (1859–1952), the eminent American philosopher, psychologist and educationist, who, after holding professorships at the Universities of Minnesota, Michigan, and Chicago, where he was also Director of the School of Education until 1904, was Prof. of Philosophy at Columbia University, New York, 1904–32. A follower of William James, he became well known in America as an adherent of pragmatism.

De Witt, Jan (1625–72), Dutch republican statesman, who carried on war with England and later negotiated the Triple Alliance, but was overthrown by the Orange Party and murdered.

Diaghilev, Sergei Pavlovich (1872–1929), Russian ballet impresario and founder of the Russian ballet, who selected the best dancers, musicians, and artists in his productions. Among those associated with him were Anna Pavlova, Vaslav Nijinsky, Tamara Karsavina, Leonide Massine, Michel Fokine, the choreographer, L. N. Bakst, the painter, and Igor Stravinsky, the composer.

Dick, Sir William Reid, K.C.V.O., R.A., F.R.B.S. (b. 1879), British sculptor whose works include the Livingstone statue (Victoria Falls, Africa), memorial statue of King George V. at Westminster, and the statue of Pres. Roosevelt in Grosvenor Square.

Dickens, Charles (John Huffam) (1812–1870), the most popular novelist of the 19th century, who from very humble beginnings worked himself up to the highest position in the world of letters. His literary output was enormous. From the time of the publication of the *Pickwick Papers* down to his death in 1870, covering a period of 33 years, he produced novel after novel, all possessing the original Dickensian characteristics, yet each wonderfully different from the rest and his popularity continues undiminished. He did so much for the cultivation of the true sentiment of Christmas that, whenever that season comes round, his name is recalled with honour and homage. As a public reader of his own works Dickens evinced a marvellous dramatic gift. He was buried in Westminster Abbey.

Dickinson, Goldsworthy Lowes (1863–1932), English scholar, author and philosopher; an interpreter and upholder of the Greek view of life, which is the subject of many of his books.

Dicksee, Sir Francis Bernard, R.A. (1853–1928), well known as the painter of numerous pictures, including "Harmony," "Romeo and Juliet," and "The Funeral of a Viking."

Diderot, Denis (1713–1784), the famous French philosopher and editor of the *Dictionnaire Encyclopédique*, which occupied him thirty years.

Diefenbaker, Rt. Hon. John George, M.A., Q.C. (b. 1895), Canadian lawyer and leader of the Canadian Progressive Conservative Party; Prime Min., 1957– .

Diemen, Anthony van (1593–1645), Dutch Admiral who was Governor-General of the East Indian Colonies, 1636–45. He extended Dutch influence and trade throughout the Far East, promoted explorations to Australia, 1636–42, and on one of such explorations, Abel Tasman discovered New Zealand and named the island which we now know as Tasmania, Van Diemen's Land.

Diesel, Rudolf (1858–1913), German engineer, inventor of an internal-combustion engine which he patented in 1893. The modern so-called Diesel engine represents the improvements achieved by many men and has evolved mainly from the invention of Herbert Akroyd-Stuart, patented in 1890.

Diocletian (Caius Aurelius Valerius Diocletianus) (245–313), Roman Emperor (284–305). Inaugurated the system of partnership emperors, whereby the Empire was divided into four sections (the famous tetrachy), administered by himself in the East, Maximian in Italy and Africa, Constantius in Britain, Gaul, etc., and Gallerius in Illyricum. Ruthlessly persecuted the Christians.

Diogenes (412–322 B.C.), the celebrated Greek cynic philosopher who is said to have lived in a tub wearing the coarsest clothing and living on the plainest food. Many of his sayings have been preserved.

Dionysius. Two of the tyrants of Syracuse bore this name. The first was a great soldier and statesman as well as a poet and philosopher, and lived from *c.* 430–367 B.C. The second Dionysius was his son and successor, but was of such a cruel disposition that he was driven from the throne and died in obscurity in 343.

Disney, Walter Elias ("Walt") (b. 1901), American cartoonist; creator of Mickey Mouse, Silly Symphonies, Donald Duck Cartoons, and Pinocchio shown on the screen.

Disraeli, Benjamin. (*See* Beaconsfield).

D'Israeli, Isaac (1766–1848), the father of Benjamin Disraeli. Was an interesting worker in a special literary field, and produced some exceedingly interesting volumes dealing with authors and their writings. His best-known work is his *Curiosities of Literature.*

Dixon, Harold Bailey (1852–1930), Professor of Chemistry at Manchester University, 1887–1922, whose work on gaseous explosions opened a new era in combustion research.

Dobson, Frank, C.B.E., A.R.A., A.R.B.S. (b. 1888), a leading English sculptor. President of the London Group, 1923–27.

Dobson, Henry Austin, LL.D. (1840–1921), a Civil Servant from 1860 to 1901, he was the author of several volumes of Society verse and prose works, dealing chiefly with the 18th century.

Dodd, Francis, R.A., R.W.S. (1874–1949), painter, engraver and draughtsman. He was one of the official artists during the War of 1914–18, and executed a valuable series of portraits of British Admirals and Generals on active service. Appointed one of the official artists for the second world war, 1939–45.

Dodgson, Charles Lutwidge (1832–1898), a writer and mathematical lecturer at Christ Church,

Oxford, who, under the pseudonym of Lewis Carroll, achieved lasting fame by his *Alice's Adventures in Wonderland*, one of the most delightful books for children ever written.

Dolci, Carlo (1616–1686), the famous Florentine painter, examples of whose Madonnas and Saints are to be found in most National collections.

Dolci, Danilo (b. 1925), Italian architect who since 1952 has dedicated himself to the rehabilitation of the people of Sicily in their desperate poverty. He began with no resources but his own humanity, but now his work—agricultural, educational, and social—is inspiring world-wide interest.

Dominic, St. (1170–1221), founder of the Order of Dominicans, or Black Friars, who devoted much energy to the conversion of the Albigenses, but meeting with small success, instituted a policy of persecution after the manner of the later Inquisition.

Domitian (Titus Flavius Domitianus) (A.D. 51–96), Roman Emperor, son of Vespasian, who after many cruel and tyrannical acts aroused the enmity of the people and was assassinated.

Donatello (Donato di Niccolò di Betto Bardi) (1386–1466) the famous Italian sculptor, whose works are to be seen chiefly at Florence, though several examples are at South Kensington.

Donizetti, Gaetano (1797–1848), Italian operatic composer. Most popular of his sixty operas are *Lucrezia Borgia*, *Lucia di Lammermoor*, *La Fille du régiment*, *La Favorita*,and *Don Pasquale*.

Donne, John (1573–1631), an English poet and divine. As a preacher he was celebrated in his lifetime but few of his poems were printed and it was not until the 20th century that he was universally recognised as one of the most original of English poets. His writings include *Songs and Sonnets*, *Satyres*, *Elegies*, *Problems and Paradoxes*, and the *Holy Sonnets*. He took orders in 1615 and was made dean of St. Paul's in 1621. Sir Edmund Gosse's *Life and Letters* appeared in 1899 and Sir Herbert Griersons' monumental edition of Donne's poetry in 1912.

Donoghue, Stephen ("Steve") (1884–1945), in his day a famous jockey. Rode the Derby Race winner six times, and established a new record by winning this classic event in three successive years, 1921–22–23.

Doré, Gustave (1833–1883), the well-known French artist, famous for his colossal scriptural paintings and his powerful illustrations to the works of Dante, Milton, and Tennyson.

Dostoievsky, Feodor Mikhailovitch (1821–1881), one of Russia's greatest novelists. Author of *Crime and Punishment Brothers Karamazov*, *The Idiot*, *The Possessed*, etc. Dostoievsky's novels are quite exceptional for their deep psychological insight, vision and marvellous tragic and analytic power, and have had a profound influence on modern European writers.

Douglas, Marshal of the R.A.F. Lord, G.C.B., M.C., D.F.C. (b. 1893), commanded Fighter Command, 1940–42, R.A.F. Middle East, 1943–44, and Coastal Command, 1944–45. C.-in-C. and Military Governor of British Zone of Germany, 1946–47. A Labour peer.

Douglas, Norman (1868–1952), novelist and writer of witty and elegant prose. A Scot, born in Austria, he made his home on the Mediterranean and was buried on Capri. Travel books include *Siren Land* (1910). *Fountains in the Sand* (1912), *Old Calabria* (1915), *Alone* (1921), *Together* (1923); his highly entertaining novel *South Wind* was published in 1917.

Doulton, Sir Henry (1820–1897), famous potter and the inventor of Doulton ware.

Dowden, Edward, M.A., LL.D., D.C.L., Litt.D. (1843–1913). Well known for his critical and other writings, mainly dealing with the lives and works of the poets. Was Professor of Literature at Trinity College, Dublin, for 37 years

Dowding, Air Chief Marshal Lord, G.C.B., G.C.V.O., C.M.G. (b. 1882), Chief of Fighter Command in Battle of Britain, 1940.

Dowland, John (*c.* 1563–1626), English composer whose songs with lute accompaniment established him as the foremost lutanist of his day. His son Robert succeeded him as Court lutanist to Charles I.

Doyle, Sir Arthur Conan, M.D. (1859–1930), masterly writer of detective stories, the creator of Sherlock Holmes, the archetype of detectives, who shared a flat in Baker Street with his friend and chronicler, Dr. Watson, and conducted a long series of investigations. The immensely popular stories appeared in the *Strand Magazine* and include the *Hound of the Baskervilles* and the *Speckled Band*.

Doyle, Richard (1824–1883), an artist of much humour and fancy, who was exceedingly popular while on the staff of *Punch* from 1841 to 1850. The familiar cover of *Punch* is his work.

D'Oyly Carte, Richard (1844–1901), English theatrical manager, associated with the production of the Gilbert and Sullivan comic operas. The D'Oyly Carte Opera Companies played Gilbert and Sullivan all over the world.

Drake, Sir Francis (*c.* 1540–1596), the great admiral of Queen Elizabeth's time, who made many adventurous voyages, bent partly on discovery and partly on plunder. He was a leading figure—under Lord Howard—in the attack on and destruction of the Spanish Armada in 1588.

Draper, John William (1811–82), American chemist, b. near Liverpool, aided in the organisation of the medical school of New York university and became its professor of chemistry and physiology. He was the first to take a satisfactory photograph of the human face (1840).

Dreiser, Theodore (1871–1945), an American author whose novels of American life are written in vigorous native prose.

Dreyfus, Lt.-Col. Alfred (1859–1935), a French officer, condemned by a military secret tribunal on a charge of divulging secrets in 1894 to a foreign power, and condemned to imprisonment for life on Devil's Island in French Guiana. At a sensational new trial in 1899 he was again found guilty, and sentenced to a mitigated term of incarceration for ten years; but strenuous efforts on his behalf secured a pardon later. In 1906 he was entirely exonerated and reinstated in the army, with the rank of Major, and made a Chevalier of the Legion of Honour.

Drinkwater, John (1882–1937), was a well-known dramatist and poet. His plays *Abraham Lincoln* and *Oliver Cromwell* have had great praise and success.

Driver, Samuel Rolles (1846–1914) a distinguished Hebrew and Old Testament Scholar who was Regius Prof. of Hebrew at Oxford, 1883–1914. He was one of the greatest Hebrew scholars of his day, and was one of the higher critics of the Old Testament.

Drummond, William (1585–1649), a Scottish poet —laird of Hawthornden—whose works dealt largely with political matters, but revealed considerable poetic power. Ben Jonson walked from London to Scotland to pay him his respects.

Drury, (Edward) Alfred (Briscoe), R.A. (1857–1944). English sculptor who was responsible for may public monuments, including the colossal statues of Queen Victoria at Bradford and Portsmouth (1903), the decorations for the exterior of the War Office (1905) and of the Victoria and Albert Museum (1909).

Dryden, John (1631–1700), one of the most vigorous and prolific of English poets and writers, and a popular dramatist. He excelled in satire, and drew some powerful pictures of the statesmen of his day. His translation of Virgil ranks with Pope's translation of the *Iliad*. He was buried in Westminster Abbey. Originally a Parliamentarian he went over to the Royalists and was laureate and historiographer-royal, 1670–88.

Du Barry, Marie Jeanne Bécu, Comtesse (1746–1793), the favourite of Louis XV., who exercised great influence over the King, but after his death, and the breaking out of the Revolution, took refuge in England for a time. Being tempted to return to Paris in 1793, she was arrested and guillotined.

Du Chaillu, Paul Belloni (1835–1903), a noted African traveller who was chief of General Gordon's staff in 1874, and wrote many valuable books of travels, his studies of the gorilla being especially interesting.

Dufferin and Ava, 1st Marquess of, P.C., K.P., G.C.B., G.C.S.I., G.C.M.G., G.C.I.E., F.R.S. (1826–1902), was a diplomatist of great experience, a writer of brilliance, and filled many high offices with distinction and success, including those of Governor-General of Canada and Viceroy of India.

Duke-Elder, Sir William Stewart, K.C.V.O., M.A., D.Sc., M.D. (b. 1898), Scottish ophthalmic surgeon at several London Hospitals and Surgeon-Oculist to H.M. Queen Elizabeth.

Dulles, John Foster, (1888–1959), U.S. Secretary of State in the Republican Administration, 1953–59. In his foreign policy he encountered widespread criticism for his inflexible opposition to negotiation with Russia and U.S. recognition of China.

Dumas, Alexandre (1802–1870), French novelist and dramatist, who published more volumes than any man of his time. In the field of historical romance he showed wonderful power and resource and his thrilling story *Monte Cristo* is one of the great novels of the nineteenth century. He also wrote *The Three Musketeers.*

Dumas, Alexandre, Fils (1824–1895), French dramatist and novelist, son of the last-named, author of *La Dame aux Camélias.*

Du Maurier, George Louis Palmella Busson (1834–1896), one of the best known of the *Punch* artists during a long period and author of the novels of *Peter Ibbetson, Trilby,* and *The Martian.*

Dundee, John Graham of Claverhouse, 1st Viscount (1648–89), known as "Bonnie Dundee," royalist leader employed in the supression of the Covenanters, taking part in the defeat at Drumclog and the victory of Bothwell Brig under the Duke of Monmouth in 1679. Defeated Mackay in the pass of Killiecrankie but was killed in the moment of victory.

Duns Scotus, Johannes (1266–1308), a famous scholastic who was born at Maxton, in the county of Roxburgh; joined the Franciscan Order at Dumfries in 1281, and ordained priest at Lincoln in 1291. Student and teacher at Oxford and Paris and died at Cologne. He was the great doctrinal opponent of Thomas Aquinas and has been surnamed *doctor subtilis.*

Dunsany, 18th Baron (b. 1878), Irish dramatist and author. He has written a number of colourful, whimsical and deeply imaginative novels, as well as short stories, and plays.

Dunstan, Saint (909–988), the famous Abbot of Glastonbury and Archbishop of Canterbury, who lived through seven reigns from Ethelstan to Ethelred and exercised great political influence.

Dupleix, Joseph François (1697–1763), was governor of the French East Indian possessions at the time when Clive was guiding the fortunes of the East India Company, and after Clive's victory at Plassey Dupleix's day was over. He returned to France, and fell into disgrace and poverty.

Dürer, Albrecht (1471–1528), the great German painter and engraver, and friend of Luther. Many of his engravings are in the British Museum. Of Nuremberg birth, he may be regarded as the founder of the German school and the inventor of etching.

Durham, John George Lambton, Earl of (1792–1840), served as Governor-General of Canada after the disturbances of 1837, and in 1839 presented the famous *Durham Report* to Parliament. This laid down the principle of colonial self-government and marks a turning-point in the affairs of the Empire.

Duse, Elenora (1861–1924), an Italian tragedienne of world-wide reputation.

Duval, Claude (1643–1670), a notorious highwayman who, coming to England from Normandy in the Duchess of Richmond's service, took to "the road," and for a few years successfully evaded capture. He was hanged at Tyburn.

Duveen, 1st and only Baron, of Millbank (1869–1939), was head of a firm of noted art dealers, and a generous benefactor to British Art.

Dvorák, Antonin (1844–1904), Czech composer whose music is rich in the folk-song melodies of his native Bohemia and has a characteristic lilt and harmony. In 1884 he conducted his *Stabat Mater* in London, where this cantata and his *Slavonic Dances* were very popular. Composed his *From the New World* symphony in New York where he was head of the National Conservatoire (1892–94). He wrote 9 symphonies besides much orchestral and chamber work, piano pieces, songs, and operas.

Dyson, Sir Frank (Watson), K.B.E., F.R.S. (1868–1939), Astronomer Royal (1910–33). Was previously (1905–10) Astronomer Royal for Scotland. Was the author of a number of works on astronomy, and widely celebrated for his interesting public lectures.

Dyson, Sir George, K.C.V.O., M.A., Mus.D., LL.D., F.R.C.M. (b. 1883), Director of the Royal College of Music 1938–53. Author of *The New Music,* in which he analyses the technique of modern schools of composition. Composed a symphony, a violin concerto, and several choral works such as *The Canterbury Pilgrims* and *Nebuchadnezzar.*

E

Eastlake, Sir Charles Lock, P.R.A. (1793–1865), an eminent English painter whose works were mostly of a religious character. Pres. of R.A. 1850.

Eastman, George (1854–1932), American inventor who invented the roll photographic film and the famous Kodak camera. He amassed a vast fortune and his philanthropies were estimated at over £60 million. After a long illness he committed suicide.

Eck, Johann von (1486–1543), one of the most vigorous opponents of the Reformation in Germany.

Eddington, Sir Arthur Stanley, O.M., F.R.S. (1882–1944), Plumian Professor of Astronomy, Cambridge, 1913; Director of the Cambridge Observatory, 1914–44. Author of *The Nature of the Physical World* (1928) and many scientific works.

Eddy, Mrs. Mary Baker (1821–1910), founder of the religion (theology and practice) which she named Christian Science, and of the Church of Christ, Scientist. Author of the Christian Science textbook, *Science and Health with Key to the Scriptures,* published in 1875.

Ede, Rt. Hon. James Chuter, C.H., M.P. (b. 1882), Home Secretary in two Labour Governments, 1945–51. Parliamentary Secretary to the Ministry of Education, 1940–45.

Eden, Rt. Hon. Sir (Robert) Anthony, K.G., M.C., (b. 1897), succeeded Sir Winston Churchill as Prime Minister in April 1955. He had been Deputy Prime Minister and Foreign Secretary since 1951. First appointed Foreign Secretary in 1935 (the youngest to hold that office for over a century), but resigned in 1938 on a difference of policy with Mr. Neville Chamberlain about relations with Italy. Entered Parliament as a member for Leamington in 1923. He has many diplomatic achievements to his credit, though his Suez policy in 1956 divided the country. Resigned because of ill-health in Jan. 1957. His Memiors, *Full Circle,* pub. 1960.

Edgar (943–75), King of England 959–75, who under the influence of Dunstan was able to carry out many useful reforms.

Edgar Atheling (*c.* 1060–*c.* 1130), as grandson of Edmund Ironside, was the lawful heir of Edward the Confessor, but in the confusion of the Norman invasion he was unable to maintain his claim.

Edgeworth, Maria (1767–1849), Irish novelist, whose stories included *Castle Rackrent, The Absentee,* and *Belinda.*

Edinburgh, H.R.H. Prince Philip, Duke of, K.G., P.C., K.T., G.B.E. (b. 1921), consort of H.M. Queen Elizabeth II. Relinquished his title of Prince Philip of Greece and of Denmark on his naturalisation in 1947, taking the name of Mountbatten. He is the great grandson of Queen Victoria, grandson of Admiral Prince Louis of Battenburg, and nephew of Earl Mountbatten of Burma. Educated in England and Germany and at the Royal Naval College. Served in the Royal Navy throughout the war. Pres. of the National Playing Fields Association; Pres. of the British Association, 1951–52. Chancellor of Edinburgh University, 1953.

Edison, Thomas Alva (1847–1931), an American inventor, who after an adventurous boyhood became a telegraph operator and interested in electrical problems. Established himself in New York in 1869, and invented an improved printing telegraph. In 1867 set up an elaborate laboratory and factory at Memlo Park, New Jersey, from which place he sent out many clever and some startling inventions, including a system of duplex telegraphy, afterwards im-

proved into quadruplex and sextuplex transmission, the phonograph, and a method of preparing carbon filaments for the electric lamp; patented over 1300 inventions.

Edmund II. (**Ironside**) (980–1016), the son of Ethelred, after years of contention with the Danes, made a compact with Canute to divide England between them, but dying shortly afterwards the kingdom was settled on Canute.

Edward the Confessor (*c.* 1004–1066), the Anglo-Saxon king who immediately preceded—save for the brief reign of Harold of less than a year—the Norman Conquest, and founded Westminster Abbey, where a smaller church, then dilapidated, had previously for a period had a precarious existence. He was a religious-minded mystic, and was canonised in 1161, and given the shrine in the Abbey of his origination, which yet remains fairly intact, despite the ravages of time and disturbing hands.

Edward the Elder was the son of Alfred, and succeeded him as King of the West Saxons in 899. He was successful in overcoming the Danes, and became overlord of the Northern counties.

Edward the Martyr (963–979) became king in succession to Edgar, but, although supported by Dunstan, was not able to prevail against his stepmother Elfrida, who had him murdered.

Edward I. (1239–1307) was king of England from 1272 to 1307. Took part in the Crusades, completed the conquest of Wales, overcame Scottish opposition—executing Wallace and receiving the submission of Bruce, and promulgated many wise laws. He was nicknamed "Longshanks."

Edward II. (1284–1327), the son of Edward I. succeeded his father when the latter died at Burgh-over-Sands in 1307. Suffered defeat at the hands of the Scots at Bannockburn, and on account of his arbitrary disposition, cruelty and lavish concessions to favourites, was deposed in 1327, and afterwards murdered at Berkeley Castle.

Edward III. (1312–1377) was one of the ablest of English monarchs who, although much taken up with long and bitter wars with France and Scotland, did much for the commercial interests of the nation, and was the means of introducing large numbers of Flemings into the country, who laid the foundation of the English textile manufacturers. He married Philippa of Hainault, and was the father of Edward the Black Prince.

Edward IV. (1442–1483) attempted unsuccessfully to regain the lost English possessions in France, and resorted to many despotic expedients for obtaining supplies but it stands to his credit that he entered into trading treaties with the commercial merchants of the Continent which were of benefit to his people.

Edward V. (1470–1483)—son of Edward IV. and Elizabeth Woodville—was the unfortunate king who was put to death in the Tower of London, and succeeded by Richard III., his unscrupulous uncle, who had made himself "Protector" and assumed the Crown a little more than two months after the death of Edward IV., publishing the demise of the young King and his brother the Duke of York as having occurred in prison. The bones of the murdered boys were many years afterwards taken to Westminster Abbey for final burial.

Edward VI. (1537–1553), succeeded his father, Henry VIII., when in his tenth year and died in his sixteenth year. The Reformation under the Regency of Somerset first, and then of Northumberland, made considerable progress during his brief reign. He was induced during his last illness to name Lady Jane Grey his successor, with results disastrous to that unfortunate personage and many others concerned.

Edward VII. (1841–1910). Was married to Princess Alexandra of Denmark in 1863. Visited India in 1875, and from that time onward was constantly in the public eye, taking part in all kinds of functions. Succeeded to the throne on the death of Queen Victoria, Jan. 22, 1901. The Coronation, which had been planned for June 26, 1902, had to be postponed in consequence of the King's sudden illness, but eventually took place on August 9 in the same year. His Majesty was a powerful factor in the preservation of the peace of Europe, his friendly intercourse with the heads of the French, German, and other nations earning for him the title of "Edward the Peacemaker."

Edward VIII. (b. 1894), succeeded to the throne on the death of his father, George V., Jan. 20, 1936; Prince of Wales 1911–36. Abdicated in favour of his brother H.R.H. the Duke of York Dec. 10, 1936, and was created Duke of Windsor. Governor of the Bahamas 1940–45.

Edwin (585–633), King of Northumbria, killed in battle at Hatfield Chase, Yorkshire, in 633. He was baptised into the Christian faith at York in 627, and built a church there. He was canonised later.

Egbert was a descendant of Cerdic, king of the West Saxons, and reigned from 802 to 839 in Wessex; in his later years became the first king of all England. In 835 he had to drive the Northmen away from Cornwall.

Ehrlich, Paul (1854–1914), a noted German scientist who was Director of the Royal Institute for Experimental Therapeutics at Frankfurt-on-Main, which he made famous by his experimental laboratory work in connection with cancer. His prolonged experimental researches brought him world-wide renown, his greatest triumphs being the discovery of salvarsan and neo-salvarsan. He received the Nobel Prize in 1908.

Eiffel, Alexandre Gustave (1832–1923). French engineer, one of the first to employ compressed-air caissons in bridge building. Among his notable works are the great Eiffel Tower, Paris (1887–89) and the Panama Canal Locks.

Einstein, Albert (1879–1955), one of the greatest men of science of all time, whose chief claim to fame rests upon his theories of relativity. He was born in Ulm of Jewish parents and lived for many years in Switzerland. Awarded the Nobel Prize in 1922 for his work in quantum theory. In 1933 he was driven by the Nazis to seek asylum in America and became a professor at the Institute for Advanced Study at Princeton, 1933–45. His works include *Relativity* (1920), *Zur Einheitlichen Feldtheorie* (1929), *About Zionism* (1930), *The Evolution of Physics* (1938), *The Meaning of Relativity* (1950), *Out of My Later Years* (1950).

Eisenhower, Dwight David, G.C.B., O.M. (b. 1890), Pres. of United States since 1953 (re-elected Nov. 1956). Supreme Commander Atlantic Forces in Europe 1950–52. U.S. Chief of Staff, 1945–48. C.-in-C. Allied Forces, European theatre of operations, 1943–45, and of Allied Forces, N. Africa, 1942–43. Pres. of Columbia Univ., 1948–50. Retired from the army in June 1952.

Eisenstein, Sergei Mikhailovich (1898–1948), Russian film director, whose silent film classic *The Battleship Potemkin* brought him world-wide fame. He also produced *Alexander Nevsky* and *Ivan the Terrible*.

Eleanor, Queen of Edward I. (d. 1290), was a woman of great piety and devotion. After her death the king had memorial crosses erected at the twelve places where her body rested on its way from Grantham to Westminster.

Elgar, Sir Edward, Bart., O.M., G.C.V.O. (1857–1934), English composer and Master of the King's Musick, 1924–34. Starting as a violinist and a teacher, he composed many choral-orchestral works for various festivals and sprang to fame with the *Enigma Variations*, musical portraits of his friends. Other compositions include two symphonies, the oratorios *The Kingdom*, *The Apostles* and *The Dream of Gerontius* and the tone-poem *Falstaff*.

Elgin, Thomas Bruce, 7th Earl of, P.C. (1766–1841), a British diplomatist who brought to England from Athens the famous "Elgin marbles," now in the British Museum.

Eliot, George (1819–1880), the pen name of Marian Evans, who produced some of the most memorable novels of the 19th century, including *Adam Bede*, *The Mill on the Floss*, *Silas Marner*, *Middlemarch* and *Daniel Deronda*.

Eliot, Thomas Stearns, O.M. (b. 1888), one of the foremost lyric poets of the 20th century. Born in U.S.A. he became a naturalised British citizen in 1927. The poet of disillusionment, as he has been called, he made his name with his poem *The Waste Land* (1922), which was followed by *Poems* (1909–33), and by *Ash Wednesday* (1930). Author of *Murder in the Cathedral*, portraying the murder of Thomas à

Becket, *The Cocktail Party*, and *The Confidential Clerk*. Awarded Nobel Prize for Literature 1948.

Elizabeth (b. 1900), Queen Consort of George VI., daughter of the 14th Earl of Strathmore. Before her marriage in 1923 she was Lady Elizabeth Angela Marguerite Bowes-Lyon.

Elizabeth I. (1533–1603) came to the throne in 1558 at the age of twenty-five, and reigned forty-five years. Was a fervid Protestant, a sincere lover of her country, a masterful and enlightened ruler—fickle as far as her favourites were concerned—and added distinction to a distinguished period. The defeat of the Spanish Armada, the execution of Mary Stuart, the naval supremacy of England, the extension of her colonies, and the glory of a great new literature of which Shakespeare was the brightest ornament are features associated with her reign.

Elizabeth II. (**Elizabeth Alexandra Mary of Windsor**) (b. 1926), ascended the throne in February 1952 at the age of twenty-five on the death of her father George VI. Her Consort, Prince Philip, Duke of Edinburgh, is the son of Prince Andrew of Greece and a descendant of the Danish royal family. They have three children, Charles, Prince of Wales (b. 1948), Princess Anne (b. 1950) and Prince Andrew (b. 1960).

Ellis, (Henry) Havelock (1859–1939), literary and scientific writer and an authority on sex.

Elwes, Gervase Henry (1866–1921), a famous English tenor who excelled in his interpretation of the works of Vaughan Williams and Elgar.

Emerson, Ralph Waldo (1803–1882), the American essayist and philosopher. His *Conduct of Life*, *Representative Men*, and *Essays*, are among the most brilliant literary productions of America.

Emin Pasha, the name adopted by **Eduard Schnitzer** (1840–92), a German explorer associated with Gen. Charles Gordon in the pacification of the Sudan. He joined Gordon's forces as a medical officer and showing marked administrative ability was made governor of the Equatorial Province in 1878. He was menaced by the Mahdi and rescued by Stanley in 1889. While engaged in exploration for Germany in the region of Lake Tanganyika he was murdered by Arabs.

Emmet, Robert (1778–1803), the enthusiastic youth who led the rebellion in Ireland in 1803 and was tried and executed in the same year for high treason. He is one of Ireland's patriot heroes.

Empedocles (*c.* 500–*c.* 430 B.C.), Greek philosopher, b. Agrigentum in Sicily, founder of a school of medicine which regarded the heart as the seat of life, an idea which passed to Aristotle, as did his idea that all matter was composed of four elements: earth, air, fire, and water. He was also a poet.

Engels, Friedrich (1820–1895), Socialist writer and lifelong friend of Karl Marx with whom he collaborated in producing the Communist Manifesto of 1848.

Epictetus of Hierapolis, the Stoic philosopher, who lived in the 1st century, and was a moral teacher of great repute and influence.

Epicurus (342–270 B.C.), the founder of the Epicurean philosophy, which taught that virtue should be followed because it leads to happiness.

Epstein, Sir Jacob, K.B.E. (1880–1959), sculptor, born in New York of Russian–Polish parents. His work includes *Rima*, the Hudson memorial in Hyde Park; *Day* and *Night* on the building of the Underground Headquarters at St. James' Park; *Genesis*, exhibited in 1931; *Lazarus*, which has a fine setting in New College, Oxford; the *Madonna and Child* group for the restored 18th cent. buildings in Cavendish Square; the figure of *Christ in Majesty*, cast in aluminium, in Llandaff Cathedral; and a monumental sculpture for the T.U.C. headquarters in London.

Erasmus Desiderius (1466–1536), the great Dutch philosopher and scholar, of whom it was said that he "laid the egg which Luther hatched."

Ericsson, John (1803–1889), Swedish engineer who entered into competition with George Stephenson in the first famous trial of locomotives.

Ervine, St. John Greer (b. 1883), author, dramatist and critic, noted as an able controversialist on all subjects pertaining to the theatre.

Essex, Robert Devereux, 2nd Earl of (1567–1601), became Queen Elizabeth's favourite after the death of Leicester, but, offending the Queen by certain acts in Ireland, was committed to prison. Later he suffered death on Tower Hill.

Ethelbert, King of Kent at the close of the 6th century and commencement of the 7th. Famous for having accepted Christianity on the entreaty of St. Augustine. Published the first code of written laws in English. Canonised later.

Ethelred II. (*c.* 968–1016), became king of England on the murder of his half-brother, Edward the Martyr (978). He was an incompetent ruler and unable to organise resistance against the Danish raids. Called "the Unready" (from Old Eng. uræd = without counsel).

Ethelwulf was the Anglo-Saxon sovereign who succeeded his father Egbert in 837. Died in 857, and was buried at Winchester.

Etty, William (1787–1849), a famous English R.A., who contributed to the Royal Academy some of its most admired pictures between 1820 and 1849.

Eucken, Rudolf Christoph (1846–1926), a famous German philosopher and theologian.

Euclid (*c.* 330–*c.* 260 B.C.), illustrious Greek mathematician whose *Elements of Geometry* remained a standard text-book until the present century.

Euler, Leonhard (1707–83), Swiss mathematician, regarded as the founder of pure mathematics. He was called by Catherine I. to St. Petersburg, where he became Professor, 1730–41.

Euripides (480–406 B.C.) was the greatest of Greek tragic poets. He wrote seventy-five plays, eighteen of which have been preserved, the most famous being *Alcestis*, *Medea*, *Iphigenia*, and *Orestes*.

Eusebius (264–340), an ecclesiastical historian of rare industry, whose works are still held in great esteem. His *Chronicon* is a history of the world down to his own time, while his *Ecclesiastical History* traces the chief events of the Christian Church.

Evans, Sir Arthur John (1851–1941), distinguished archæologist, chiefly famed for his excavations at Knossos in Crete and his discovery of the pre-Phœnician script.

Evans, Dame Edith Mary, D.B.E. (b. 1888), the versatile and brilliant English actress who made her first appearance as Cressida in *Troilus and Cressida* in 1912. She has played many leading roles and has also appeared in films.

Evatt, Rt. Hon. Herbert Vere, M.A., LL.D. (b. 1894), Australian lawyer and politician; Min. for External Affairs 1941–49; leader of the Federal Labour opposition, 1951–60; Chief Justice, New South Wales, 1960.

Evelyn, John (1620–1706), was one of the founders of the Royal Society and wrote several scientific works, but is best remembered for his *Diary* which covers the period 1640–1706.

Eyck, Hubert van (*c.* 1366–1426), and **Eyck, Jan van** (*c.* 1386–1440), two of the greatest masters of the early Flemish School of Painters.

F

Fabius Maximus (Cunctator) (d. 203 B.C.), the Roman Consul and Dictator, saved Rome from conquest by Hannibal by deliberate and well-planned strategic evasion of battle. The term "Fabian Policy" is derived from Fabian's tactics.

Fabre, Jean Henri Casimir (1823–1915), French naturalist whose lifelong interest was the study of the habits of insects and whose observations were delightfully recorded in his *Souvenirs entomologiques*, a work of many volumes.

Faed, Thomas, R.A. (1826–1900), one of the most successful of Victorian painters, won a great reputation for his Scottish subjects.

Fahrenheit, Gabriel Daniel (1686–1736), German physicist, born in Danzig, improved construction of thermometers, notably in using quicksilver for alcohol. Devised the scale with freezing-point at 32° boiling-point at 212°.

Fairbairn, Sir William, 1st Bt., F.R.S. (1789–1874), mechanical engineer and inventor. By the first utilisation of iron in shipbuilding, became eminent and wealthy.

Fairfax, Thomas, 3rd Lord (1612–1671), a promi-

nent leader of the Parliamentary army during the Civil War, who greatly distinguished himself at Marston Moor and Naseby.

Falla, Manuel de (1876–1946), Spanish composer whose music is highly individual with a strong folk-song element. His compositions are relatively few and comprise 2 operas, 2 ballets (*The Three-Cornered Hat* was one of Diaghilev's greatest successes), piano music, pieces for piano and orchestra, songs, harpsichord concerto, and guitar solo in memory of his friend Debussy.

Faraday, Michael, F.R.S. (1791–1867), great experimental physicist, founder of the science of electro-magnetism. He was the son of a blacksmith and at the age of 12 worked for a bookbinder, to whom he was later apprenticed. Became laboratory assistant to Sir Humphry Davy at the Royal Institution in 1813, and in 1827 succeeded him, becoming professor of chemistry in 1833. He was one of the world's most brilliant experimenters and set himself the problem of finding the connections between the forces of light, heat, electricity, and magnetism. The epoch-making discoveries he made form the basis of the modern electrical industry. He lectured superbly well and inaugurated the Christmas lectures for juvenile audiences at the Royal Institution.

Farman, Henri (b. 1874), French aviator, one of the pioneers of aviation and a famous designer and builder of aeroplanes.

Farouk I (b. 1920), King of Egypt, 1936–52. Forced to abdicate as a result of a military *coup d'état* in July 1952.

Farrar, Very Rev. Frederic William, D.D., F.R.S. (1831–1903), Dean of Canterbury, 1895–1903; a divine and author, some of whose writings attained a large circulation and exercised a considerable influence. His most popular publications were *The Life of Christ*, *The Life and Works of St. Paul*, and *Early Days of Christianity*. Author of the schoolboy story *Eric*.

Fauré, Gabriel Urbain (1845–1924), French composer and teacher; pupil of Saint-Saëns. He was much revered by his pupils at the Paris Conservatoire, among whom was Ravel. His works include chamber music, nocturnes and barcarolles for piano, an opera *Pénélope*, some exquisite songs, and *Requiem*.

Fawcett, Rt. Hon. Henry (1833–84), was totally blinded in a shooting accident in 1858, but rose to Professor of Political Economy at Cambridge after the publication of his *Manual of Political Economy* in 1863. In 1865 he entered Parliament as a Liberal and in 1880 became Postmaster-General. Introduced the parcel-post, postal orders, and the 6*d*. telegram.

Fawcett, Dame Millicent Garrett, G.B.E. (1847–1929), widow of the above; educational reformer and leader of the movement for women's suffrage; a very able writer on political economy and one of the founders of Newnham College, Cambridge.

Fawkes, Guy (1570–1606), a Yorkshire Catholic, who with Catesby and other conspirators planned the Gunpowder Plot. Although warned of the discovery of the plot, Fawkes persisted and was captured in the cellar of the Parliament House and hanged. (*See* **Gunpowder Plot**, General Information section.)

Fénelon, François de Salignac de la Mothe (1651–1715), Archbishop of Cambrai and a writer of distinction. His *Telemachus* is a French classic.

Ferdinand V. of Aragon (1452–1516), who married Isabella of Castile, and with her reigned over Spain during a period of great events. He saw the Moors expelled from Spain, equipped Columbus for the discoveries which led to Spain's vast colonial possessions, and instituted the Inquisition.

Ferguson, James, F.R.S. (1710–1776), a Banffshire man of great ability and inventiveness, who, from being a shepherd-boy, educated himself in astronomy, mathematics, and portrait painting, so that he was able to support his parents, and became eminent as a scientific lecturer. He was made a Fellow of the Royal Society.

Fermi, Enrico (1901–54), Italian nuclear physicist whose research contributed to the harnessing of atomic energy and the development of the atomic bomb. Prof. of Physics at Rome, Columbia Univ., New York, and Univ. of Chicago. He postulated the existence of the neutrino and discovered the element Neptunium. Awarded the 1938 Nobel Prize in Physics.

Festing, Gen. Sir Francis Wogan, G.C.B., K.B.E., D.S.O. (b. 1902), succeeded Field-Marshal Sir Gerald Templer as Chief of Imperial General Staff in 1958. During the war he commanded the 36th Division in Burma.

Feuchtwanger, Dr. Lion (1884–1958), German-Jewish author famous for his historical novels, such as *Jew Süss* and *'Tis Folly to be Wise*, an essay about Jean-Jacques Rousseau, published in 1954.

fforde, Sir Arthur Frederick Brownlow, M.A. (b. 1900), British solicitor and educationist who became Chairman of the B.B.C. in 1957.

Fichte, Johann Gottlieb (1762–1814); was Professor of Philosophy, first at Jena and then at Erlangen, and later Rector of the University of Berlin. His works had great influence upon the thought of his time and prepared the way for the later Hegelian dialectic.

Field, John (1782–1837), composer and pianist, born in Dublin; pupil of Clementi and teacher of Glinka. At early age travelled Europe as virtuoso pianist. Composed seven concertos, three sonatas, and numerous piano pieces. Chopin's nocturnes were modelled on those of Field. The later part of his life was spent in Moscow, where he died.

Fielding, Henry (1707–1754), a celebrated English novelist, author of *Tom Jones*, *Joseph Andrews*, and *Amelia*, as well as many plays.

Fields, Gracie, C.B.E. (b. 1898), an inimitable Lancashire comedienne, and a great popular favourite with the British public. Made her first London appearance in 1915. Equally successful on the films as on the stage, she gained the affections of her music hall audiences through her abundant vitality, her Lancashire humour and her remarkably flexible voice.

Fildes, Sir Luke, K.C.V.O., R.A. (1844–1927), first attracted notice as a black-and-white artist, and illustrated Dickens' *Edwin Drood*. Exhibited at the Royal Academy in 1872, and at successive exhibitions was represented by many important works.

Finsen, Prof. Niels Ryberg (1860–1904), a Danish physician whose light-ray treatment of *lupus vulgaris* won the approval of Queen Alexander and the aid of many philanthropists. He established in Copenhagen an institute for light therapy. Inventor of the Finsen ultra-violet lamp. Awarded 1903 Nobel Prize for Medicine.

Firdousi, *nom de plume* of **Abdul Kasim Mansur** (*c.* 930–1020), Persian poet whose great epic *Shahnama*, or *Book of Kings*, relates the history of Persia in 60,000 verses.

Fisher, Most Rev. Geoffrey Francis, P.C., G.C.V.O., M.A., Hon. D.D. (b. 1887). Archbishop of Canterbury since 1945, the 99th holder of the office; Bishop of London, 1939–45; Bishop of Chester, 1932–39; Headmaster Repton School, 1914–32.

Fisher, Rt. Hon. Herbert Albert Laurens, O.M., F.R.S. (1865–1940), President of the Board of Education, 1916–22. His comprehensive *History of Europe* shows a vast range of knowledge and a great ability to generalise.

Fisher, Professor Sir Ronald Aylmer, Sc.D., F.R.S. (b. 1890), one of the greatest of British scientists who has revolutionised both genetics and the philosophy of experimentation by founding the modern corpus of mathematical statistics.

FitzGerald, Edward (1809–1883), English poet who gained world-wide fame by his translation of the *Rubaiyát* of Omar Khayyam (1859).

Fitzroy, Vice-Admiral Robert, F.R.S. (1805–1865). Attained celebrity as a meteorologist, and in 1854 was made superintendent of the Meteorological Department, and was the introducer of the system of storm warnings which were the beginning of weather forecasts.

Flammarion, Camille (1842–1925), French astronomer, famous for his observations on double stars, star-drift and popular lectures and books on astronomy. Founded the Astronomical Society of France in 1887. His best-known work is *L'Astronomie Populaire*.

Flamsteed, John, F.R.S. (1646–1719), was the first English Astronomer Royal, and a close friend of Sir Isaac Newton, whom he aided in many of his experiments.

Flaubert, Gustave (821–80), one of the greatest of French novelists and creator of *Madame Bovary* which took six years to write. His extraordinary perfection of style was attained only through incessant labour. He hated anything lax and was only satisfied when he had exactly expressed his meaning. Other works were *Salammbo*, *La Tentation de Saint-Antoine* and his drama *Le Candidat*.

Flaxman, John R.A. (1755–1826), a great English sculptor who was born at York, and at 20 was employed as modeller by Josiah Wedgwood. In 1787 he went to Rome, where he stayed 7 years. In 1800 he was elected R.A. and in 1810 became professor of sculptor to the Royal Academy.

Flecker, James Elroy (1884–1915), English poet who early showed signs of becoming one of the most notable poets of his generation, and lived to see his works recognised by the best critics of his time. His works include *Golden Journey to Samarkand*, *Hassan* (staged in London, 1923) and *Don Juan*, as well as many lyrics.

Fleming, Sir Alexander, F.R.S. (1881–1955), as a bacteriologist he made many original contributions, including the discovery of the antibacterial enzyme lysozyme in 1922 and penicillin in 1928. Full recognition of his discovery came only during the war, when Sir Howard Florey separated the drug now used for treatment from the original penicillin. Awarded Nobel Prize for Medicine jointly with Sir H. Florey and Dr. E. B. Chain, 1945. Retired as director of the Wright-Fleming Institute of Microbiology at St. Mary's Hospital, London, in 1954.

Fleming, Sir (John) Ambrose, F.R.S. (1849–1945), was the inventor of the thermionic valve which revolutionised wireless telegraphy and also made wireless telephony possible. Prof. of Electrical Engineering in University College, London, 1885–1926.

Fletcher, John (1579–1625), the famous collaborator with Beaumont in numerous plays which were popular in their day and take high position in the dramatic literature of the country.

Fleure, Prof. Herbert John, D.Sc., F.R.S. (b. 1877), British geographer and anthropologist who was Prof. of Geography at Manchester University 1930–44, and Prof. of Geography and Anthropology, University College of Wales, 1904–30.

Flinders, Matthew (1774–1814), an explorer and navigator, who made important discoveries in and around Australia. He sailed through Bass Strait, so called in honour of his surgeon.

Foch, Marshal Ferdinand, O.M. (1851–1929), Generalissimo commanding the Allied Forces in France from March 1917 until after the Armistice was signed, Nov. 11, 1918. Under his direction the great German offensive was checked and turned at the Marne in July 1918. He followed up this success with a series of rapid attacks culminating in the German surrender, Nov. 11, 1918, when he imposed the conditions of the Armistice.

Fokine, Michel (1880–1944), was the famous Russian dancer and Master of the original Russian Ballet, to whom the modern renascence of ballet may be largely attributed. A dominating figure in the world of ballet who became choreographer to Diaghilev's company.

Fokker, Anthony Herman Gerard (1800–1939), was a famous Dutch airman and aeronautical engineer, and designer and builder of the well-known Fokker military and commercial aeroplanes.

Fonteyn, Dame Margot (Mme. Roberto de Arias), D.B.E. (b. 1919), Prima ballerina of the Royal Ballet (formerly Sadler's Wells Ballet) and acclaimed as the foremost English dancer of to-day.

Forbes, (Joan) Rosita, F.R.G.S. (b. 1893), the well-known traveller and authoress. She has travelled and explored in Abyssinia, and crossed the Libyan desert in native costume in 1920.

Ford, Henry (1863–1947), founder of Ford Motor Co., 1903, of which he was President until 1919, when he was succeeded by his son, Edsel B. Ford (1893–1943). Henry Ford became the world's leading industrialist and its second richest man. Was the pioneer of the cheap motor-car, of which, since 1920, more than a million have been produced annually.

Forester, Cecil Scott (b. 1899), British author. His many novels include the *Captain Hornblower* series.

Forster, Edward Morgan, C.H., LL.D. (b. 1879), novelist. Author of *A Passage to India*, *A Room with a View*, and *Abinger Harvest*.

Foscari, Francesco (c. 1372–1457), Doge of Venice from 1423 to 1457. A great historical character, who governed Venice with a firm hand and increased her renown.

Fosdick, Rev. Harry Emerson (b. 1878), the noted American preacher. Was a Baptist Minister 1904–15, since when he has been Professor of Theology, Union Theological Seminary, New York, and Pastor, Riverside, formerly Park Avenue, Baptist Church, New York, 1926–46. One of the best known preachers in the U.S.A.

Fourier, François Charles Marie (1772–1837), the famous French socialist, who propounded a system of associated enterprise for giving everyone ample means on a system of communal industry. He made some attempts to carry out his Utopian ideas, but they did not succeed. He is best known by his *Traité de l'Association Domestique Agricole*.

Fowler, Sir John, Bart., K.C.M.G. (1817–1898), an eminent civil engineer, son of a Sheffield land surveyor. With Sir Benjamin Baker he was the engineer of the Forth Bridge and of the Metropolitan Railway.

Fox, Rt. Hon. Charles James (1749–1806) was the second son of the first Lord Holland. Entered Parliament at nineteen, and became a Lord of the Admiralty in 1770. His opposition to the Royal Marriage Bill drew down upon him the displeasure of George III. Through the whole of Pitt's Premiership he was that statesman's most formidiable opponent. He favoured American Independence; opposed the war with France; was one of the impeachers of Warren Hastings; denounced the Slave Trade and advocated Parliamentary Reform. After the death of Pitt in 1806 he was made Foreign Secretary, but died a few months later, and was buried in Westminster Abbey.

Fox, George (1624–1691), was the founder of the Society of Friends.

Foxe, John (1516–1587), the English martyrologist, whose *Acts and Monuments* (*Book of Martyrs*) is one of the best-known books in the language. Born at Boston in Lincolnshire, he became a clergyman of the Anglican Church and died in London.

Frampton, Sir George James, R.A., F.S.A. (1860–1928). English sculptor. Well known are his Peter Pan statue in Kensington Gardens, and the Edith Cavell Memorial in St. Martin's Place, London.

France, Anatole (Jacques Thibault) (1844–1924), one of France's notable writers of fiction, showing a great mastery of character portrayal and satire. Most of his works are translated into English.

Francis I. (1494–1547), was King of France from 1515 to his death. He was involved in many wars and was taken prisoner by Charles V. of Germany at the Battle of Pavia. After friendly relations had been established between Francis and Henry VIII., the two met on the "Field of the Cloth of Gold."

Francis of Assisi, St. (1182–1226), founded the Franciscan Order of Monks and devoted himself to a holy life. He is a saint of the Roman Church, having been canonised by Pope Gregory IX., and is commemorated on October 4th.

Francis, Sir Philip, K.B. (1740–1818), an English statesman, the reputed author of the famous *Letters of Junius*.

Franck, César Auguste (1822–90), composer and organist, born at Liége in Belgium. From 1872 until his death was professor of organ at the Paris Conservatoire. His music is romantic, mystical, and personal in idiom. Much of his finest composition is for the organ, and his *Symphonic Variations for Piano and Orchestra*, *Sonata for Violin* and the *Symphony in D* rank him, with his younger contemporary Debussy, among the greatest of 19th-century musicians.

Franco, General Francisco (b. 1892), Spanish soldier and Dictator who served with the Spanish Forces in the Moroccan campaign of 1920–23 and was later Head of the Military Academy at Saragossa. Chief of the General Staff 1935–36. Was Commander-in-Chief of the

Nationalist Forces during the Spanish Civil War, 1936–39. President of Spain since Aug. 1939.

Franklin, Benjamin, F.R.S. (1706–1790), the famous American statesman and philosopher, who after serving an apprenticeship as a printer attracted public attention by publishing his *Poor Richard's Almanac.* He then began a series of scientific experiments, inventing among other things the lightning conductor. He was for ten years a member of the General Assembly; then lived in Britain as agent for his State for eighteen years; returning to America he took part in framing the Constitution of the United States.

Franklin, Rear-Admiral Sir John, F.R.S. (1786–1847), the famous Arctic explorer, whose final expedition in command of the *Erebus* and *Terror* ended disastrously, all the members of the expedition perishing. Many attempts were made to discover Franklin, but without obtaining anything save very fragmentary knowledge concerning his fate. He was born at Spilsby.

Franks, Rt. Hon. Sir Oliver Shewell, G.C.M.G., K.C.B., C.B.E., M.A. (b. 1905), British Ambassador to U.S.A. 1948–52; Prof. of Moral Philosophy Univ. of Glasgow 1937–45.

Fraser of the North Cape, Admiral of the Fleet, Lord, G.C.B., K.B.E. (b. 1888), commanded Home Fleet, Eastern Fleet, and British Pacific Fleet successively, 1943–46. First Sea Lord, 1948–51.

Fraser of Lonsdale, Ian, Baron, C.H., C.B.E. (b. 1897). Chairman of St. Dunstan's since 1921. A Governor of the B.B.C., 1937–39 and 1941–46. Life peerage conferred, 1958.

Frazer, Sir James George, O.M., LL.D., F.R.S. (1854–1941), was an eminent British anthropologist; author of *The Golden Bough* and numerous other works on his subject.

Frederick I. (*c.* 1123–90), Holy Roman emperor from 1152. Nicknamed Barbarossa. A commanding personality, he won for the empire prestige unknown since Otto the Great. Though failing to subjugate his Italian territories, for his armies suffered from the Italian climate, he dominated his German subjects, expelled the semi-independent Duke of Saxony, Henry the Lion, from his duchy, encouraged the German cities, and was a national hero. Though not an ascetic, he was remarkable for an impeccable private life, distinguished himself on the second Crusade, and was drowned in Asia Minor on his way to the third.

Frederick II. (1194–1250), Holy Roman Emperor, an enlightened ruler whose court in Sicily was a centre of culture and learning, attracting Jewish, Mohammedan, and Christian scholars. Forced by illness to return from crusade in 1227, he was excommunicated by Pope Gregory IX.; still excommunicated, he again set sail for Palestine and by skilful diplomacy gained possession of Jerusalem, Bethlehem, and Nazareth. Frederick was a philosopher and man of science and delighted in exploding superstition. He founded the university of Naples, was a patron of the medical school at Salerno, wrote a treatise on falconry, and gave Sicily a code of laws.

Frederick II. or **Frederick the Great** (1712–86), King of Prussia (1740–86). By his masterful government and military successes he raised Prussia to the rank of a great power. He was a scholarly potentate, composed music and played the flute.

French, Field-Marshal Sir John. (*See* **Ypres, 1st Earl of.**)

Freud, Sigmund, M.D. (1856–1939), was Professor of Neurology, Vienna University, 1902–38. An eminent psychoanalyst; author of many books on his subject. Left Austria after the *Anschluss* to take up permanent residence in England. Was elected a foreign member of the Royal Society in 1936.

Freyberg, 1st Baron, Lieut.-Gen. Bernard Cyril, V.C., G.C.M.G., K.C.B., K.B.E., D.S.O. (b. 1889), Gov.-Gen. of New Zealand, 1946–52. Served with distinction in both world wars. Commanded Allied troops on Crete, 1941. Won third bar to D.S.O. in Italy, 1945.

Friese-Greene, William (1855–1921), inventor of the cinematograph. His pioneer work in commercial photography brought him no profit, and for many years he lived in poverty.

Frobisher, Sir Martin (1535–1594), was the earliest of British navigators to attempt to find the North-West passage from the Atlantic to the Pacific through the Arctic seas, and his name is commemorated in Frobisher's Strait, to the south of Baffin Land. For his services in connection with the defeat of the Spanish Armada he was knighted.

Froebel, Friedrich Wilhelm August (1782–1852), was the founder of the Kindergarten system of education, the object of which is "to give children employment in harmony with their nature, to strengthen their bodies, to exercise their senses and lead them up to the original ground of all life, to the idea of unity with themselves."

Froissart, Jean (1337–1410), a celebrated French writer who visited England and Scotland, and was the author of the famous *Chronicles,* which tell us so much of the achievements of the barons of old.

Frost, Robert (b. 1874), best loved of American poets. "Stopping by Woods on a Snowy Evening"; "Birches"; "The Death of the Hired Man"; "After Apple-Picking". Awarded Pulitzer Prize for poetry in 1924, 1931, 1937, and 1943.

Froude, James Anthony (1818–1894), the celebrated historian and biographer of Carlyle.

Fry, Elizabeth (1780–1845), a Norwich lady who devoted much of her life to the promotion of prison reform, and achieved considerable reputation as a preacher. She belonged to the Society of Friends.

Fry, Christopher (b. 1907), English poet and dramatist of Quaker family. Author of *The Lady's Not for Burning, Venus Observed,* and *The Darkness is Light Enough.*

Fry, Roger (1866–1934), English art critic and painter. Introduced the work of Cézanne and the post-impressionists into England. His most important book is *Vision and Design.* Biography by Virginia Woolf (1940).

Fuchs, Sir Vivian Ernest, M.A., Ph.D. (b. 1908), British geologist and explorer. Dir. of the Falkland Islands Dependencies Scientific Bureau since 1951; leader of the British Commonwealth Trans-Antarctic Expedition 1957–58, the first to cross the Antarctic continent.

Fuller, Thomas (1608–1661), the author of *Worthies of England* and a *Church History of Britain,* two well-known and valuable works.

Fulton, Robert (1765–1815), an inventive American engineer who distinguished himself by experiments in the application of steam to navigation, and finally in 1807, launched the *Clermont* on the Hudson.

Furniss, Harry (1854–1925), British caricaturist, was born in Wexford and came to London as a young man. He was a famous cartoonist and served on the staff of *Punch* from 1878–94. Illustrated the works of Dickens and Thackeray.

Furse, Dame Katharine, G.B.E., R.R.C. (1875–1952), pioneer of women's services, daughter of John Addington Symonds. C.-in-C. V.A.D.s, 1914–17; Director W.R.N.S., 1917–19; Dir. World Bureau Girl Guides and Girl Scouts, 1928–38.

Furtwängler, Wilhelm (1886–1954), famous German conductor, and popular in Great Britain for his visits with the Berlin Philharmonic Orchestra, of which he succeeded Herr Nikisch as conductor.

G

Gade, Niels Vilhelm (1817–90), Danish composer. While studying at Leipzig he met Mendelssohn, whom he succeeded as conductor of the Gewandhaus orchestra. He wrote eight symphonies, chamber music, and choral works. Though characteristically Scandinavian, his work shows the influence of German romanticism.

Gainsborough, Thomas, R.A. (1727–1788), English landscape and portrait painter, whose works are remarkable for their grace and refinement. His *Duchess of Devonshire* was stolen when exhibited in 1876 and recovered in America some years later.

Gaiseric or **Genseric** (*c.* 390–477), king of the Vandals, the ablest of the barbarian invaders of the Roman empire. He led his people from Spain into Africa, took Carthage, gained control of the Mediterranean by his pirate fleets, and

sacked Rome in 455, thereby bringing about the fall of the western empire.

Gaitskell, Rt. Hon. Hugh Todd Naylor, C.B.E., M.P. (b. 1906), elected leader of the Parliamentary Labour Party when Earl Attlee retired in 1955. Has had distinguished career as economist, Civil Servant, and Chan. of Exchequer, 1950–51. M.P. for South Leeds since 1945.

Gale, General Sir Richard, G.C.B., K.B.E., D.S.O., M.C. (b. 1896), Commander of 6th Airborne Div. which landed in Normandy in June 1944; C.-in-C. B.A.O.R., 1952–56; succeeded Lord Montgomery as Deputy to General Norstad, 1958–.

Galen, Claudius (A.D. 131–201), physician, b. Pergamum (Asia Minor) of Greek parents. He lived most of his life in Rome, established a large practice, and became court physician to Marcus Aurelius. He systematised medical knowledge in accordance with his idea of purposive creation by the will of God. This unscientific attitude, by discouraging original investigation, hampered medical progress for a thousand years. Many of his treatises still survive.

Galileo (1564–1642), great Italian scientist whose experimental-mathematical methods in the pursuit of scientific truth laid the foundations of modern science. He became professor of mathematics at Pisa university when he was 25 and lectured at Padua university for 18 years. He made a number of fundamental discoveries, *e.g.*, in regard to the hydrostatic balance, thermometer, magnet, telescope, and foreshadowed Newton's laws of motion. He detected the satellites of Jupiter, the ring of Saturn, and the spots of the sun. He proved the superiority of the Copernican over the Ptolemaic theory, and was imprisoned for so doing. He died the year Newton was born.

Galsworthy, John, O.M. (1867–1933), an English novelist and dramatist of force and originality who wrote a great series of novels dealing with the history of an upper middle class family. Awarded Nobel Prize for Literature in 1932.

Galton, Sir Francis, F.R.S. (1822–1911), founder of eugenics, cousin of Darwin. His early work, *Meteorographica* (1863), contains the basis of the modern weather chart. He is also remembered for his device of finger-print identification and for being one of the first to apply mathematics to biological problems.

Galvani, Luigi (1737–1798), Italian physician and physiologist, whose experiments at Bologna university demonstrated the principle of animal electricity.

Gama, Vasco da (*c.* 1460–1524), the adventurous Portuguese navigator who discovered the sea route to India in 1498 by doubling the Cape of Good Hope.

Gandhi, Mohandas Karamchand (1869–1948), great Indian patriot, social reformer, and moral teacher. Believed in the doctrine of non-violence. In the tense situation following the granting of independence to India, he strove to promote the co-operation of all Indians but was assassinated on his way to a prayer meeting.

Garbo, Greta (b. 1905), Swedish film actress. The most arresting and poetical actress on the screen of her day.

Garcia, Manuel de Popolo Vicente (1775–1832), Spanish tenor, composer, and singing master. His son **Manuel Patricio Rodriguez** (1805–1906) was tutor to many celebrities including Jenny Lind. Both his daughters (Mme Malibran and Mme Viardot) were celebrated operatic singers. His grandsons taught at the Royal Academy of Music and the Royal College of Music in London.

Gardiner, Samuel Rawson (1829–1902), an English historian, whose works deal mainly with the period from the accession of James I. to the end of the Commonwealth. Many of his books remain the standard authorities on their subjects.

Garibaldi, Giuseppe (1807–1882), the famous Italian soldier and patriot. In 1834 he was condemned to death for being concerned in a plot to seize a Government vessel, but escaped to South America, and for some years was engaged in various conflicts for liberty in that hotbed of revolution. Returning to Italy in 1848, he joined the Roman Republican movement, but was ultimately compelled to fly for his life, and emigrated to New York. In 1854 he returned to Italy, and on the outbreak of war in 1859 had a command given to him, and scored several victories against the Austrians. The next year found him at the head of a great volunteer army, intent upon liberating Italy. This tremendous task he successfully carried through, earning the admiration of the world for his generalship and patriotism.

Garrick, David (1717–1779), the leading tragic actor of his time and a highly successful manager. Was buried in Westminster Abbey.

Garrison, William Lloyd (1805–1879), an eminent anti-slavery leader of America.

Garvin, James Louis, C.H. (1868–1947), editor of the *Observer*, 1908–42, and of the *Encyclopaedia Britannica* (14th ed.), 1926–29.

Gaskell, Mrs. Elizabeth Cleghorn (1810–1865), an English novelist of acknowledged power, whose *Mary Barton*, *Ruth*, *Cranford*, and other stories dealing largely with Lancashire life achieved great popularity. Her *Life of Charlotte Brontë* was also a remarkable book.

Gaulle, Charles André Joseph Marie de (b. 1890), French general and statesman, chosen President of the Fifth Republic, Dec. 1958. On collapse of France in 1940 refused to surrender, but raised and led the Free French fighting forces, with headquarters in England and Cross of Lorraine as emblem. Attacked constitution of the Fourth Republic, refused to ally himself with any of the political parties, and in 1947 founded the R.P.F. (Rally of the French People) in opposition to the left wing. Took no part in parliamentary life from 1953 until June 1958, when a rebellion of colonists in Algeria brought him to supreme power.

Gautier, Théophile (1811–1872) was an eminent French critic and novelist who at one time filled the position of secretary to Balzac. His romance, *Mademoiselle de Maupin*, caused a great sensation. He was also a poet of considerable power.

Gay, John (1685–1732), the English poet who penned *The Beggar's Opera* and the well-known collection of poetic fables. He was a writer of great wit and fancy, and much patronised by Society.

Gay-Lussac, Joseph Louis (1778–1850), a French chemist, whose experiments in connection with gases and vapours were of much scientific importance.

Ged, William (1690–1749), was one of the inventors of the process of stereotyping. He was a goldsmith and a native of Edinburgh.

Geikie, Sir Archibald, O.M., K.C.B., F.R.S. (1835–1924), noted geologist; President of the Royal Society 1908–13.

Geikie, Prof. James, F.R.S. (1839–1915), brother of the foregoing, and his successor in the Chair of Geology at Edinburgh University in 1882. His work on *The Great Ice Age* is a notable one.

Geoffrey of Anjou, Duke of Brittany (1113–51), founder of the Angevin dynasty of England, was son-in-law of Henry I. and father of Henry II., the first Angevin or Plantagenet king.

Geoffrey of Monmouth (1100–1154), was the author of the famous Old English chronicle which bears his name. He was born at Monmouth, and became Bishop of St. Asaph in 1152. His *Chronicon* is a compilation from older authors, and is notable for having contained the stories of King Arthur, King Lear, and Cymbeline.

George I. (1660–1727) was King of Great Britain from 1714 to his death, ascending the throne as direct descendant of James I. His reign saw many memorable events, including the Jacobite Rebellion, the South Sea Bubble, and the beginning of Walpole's great ministry.

George II. (1683–1760), son of the last-named, was King of Great Britain from 1727 to 1760. His reign covered a prosperous period in spite of wars and rebellions, and saw the Empire extended in India and North America, but the King was personally a man of limited power and achievement.

George III. (1738–1820), was the grandson of George II., and reigned from 1760 to 1820. He was a popular monarch for the most part, possessing all the domestic virtues and of simple tastes. The war with America lasted from 1775 to 1782, when the American States gained their independence, and from 1793 to 1815 the war with France was kept up with but little interruption. On the other hand, the

Empire in India was strengthened and enlarged, and the power of Great Britain on land and sea was splendidly shown.

George IV. (1762–1830) reigned from 1820 to his death, but filled the position of Prince Regent for some years previously. The King's personal character, in spite of the fact that he was called "The First Gentleman in Europe," showed such a want of dignity, and such an abandonment to licentiousness and frivolity, that he became very unpopular with the people.

George V. (1865–1936), was the second son of Edward VII. and Queen Alexandra. Entered the Navy as a cadet in 1877 and became second in the line of succession to the throne on the death of the Duke of Clarence in 1892. Married to Princess Mary of Teck in 1893. Succeeded to the throne May 6th, 1910, and celebrated his Silver Jubilee in 1935. Maintained the royal tradition of strenuous public engagements combined with unfailing attention to business of State.

George VI. (1895–1952), (Albert Frederick Arthur George of Windsor), second son of George V., was called to the throne in December 1936 on the abdication of his elder brother, Edward VIII. His reign was marked by the ordeal of war, by world revolution and social change and at the same time by a remarkable degree of constitutional harmony which his fine example and personal qualities did much to achieve.

George, Henry (1839–1897), American political economist whose "single tax" on land values as a means of solving economic problems is expounded in his *Progress and Poverty*, pub. 1879.

George, Saint, the tutelary saint of England, adopted by Edward III. He is believed to have been a native of Cappadocia and a vigorous champion of Christianity in the days of Diocletian, and to have suffered martyrdom at Nicomedia 303 A.D. The dragon which he is said to have slain symbolises the powers of evil over which he triumphed.

German, Sir Edward (1862–1936), English composer, best known for his incidental music and light opera *Merrie England*. (His name was originally Edward German Jones.)

Gershwin, George (1898–1937), American jazz pianist and song-writer, composer of the famous *Rhapsody in Blue* and other works including the negro "folk-opera" *Porgy and Bess*.

Gesner, Konrad von (1516–1565), a scholarly Swiss naturalist, and father of the science of zoology.

Ghiberti, Lorenzo (1378–1455), Florentine sculptor whose bronze doors, beautifying the baptistery in Florence, were described by Michaelangelo as fit for the gates of paradise.

Gibbon, Edward (1737–1794), celebrated historian of the *Decline and Fall of the Roman Empire*.

Gibbons, Grinling (1648–1720), the celebrated wood-carver and sculptor, was born at Rotterdam and was brought to the notice of Charles II. by Evelyn, the diarist. The choir stalls of St. Paul's and the carving in the Wren library at Trinity College, Cambridge, are his work.

Gibbons, Orlando (1583–1625), a noted English composer of Church music who was organist of the Chapel Royal.

Gibson, Charles Dana (1867–1944), the famous American black-and-white artist and book illustrator, creator of "the Gibson girl."

Gide, André Paul Guillaume (1869–1951) French man of letters, novelist, dramatist and poet. Awarded the Nobel Prize for Literature in 1947.

Gielgud, Sir (Arthur) John (b. 1904), English actor, member of the Terry family. Began by walking on at the Old Vic, and, later, became a Shakespearian actor, making a marked success as Hamlet, Richard II., and Prospero.

Gigli, Beniamino (1890–1957), the great Italian operatic tenor of the Metropolitan Opera House New York. The possessor of a voice of great natural beauty, and one of the finest exponents of the music of Puccini and Verdi.

Gilbert, Sir Alfred, M.V.O., R.A., (1854–1934), sculptor and designer of gold and silver objects. Among his best-known sculptures are *Perseus Arming*, *Icarus*, *Eros* in Piccadilly Circus, the Shaftesbury Memorial and the Duke of Clarence Memorial at Windsor.

Gilbert, Sir Humphrey (1539–1583), knighted by Queen Elizabeth for his bravery in Ireland, later made voyages of discovery, and added Newfoundland to the British possessions.

Gilbert, Sir John, R.A. (1817–1897), one of the most prolific artists of his time. His illustrations to Staunton's edition of Shakespeare are remarkable for their picturesqueness and dramatic power.

Gilbert, William (1543–1603), physician to Queen Elizabeth I., has been called the father of electric and magnetic science. Published his great book on the magnet in 1600.

Gilbert, Sir William Schwenck (1836–1911), English humorist and playwright, is best remembered for the "Bab Ballads" and for the famous Savoy series of operas in which he collaborated with Sir Arthur Sullivan. Among the operas are *H.M.S. Pinafore*, *Patience*, *Iolanthe*, *The Mikado*, *The Gondoliers*, and *The Yeomen of the Guard*. The Gilbertian humour of plot and paradox, the kindly satire and the delightful metres combine with Sullivan's music to make the operas unforgettable and ever popular.

Gill, Arthur Eric Rowton, A.R.A. (1882–1940), English sculptor and engraver. His first piece of sculpture, *Madonna and Child*, was produced in 1910 and in 1913 he received the commission to carve the Stations of the Cross for Westminster Cathedral. In 1922–23 he carved the relief, *Christ Driving the Money-changers from the Temple*, which is placed at the entrance of Leeds University as a War Memorial. Executed the carvings on Broadcasting House, London; also worked as a designer for printing; the Gill Sans type and the George VI stamps were his designs.

Gillray, James (1757–1815), the eminent caricaturist of the time of George III., who produced upwards of a thousand political cartoons.

Giotto di Bondone (*c.* 1266–*c.* 1337), great Florentine artist, the first to break away from byzantine tradition and paint in a naturalistic way. Much of his work has perished but still surviving are the great frescoes in the churches of Assisi, Padua, and Florence. He designed the western front of the cathedral at Florence and the campanile, the lower part of which was completed from his designs before his death.

Gissing, George Robert (1857–1903), English author whose novels deal with poverty and the sociological problems of his day. *New Grub Street*, *The Unclassed*, *Charles Dickens, A Critical Study*, *The Private Papers of Henry Ryecroft* are among his best-known works.

Giulio Romano or **Giulio Pippi** (*c.* 1492–1546) was a pupil of Raphael, and himself a distinguished painter and architect.

Gladstone, Rt. Hon. William Ewart (1809–98), the great Liberal statesman of the latter part of the nineteenth century, popularly known as the Grand Old Man. Entered Parliament in 1832 as a Tory, held various offices under Peel, and joined the Aberdeen coalition in 1852. From that time he served several terms as Chancellor of the Exchequer and was Liberal Prime Minister, 1868–74, 1880–85, 1886, and 1892–94. His financial policy was able, accurate, lucidly exposed, and very successful. His first ministry was active, its legislative achievements including the Disestablishment of the Church of Ireland, the Education Act of 1870, the Ballot Act of 1872, and the Irish Land Act, but in 1873 they were aptly described by Gladstone's great rival, Disraeli, as "exhausted volcanoes." His second ministry, returned to power after the astonishing Midlothian campaign, witnessed the defeat by the Boers at Majuba, the bombardment of Alexandria, and the disaster of General Gordon at Khartoum. His last two ministries were marked by the adoption of the policy of Home Rule for Ireland, which he was unable to carry. Gladstone was a good classical scholar and an earnest high churchman, who in 1838 published the *State in its Relations with the Church*, a work of considerable interest.

Glazunov, Alexander Constantinovich (1865–1936), Russian composer, pupil of Rimsky-Korsakov. He was an accomplished and prolific composer, the first of his eight symphonies being composed when he was only 16.

Glendower, Owen (1359–1415), a famous Welsh chieftain who proved a formidable opponent to Henry IV., and gathered around him a great following of Welshmen, whom he led with much bravery, though finally defeated in 1405.

Glinka, Mikhail Ivanovich (1804–57), Russian composer whose music has a strong folk-song element. Notable among his works are his two operas, *A Life of the Tsar* and *Russlan and Ludmilla*, based on a poem by Pushkin. He is recognised as the first of the Russian national school.

Gluck, Christoph Willibald (1714–87), German composer, a figure of great historical importance in the development of the opera. He was the son of a Bohemian forester and studied in Prague, Vienna, and Italy. His first operas were in the Italian tradition, but with *Orfeo ed Euridice* (1762), inspired by classical Greek drama, he began his reform of the opera. Then followed the great operas *Alceste*, *Armide*, and *Iphigénie en Tauride* (1779), which is considered his masterpiece.

Goddard, Lord, P.C., Q.C. (b. 1877), Lord Chief Justice of England, 1946–58.

Godfrey of Bouillon (c. 1061–1100) was the leader of the First Crusade, and after the conquest of Jerusalem, exchanged the title of King for that of "Protector of the Holy Sepulchre." He liberated the Holy Land, and was buried on Mount Calvary.

Godiva, Lady (1040–1080), was the pious and beautiful wife of Leofric, Earl of Chester and Lord of Coventry. Having appealed to her lord to remit certain impositions from the inhabitants, he promised to grant her request if she would ride naked through the town. This she did, having first passed the word to have blinds and shutters drawn at the appointed hour, and so obtained the people's ransom.

Godwin, Earl of the West Saxons (990–1053), was one of the most influential noblemen of his time and gave his daughter in marriage to Edward the Confessor, against whom he was afterwards in rebellion. Godwin's son, Harold, claimed the throne after Edward's death, but was killed at Hastings.

Godwin, William (1756–1836), English Radical philosopher, author of *Political Justice* and a novel, *Caleb Williams*. Married Mary Wollstonecraft (1759–97), author of *A Vindication of the Rights of Women*, in which she pleaded for the equality of the sexes, particularly in education. Their daughter, Mary Wollstonecraft Godwin (1797–1851), married the poet, Shelley, and was the author of *Frankenstein*.

Goethe, Johann Wolfgang von (1749–1832), German poet of great gifts and versatility. Born at Frankfurt on Maine of a cultivated and well-to-do family, he was able to integrate all the powers with which nature had endowed him in one harmonious personality. Before he went to Weimar at the age of 25 he had written *Götz von Berlichingen* and *Werthers Leiden* and many beautiful lyrics. He settled at Weimar in 1775, received a Ministerial appointment and actively interested himself in the welfare of the state. *Faust*, the great dramatic poem which accompanied him from early manhood to the end, epitomises his whole life and was his crowning achievement. Not only was he a great poet, but scientist and philosopher besides.

Gogol, Nikolai Vasilievich (1809–52), one of the greatest of Russian novelists whose stories of provincial life are in the same setting as his masterpiece, *Dead Souls* (1842), of which an English translation appeared in 1906. Was also a playwright, his most successful play being *The Government Inspector* (1836), a satire on provincial bureaucracy.

Goldsmith, Oliver (1728–1774), the celebrated author of *The Vicar of Wakefield*, *The Deserted Village*, and *She Stoops to Conquer*. The son of a poor Irish curate, he found his way to London in 1756, subsequently devoting himself entirely to literature, being befriended by Dr. Johnson and held in great esteem by Reynolds, Burke and other eminent men of the time. He was buried in the churchyard of the Temple.

Goodyear, Charles (1800–1860), an American, discoverer of the art of vulcanising rubber, by which the utility of the material was greatly extended.

Goossens, Sir Eugène (b. 1893), English composer and conductor of Belgian parentage. He has been associated with many famous orchestras, and his compositions include the operas *Judith* and *Don Juan de Mañara*. His brother Léon is a celebrated oboe virtuoso, both his sisters are gifted harpists, and his father and grandfather, who also bore the name Eugène, were conductors.

Gordon, Adam Lindsay (1833–1870), an Australian poet who wrote many stirring ballads and poems, his *Bush Ballads and Galloping Rhymes* being a great success. As a settler, however, he failed, and, after numerous unfortunate experiments, committed suicide.

Gordon, Major-General Charles George, C.B. (1833–1885), a distinguished soldier, administrator, and earnest Christian, who had a most adventurous, useful, and self-sacrificing career. He saw active service in the Crimea, China, and India, and in 1873 was made Governor of the Equatorial provinces of Egypt. In 1877 he went out to the Sudan for the Egyptian Government, and in 1884 again proceeded thither on behalf of the English Government to deal once more with the difficulties which had arisen consequent on the Mahdi's Rebellion. While defending Khartoum he was murdered by the Mahdi's forces on the palace staircase.

Gordon, Lord George (1751–1793), was tried for treason as the instigator of the Anti-Popery riots of 1780, but acquitted on the ground that he had no treasonable intention. Some years later he was committed to Newgate for libelling Marie Antoinette and died there of fever.

Gorky, Maxim (Alexi Maximovitch Pieshkov) (1868–1936), Russian novelist and writer whose works are remarkable for their realistic power. Was in turn shoemaker's apprentice, gardener, watchman, scullion on a packet boat and baker's apprentice. In 1892 his first story was published, and he found his vocation.

Gosse, Sir Edmund, C.B., LL.D., Litt.D. (1849–1928), a distinguished poet and critic who wrote lives of Gray, Congreve and Dr. Donne, and his *History of 18th Century Literature* and *History of Modern English Literature* show great critical power and appreciation. Was librarian to the House of Lords 1904–14, and wrote a book on French literary men and a life of Sir Thomas Browne. In 1907 he published *Father and Son*, being recollections of his father.

Gould, Sir Francis Carruthers (1844–1925). Perhaps the cleverest political caricaturist of his day, and did also considerable journalistic work as assistant editor of the *Westminster Gazette*.

Gould, Jay (1836–1892), American financier and railway magnate, who acquired an enormous fortune in Wall Street speculations.

Gounod, Charles François (1818–93), French composer whose fame rests chiefly on his operas *Faust* and *Roméo et Juliette*, though his lyrical gifts are best shown in some of his earlier works, such as *Le Médicin malgré lui* and *Mireille*. He also wrote oratorios and church music.

Gower, John (1325–1408), an English poet of the time of Chaucer, who wrote many elegant ballads and devotional poems. His *Confessio Amantis* was his outstanding work.

Goya y Lucientes, Francisco José (1746–1828), a famous Spanish painter and etcher, and one of the greatest of Spanish artists, and renowned for his wonderful series of etchings and satirical drawings. There are four Goya paintings in the National Gallery. One of his fine portraits is that of the Duchess of Alva. In addition to portraits and genre he painted frescoes in the Cathedral at Saragossa. As versatile as he was facile, he also occupies a high position among etchers.

Grace, Dr. William Gilbert (1848–1915), renowned and almost legendary cricketer who by his character and skill dominated English cricket for over forty years, and was probably the best-known man in England. Altogether in first-class cricket he scored 54,896 runs, including 126 centuries, and took 2876 wickets. Scored 1000 runs in May 1895; and three times made over 300 runs in an innings.

Graham, John, of Claverhouse, Viscount Dundee (1643–1689). Renowned for his sturdy adherence to the Stuarts, and headed a rebellion in Scotland against William and Mary, but was killed at the Battle of Killiecrankie.

Grahame, Kenneth (1859–1932), as a writer of books for children ranks almost with Lewis Carroll. *The Golden Age*, *Dream Days*, and *Wind in the Willows*, all achieved great popularity.

Grahame-White, Claude (1879–1959), aviator and

engineer, the first Englishman to gain an aviator's certificate, 1909; won the Gordon Bennett Cup with the then record speed of 60½ miles per hour in 1910, founded the first British Flying School and published many works on aircraft from both the historical and technical aspects.

Grainger, Percy Aldridge (b. 1882), U.S.A. citizen, born in Australia, pianist and composer. A brilliant player and an authority on folk-song, the influence of which is apparent in all his compositions.

Grant, General Ulysses Simpson (1822–1885), the most distinguished American general of the Civil War. Was President of the United States from 1869 to 1876.

Granville-Barker, Harley, D.Litt., LL.D., F.R.S.L. (1877–1946), distinguished English dramatist, producer, and actor. Introduced plays of Ibsen and Shaw to British public. His own plays reflect influence of Shaw, and are particularly notable for their realistic dialogue.

Grattan, Henry (1746–1820), an Irish orator and statesman who, first in the Irish Parliament and afterwards in the Imperial Parliament, did memorable work for the cause of his country.

Gray, Thomas (1716–1771), the English poet, whose *Elegy written in a Country Churchyard* is one of the most beautiful in the language. His other poems were not numerous but included a fine *Ode on a Distant Prospect of Eton College* and a notable *Ode to Adversity.*

Greeley, Horace (1811–1872), founder of the *New York Tribune* and a political writer of great power and influence. Was an unsuccessful candidate for the United States Presidency in 1872.

Green, John Richard (1837–1883), an eminent English historian. Published a *Short History of the English People* in 1874.

Greenaway, Kate (1846–1901), a gifted book illustrator and water-colour artist, whose drawings of children were full of charm and delicacy and gained her great popularity and the warm approval of no less a critic than Ruskin.

Greene, Graham (b. 1904), author of the novels *Brighton Rock, The Power and the Glory, The Heart of the Matter* and a play *The Living Room.*

Gregory, St. (257–336), was founder of the Armenian Church, and spent his last years in a cave at the foot of Mount Sebuh.

Gregory the Great, St. (*c.* 540–604), Pope 590–604. The last great Latin Father and the forerunner of scholasticism. The real founder of the temporal power and the political influence of the papacy, he also maintained the spiritual claims of Rome, enforcing discipline, encouraging monasticism, defining doctrine, and adding to the music liturgy, and canons of the Church. Thus he exerted enormous influence on the life and thought of the Middle Ages.

Gregory VII (*c.* 1020–85), Pope from 1073. Originally called Hildebrand. Battled for papal omnipotence within the Church, stamping on simony and the marriage of priests. His victory in the conflict of empire and papacy came when the emperor, Henry IV, did penance for three days in the snow at Canossa, but had the unfortunate result of leading to further internal dissensions in Germany and to papal absorption with power politics rather than to Gregory's aim of an ideal theocracy embracing all States.

Gregory XIII (1502–85), Pope, 1572–85; introduced the Gregorian calendar.

Grenville, Sir Richard (1541–1591), the Elizabethan sea-captain, who with his one ship engaged a fleet of Spanish war-vessels off Flores, in 1591, was captured and shortly after died on the Spanish flagship *San Pablo*, an exploit celebrated in Tennyson's noble ballad, *The Revenge.*

Gresham, Sir Thomas (1519–1579), was the wealthiest London merchant and financier of his time. He built the first Royal Exchange and founded Gresham College. The son of Sir Richard Gresham (Lord Mayor of London), he succeeded his father as King's Agent at Antwerp, and proved an astute money-finder for the Court in four successive reigns, ending as Queen Elizabeth's " Royal Merchant."

Greuze, Jean Baptiste (1725–1805), French painter, whose works, especially his studies of girls, display much delicacy and beauty of handling.

Grey, Charles, 2nd Earl, K.G. (1764–1845), a great English Whig statesman under whose Premiership were passed the Reform Bill of 1832, the Bill abolishing slavery throughout the British Empire (1833), and the Poor Law Amendment Act, 1834.

Grey, Lady Jane (1537–1554), was the daughter of the Duke of Suffolk and great-granddaughter of Henry VII. On the death of Edward VI. she was proclaimed Queen, but only reigned for nine days, Queen Mary ousting her and maintaining the Tudor succession. Six months later Lady Jane and her husband, Lord Guildford Dudley, were executed.

Grey of Fallodon, 1st and only Viscount, K.G., P.C. (1862–1933). Under-Secretary for Foreign Affairs, 1892. Foreign Secy., 1905–16. He won high approval for his handling of the Balkan difficulties of 1912–13, and all through the difficult strain which preceded Germany's rush into war acquitted himself with force and dignity. Leader of Liberal Party in House of Lords until Aug. 1924. Chancellor of Oxford Univ., 1928–33.

Grieg, Edvard Hagerup (1843–1907), a Norwegian musical composer, who presented the characteristics of his country's music with strong accentuation in numerous compositions of great melodic beauty.

Griffin, His Eminence Cardinal Bernard William (1899–1956), Roman Catholic Archbishop of Westminster from 1944 until his death.

Griffith, Arthur (1872–1922), was the first President of the Irish Free State 1921; founder and first editor of *Sinn Fein* 1906–15, and founder of the *Sinn Fein* movement.

Griffith, David Wark (1880–1948), pioneer American film producer. Noted especially for his remarkable films *Broken Blossoms* and *The Birth of a Nation.* Invented much of the technique of the modern cinema, such as the close-up, the flash-back, and the fade-out, and developed many famous stars, including Mary Pickford, L. Barrymore, and D. Fairbanks, Sr.

Grimm, the brothers **Jakob Ludwig Karl** (1785–1863) and **Wilhelm Karl** (1786–1859), German philologists and folk-lorists who wrote the world-famous *Fairy Tales.* They planned a gigantic etymological dictionary of the German language, which is being completed by German scholars.

Grimthorpe, 1st Baron, LL.D. (1816–1905), long known as **Sir Edmund Beckett,** Bt., K.C., was a great authority on horology, and, with Professor Sir George Airy (*q.v.*), designed " Big Ben." He restored St. Albans Cathedral at his own cost.

Gromyko, Andrei A. (b. 1908), Russian diplomat; succeeded D. T. Shepilov as Foreign Minister, Feb. 1957. Ambassador to Britain, 1952–3, and to the U.S.A., 1943–46. Representative of the Soviet Union on the U.N. Security Council, 1946–49.

Gronchi, Giovanni (b. 1888), succeeded Signor Einaudi as President of the Italian Republic in 1955 and is a member of the left-wing of the Christian Democrat Party.

Grossmith, George (1847–1912), the well-known actor and entertainer. His father, George Grossmith the elder, was also a popular entertainer and lecturer, his brother, Weedon Grossmith, was an actor and artist of considerable attainments, and his son, **George Grossmith** (1874–1935), was a successful comedian, and the first to introduce revue and also cabaret entertainment into England.

Grote, George (1794–1871), English historian famous for his *History of Greece*, 1846–56, an epoch-making and standard work.

Grotius, Huig van Groot (1583–1645), Dutch jurist, the founder of international law. He was condemned to life imprisonment for supporting religious toleration but made a daring escape and found refuge in Paris, where he wrote his masterpiece *De Jure Belli et Pacis.*

Grouchy, Marshal Emmanuel, Marquis de (1766–1847), a famous Napoleonic general who, at Hohenlinden, Wagram, and in the Moscow retreat rendered signal service. After Waterloo he led the defeated army back to Paris.

Grove, Sir George (1820–1900) was a distinguished engineer and bridge and lighthouse builder, but better known as an enthusiastic lover of music, the study and performance of which in England he did much to promote. His *Dictionary of*

Music and Musicians is the leading work of its kind.

Guedalla, Philip, M.A. (1889–1944), was an English historian and essayist. Author of *The Partition of Europe* (1914), *The Second Empire* (1922), *Palmerston* (1926), *The Missing Muse* (1929), *The Duke* (1931), and other works.

Gustavus Adolphus, King of Sweden (1594–1632) the "Lion of the North," after a lengthy campaign in Poland, entered the Thirty Years' War in support of Swedish interests and Protestant distress, won the Battle of Breitenfeld in 1631, and was killed in action the next year. Succeeded by his daughter, Christina, and his policy carried on by his minister, Oxenstierna.

Guy, Thomas (1644–1724), founder of Guy's Hospital, was a dealer in Bibles, speculator and money-lender, who after making a large fortune, bequeathed £300,000 for the erection and endowment of the famous hospital.

Gwynne, Nell (1650–1687), was originally, it is said, an orange girl of provincial birth, and afterwards a sprightly London dancer and actress, who became mistress to Charles II. Her eldest son was made Duke of St. Albans.

H

Haakon VII. (1872–1957), King of Norway. Formerly Prince Carl of Denmark, second son of Frederick VIII.; elected to the throne on the separation of Norway from Sweden in 1905. Married Princess Maud, youngest daughter of King Edward VII. in 1896. Lived in England with his exiled government during German occupation, 1940–45.

Hadfield, Sir Robert Abbott, Bt., F.R.S. (1858–1940), English metallurgist whose discovery of manganese steel in 1882 brought him recognition from every steel producing country.

Hadrian (76–138) was Emperor of Rome in succession to his uncle Trajan, and one of the greatest of Roman rulers. He visited Britain, and in A.D. 121 built the wall between Newcastle and Carlisle for protection of his dominions against the Picts and Scots.

Hafiz, pseudonym of Shams ad-Din Mohammed (1320–1389), great Persian lyrical poet. His principal work is the *Divan*, a collection of short sonnets called *ghazals*. The sobriquet *Hafiz*, meaning one who remembers, is applied to any one who has learned the Koran by heart.

Hahnemann, Samuel Christian Friedrich (1755–1843), the German physician who founded the system of homœopathy.

Haig, Field-Marshal, 1st Earl of Bemersyde, K.T., G.C.B., O.M., G.C.V.O., K.C.I.E. (1861–1928), C.-in-C. of the British Expeditionary Forces in France and Flanders, 1915–19. His name is associated with the sale of poppies in aid of the British Legion.

Haile Selassie I., G.C.B., G.C.M.G., G.C.V.O. (b. 1891), Emperor of Ethiopia, April 1930 to May 1936, and since May 1941.

Hailsham, 2nd Viscount, Quintin McGarel Hogg, Q.C. (b. 1907), Chairman Conservative Party, 1957–59; Lord Privy Seal and Min. for Science and Technology, 1959–.

Hakluyt, Richard (1553–1616), the first of English naval historians. By his *Divers Voyages touching the Discovery of America*, and *Principal Navigations, Voyages, and Discoveries of the English Nation*, did much to help forward the colonising spirit.

Haldane, John Burdon Sanderson (b. 1892), British physiologist and geneticist, son of John Scott Haldane (1860–1936), whose researches led to improvements in public health and industrial safety. Formerly Weldon Prof. of Biometry at University College, London; emigrated to India, July 1957.

Haldane, Viscount, P.C., K.T., O.M., F.R.S. (1856–1928), sat for Haddingtonshire, 1885–1911. In 1901 was Vice-President of the Liberal Imperialist League, and at the close of 1905 was made War Minister and organised the Territorial Force. Lord Chancellor, 1912–15, and again in first Labour Government, 1924.

Halévy, Ludovic (1834–1903), a brilliant French writer who supplied Offenbach with libretti for some of his most famous comic operas; among them *La Belle Hélène*, *La Grande Duchesse*, and *Barbe Bleue*. In conjunction with Meilhac he wrote several notable plays of which *Frou-frou* was perhaps the most successful.

Halifax, Charles Montague, Earl of (1661–1715), seventeenth century financier who was responsible for the National Debt, the window tax, the revaluation of the currency, and the foundation of the Bank of England.

Halifax, 1st Earl of, Edward Frederick Lindley Wood, K.G., P.C., O.M., G.C.S.I., G.C.I.E., T.D. (1881–1959), filled many difficult positions with distinction and success and was especially notable as Viceroy of India, 1926–31, Foreign Secretary, 1938–40, and British Ambassador in Washington, 1940–45. He wrote a life of John Keble and was prominent in the life of the Church of England. Chancellor of Oxford University 1933–59.

Halifax, George Savile, Marquess of (1633–95), author of *Advice to a Daughter* and *Character of a Trimmer*, was a gifted and independent politician, pamphleteerist, and orator.

Hallam, Henry (1777–1859), a graceful and scholarly historian who contributed several important works. His *View of the State of Europe during the Middle Ages*, *Constitutional History of England*, and *Introduction to the Literature of Europe* are distinguished for their clearness of style and correctness of judgment.

Hallé, Sir Charles (1819–1895), a distinguished pianist and conductor who was born in Westphalia. Went to Paris to study music in 1836, and in 1848 settled in London, where he soon became known as a piano-player of the first rank. He organised an orchestra of high-class talent, and for many years conducted it in London and the provinces. He married Madam Norman Neruda (d. 1911), the celebrated violinist in 1888, and was knighted the same year.

Halley, Edmund, F.R.S. (1656–1742), English Astronomer Royal from 1720 to his death and ranked next to Newton among the scientific Englishmen of his time. Made first magnetic survey of the oceans from the naval vessel *Paramour*, 1698–1700. Discovered what is known as Halley's comet.

Hals, Franz (1584–1666), a famous painter of the Dutch School, who is represented in the leading galleries of Europe. The Wallace Collection has his world-famous picture, the *Laughing Cavalier*.

Hamilton, Alexander (1757–1804), American statesman and economist, opponent of Thomas Jefferson, served as Secretary of the Treasury in Washington's cabinet from 1789–95. Though a monarchist by predilection, he urged the adoption of the Constitution, and in conjunction with Maddison and Jay wrote the *Federalist*. *Report on Manufactures* proved a mine of arguments for future protectionists. Founded the Bank of New York. Killed in a duel with a political rival.

Hamilton, Emma Lyon, Lady (1761–1815), was a woman of humble birth and great personal beauty who attained prominent notice by her association with Sir William Hamilton, British Ambassador at Naples, who married her, and afterwards with Lord Nelson, who conceived an infatuation for her.

Hammarskjöld, Dag Hjalmar Agne Carl, D.Phil., Dr.Econ. (b. 1905), succeeded Mr. Trygve Lie in 1953 as Sec.-Gen. of the United Nations.

Hammond, John Lawrence Le Breton (1872–1949), English journalist and historian whose works on social and industrial history, written mainly in collaboration with his wife, Barbara Hammond, include *The Village Labourer*, 1911; *The Town Labourer*, 1917; *The Skilled Labourer*, 1919; *The Rise of Modern Industry*, 1925; and *The Age of the Chartists*, 1930.

Hampden, John (1594–1643), English patriot who opposed Charles I.'s "Ship Money" tax, and by his resistance and eloquent advocacy of the wish of the people helped the Parliamentary cause.

Hamsun, Knut, pen-name of **Knut Pedersen** (1859–1952), Norwegian author and farmer, who in his youth struggled for existence, visited America twice and earned his living by casual labour. His monumental work, *Markens Gröde* (*Growth of the Soil*), gained him the Nobel Prize in 1920.

Handel, George Frederick (1685–1759), German composer, son of a barber-surgeon to the Duke

of Saxony; born the same year as Bach. He spent much of his life in England composing operas and achieving world-wide fame by his magnificent series of oratorios. His operas, of which there are over forty, include *Atalanta*, *Berenice*, and *Serse*, and his oratorios, of which there are thirty-two, include *Saul*, *Israel in Egypt*, *Samson*, *Messiah*, *Judas Maccabaeus*, and *Jeptha*. He also composed chamber music, *concerti grossi*, music for chorus and orchestra, solo cantatas, harpsichord suites, and much other beautiful and noble music. Beethoven said of Handel, "Go and learn of him how to achieve great effects with simple means." Eight years before he died he became totally blind and relied upon his old friend and copyist John Christopher Smith to commit his music to paper. He was buried in Westminster Abbey.

Hannibal (247–183 B.C.), the renowned Carthaginian general, who led an army against Rome, and achieved many notable victories over superior numbers. Was defeated by Scipio at the Battle of Zama, and afterwards suffered exile, and poisoned himself.

Harcourt, Rt. Hon. Sir William Vernon, F.R.S. (1827–1904), barrister, author, Liberal statesman, an enthusiastic supporter of Mr. Gladstone.

Hardicanute (1019–1042), son of Canute the Great, was King of England from 1040 to 1042, and imposed the tax called Danegeld. He was the last Danish sovereign of this country.

Hardie, James Keir (1856–1915), a Socialist politician and Labour representative who acted as editor of the *Miner* and the *Labour Leader* from 1887 to 1904. He is regarded as the founder of the Labour Party. During his early life he worked in a Scottish coal pit, but in 1882 became a journalist, and entered Parliament as member for West Ham (South) in 1892–95, being the first Socialist to be elected to the House of Commons. First Chairman of the Parliamentary Labour Party, 1906–8, M.P. for Merthyr Tydvil from 1900 till his death.

Hardwicke, Sir Cedric Webster (b. 1893), English actor who made his debut in *The Monk and the Woman* in 1912. Has acted in many Shaw and Shakespearian plays, and is also a distinguished film actor.

Hardy, Thomas, O.M. (1840–1928), was educated as an architect and practised for some time, but became known as a promising novelist in 1871 with his story *Desperate Remedies*. In 1874 his *Far from the Madding Crowd* was published, which at once made him a name. Following that, at short intervals, came a long series of powerful novels from his pen. Perhaps the most notable of his stories are *The Trumpet Major*, *The Mayor of Casterbridge*, *Tess of the D'Urbervilles*, and *Jude the Obscure*. In 1908 he completed a dramatic poem entitled *The Dynasts*, whose central figure is Napoleon.

Hargreaves, James (1720–1778), was a poor Lancashire-born mechanic who invented the spinning jenny, one of the revolutionising labour-saving contrivances of the latter half of the 18th century. It met with much opposition, however, and kept him poor, though the community afterwards reaped the advantage in a greatly improved industry.

Harkness, Edward Stephen, B.A., M.A., LL.D. (1874–1940) was a banker and one of America's greatest philanthropists. Donor of the Pilgrim's Prize of £2,000,000 to Great Britain; founded in 1930 the Pilgrim Trust in appreciation of Great Britain's acceptance of financial burdens in the Great War of 1914–18.

Harley, Robert, 1st Earl of Oxford, K.G., P.C. (1661–1724), a distinguished Tory statesman—originally, however, a Whig—of the Queen Anne period, who fell into disgrace after that Sovereign's death in consequence of being suspected of intriguing with the Stuarts. He served at different times as Speaker of the House of Commons, Chancellor of the Exchequer, and Lord Treasurer. "The Harleian Collection" in the British Museum is a reminder of his cultured literary tastes.

Harold II. (1022–1066), the last of the Saxon Sovereigns of England, and the son of Earl Godwin, was crowned King in succession to Edward the Confessor in 1066. The coming of William the Conqueror, with his great army, soon, however, put an end to the hopes of Harold and his followers; and the Battle of Hastings terminated at once his life and Saxon sway in this country.

Haroun-Al-Raschid (763–809), the famous Caliph of Bagdad, familiar to all by the references to him in the *Arabian Nights*—a wise and powerful ruler.

Harriman, William Averell (b. 1891), adviser to Pres. Truman on defence and foreign policy and special representative in Europe of U.S. Government in connection first with the Marshall Plan and later with the Mutual Security Agency, 1948–52.

Harris, Joel Chandler (1848–1908), American journalist and author, famous as the creator of "Uncle Remus." The negro humour of his stories brought him world-wide popularity among adults and children alike. His Brer Rabbit in the Uncle Remus negro folk-tales was the forerunner of Mickey Mouse, impudently victorious in every contest against fearful adversaries.

Harrison, Frederic (1831–1923), as leader of the English Positivists, filled a prominent part in philosophical discussions during the last quarter of the 19th century. In 1907 he published *The Creed of a Layman* and *The Philosophy of Common Sense*, and in 1908 *Realities and Ideals*.

Harrison, John (1693–1776), the inventor of the chronometer, for which he received the Government grant of £20,000, was a mechanician of great ingenuity, who effected many important improvements in clocks, watches, and other instruments. In 1715 he made an 8-day clock with wooden wheels, which is still working in the Science Museum, South Kensington.

Harte, Francis Bret (1839–1902), the American poet and author, who leapt into popularity in the late 'sixties by his clever sketches and stories of Californian mining life.

Harty, Sir (Herbert) Hamilton, Mus. Doc. (1880–1941), was a well-known British composer and conductor. Conductor of Hallé Orchestra 1920–33; Musical Adviser and Conductor-in-Chief of London Symphony Orchestra 1932–41.

Harvey, William (1578–1657), an English doctor and scientist who rose to great eminence both as an anatomist and physiologist, and became Physician Extraordinary to James I. He immortalised himself by discovering the circulation of the blood in 1616.

Hastings, Sir Patrick, Q.C. (1880–1952), lawyer, politician, and playwright. Attorney-General in first Labour Government, 1924. Author of *The Blind Goddess*.

Hastings, Warren (1732–1818), the first Governor-General of India. On his return to England 12 years later he was impeached on charges of excessive cruelty and corruption. The trial lasted seven years, and cost Hastings £76,000. He was ultimately acquitted, and the East India Company settled an annuity of £4,000 upon him, and he lived to see his plans for the security of British rule in the Orient publicly applauded.

Hauptmann, Gerhart (1862–1946), one of the leading dramatic poets of Europe. Born in Silesia, he devoted himself first to agriculture, then to art, and subsequently to the drama, and lived in Rome, Berlin, Switzerland, and the United States. Produced many plays, including *The Weavers*. Winner of the Nobel Prize for Literature, 1912.

Havelock, Major-Gen. Sir Henry, K.C.B. (1795–1857), one of the heroes of the Indian Mutiny, who led the troops to the relief of Cawnpore and Lucknow.

Hawke, Edward, 1st Baron, K.C.B. (1705–1781), one of the great admirals of the 18th century. He won a brilliant victory over the French fleet at Quiberon in 1759 in a tremendous storm.

Hawkins, Sir Anthony Hope (1863–1933), a popular novelist and playwright. Amongst his best-known works were *The Prisoner of Zenda*, *The Dolly Dialogues*, and *Rupert of Hentzau*.

Hawkins, Sir John (1532–1595), a brilliant naval officer of the Elizabethan period, who did much sea fighting in many climes, and served as vice-admiral in the expedition against the Spanish Armada, for which he was knighted.

Hawthorne, Nathaniel (1804–1864), one of the most distinguished novelists that America has pro-

duced. *The Scarlet Letter* and *The Blithedale Romance* are his greatest novels.

Haydn, Franz Joseph (1732–1805), Austrian composer, who belongs to the great classical period of Bach, Handel, and Mozart and whose style also influenced Beethoven. He has been given the title "father of the symphony." Much of his life was spent as musical director to the princely Hungarian house of Esterhazy. In 1791 and again in 1794 he visited London, where he conducted his Salomon symphonies. He composed many operatic works, string quartets, symphonies (104 in all), sonatas, songs, Masses, and chamber music. His two great oratorios, *The Creation* and *The Seasons*, were written in his old age.

Hazlitt, William (1778–1830), one of the most admired of our essayists and critics. His *Characters of Shakespeare's Plays* and his published lectures on the poets and dramatists, besides his *Table Talks*, are still widely read. His son William (1811–1893) was also of literary tastes, though he became Senior Registrar in the Bankruptcy Court; and the son of the latter, William Carew Hazlitt (1834–1913), though originally a civil engineer, entered largely into journalism and authorship, and acquired celebrity as a bibliographer and numismatist, writing and editing many books.

Hearst, William Randolph (1863–1951), American newspaper proprietor who began by editing the *San Francisco Examiner* in 1887, and was until 1938 head of the largest newspaper firm in the world.

Hedin, Dr. Sven Anders, Hon. K.C.I.E. (1865–1952), a Swedish traveller who made discoveries in Central Asia, and wrote extensively thereon.

Hegel, Georg Wilhelm Friedrich (1770–1831), a famous German philosopher and professor who taught that truth or reality has three aspects revealing itself in dialectical development (Thesis, Antithesis, Synthesis) and identified reality with rationalism. He wrote many important works, among which are *The Phenomenology of the Spirit, The Science of Logic, Philosophy of Right.*

Heidenstam, Carl Gustaf Werner von (1859–1940), Swedish author and one of the most brilliant and outstanding figures in Swedish literature. Received Nobel Prize for Literature, 1916.

Heifetz, Jascha (b. 1901), Russian-born violinist who became a naturalised American. Studied with Auer in St. Petersburg. Was the first musician to win a reputation in England by gramophone records before his first personal appearance there. Is skilled in technique and a fine interpretative artist.

Heine, Heinrich (*c.* 1797–1856), the German lyric poet, who lived for the best part of his life in Paris, and produced from time to time poems of profound beauty and subtlety of thought. Cynical, satirical, and often bitter, many of his writings excited great conflict of opinion, and showed intense emotional power.

Helmholtz, Hermann Ludwig Ferdinand von (1821–94), German physiologist, physicist, and mathematician who made many important contributions to the knowledge of thermodynamics, electrodynamics, and optics. His pupil Heinrich Hertz discovered electromagnetic radiation.

Helmont, Jan Baptista van (1577–1644), Belgian chemist who devoted himself to the study of gases. His chief work is *Ortus medicinae* (1648).

Héloise (*c.* 1101–64), niece of Canon Fulbert of Notre Dame. Famed for her romantic attachment to Abelard. (*See* **Abelard.**)

Helpmann, Robert Murray (b. 1909), Australian-born actor, ballet dancer, and choreographer. Became premier danseur, Sadler's Wells Ballet, 1933, and has appeared in several films, including *Henry V* and *The Red Shoes.*

Hemingway, Ernest (*b.* 1898), American novelist and author of the three celebrated novels, *A Farewell to Arms, Death in the Afternoon,* and *For Whom the Bell Tolls.* Nobel Prize 1954.

Henderson, Rt. Hon. Arthur (1863–1935), President of World Disarmament Conference, 1932–35; Leader of the Labour Party, 1931–32; Foreign Secretary, 1929–31; Home Secretary, 1924. Awarded the 1934 Nobel Peace Prize.

Henley, William Ernest (1849–1903), English poet and journalist, a close friend of R. L. Stevenson. Was Editor of the *Scots Observer* in 1889, and later the *National Observer*, in which he first published the *Barrack-Room Ballads* of Kipling, with whose work his own has much in common.

Henrietta Maria (1609–1669), the daughter of Henry IV. of France and wife of Charles I.

Henry I. (1068–1135), youngest son of William the Conqueror, came to the throne in 1100 during the absence of his elder brother Robert on Crusade, and later had to fight and imprison the latter. He was an able administrator and a strong ruler to whom, with his grandson Henry II., we owe in a great measure the establishment of the Common Law system and many permanent administrative reforms.

Henry II. (1133–1189) was King of England from 1154 to 1189. He had serious conflicts with the Church, which were not rendered less acute by the assassination of Thomas à Becket. The story of *Fair Rosamond* is connected with this monarch.

Henry III. (1207–1272), King of England from 1216 to 1272. Was at war with his barons for the greater part of his reign, and incurred much unpopularity by his reckless living and patronage of foreign favourites.

Henry IV. (1367–1413), reigned from 1399 to 1413. The son of John o' Gaunt, he succeeded his father in the Duchy of Lancaster in 1399, and later captured and imprisoned Richard II., who was deposed by Parliament and the crown given to Bolingbroke as the grandson of Edward III. Henry IV. thus became the first of England's Lancastrian Kings.

Henry IV. of France (Henry of Navarre) (1553–1610), prior to becoming king was the leader of the French Huguenots, and although going over to the Catholics on being crowned, remained in sympathy with the Protestants and protected them by the famous Edict of Nantes. Ravaillac, a religious fanatic, assassinated Henry.

Henry V. (1387–1422), reigned from 1413 to 1422, and distinguished himself in the wars with France, the Battle of Agincourt being his greatest triumph. Is said to have been wild and dissolute in his youth, but made an able, energetic and undoubtedly courageous king.

Henry VI. (1421–1471), King of England from 1422 to 1461. Succeeding to the throne under a protectorship as a baby nine months old, he had a troubled reign, including a long war with France and loss of French possessions, the Jack Cade insurrection, and the beginning of the Wars of the Roses, which led to his deposition and the enthronement of Edward IV. by the triumphant Yorkists. Was imprisoned in the Tower, and there found dead one day in 1471. Founder of Eton and of King's College, Cambridge.

Henry VII. (1457–1509), the first of the Tudor line, reigned from 1485 to 1509, succeeding Richard III., after defeating and killing him on Bosworth Field. Was very avaricious, yet able, and accumulated vast treasure. He built the Gothic Lady Chapel of Westminster Abbey, and is there buried.

Henry VIII. (1491–1547), reigned from 1509 to 1547. A luxury-loving monarch of great diplomatic gifts, and unscrupulous to a degree when his own personal desires were concerned. His quarrels with the Church resulted in the acceptance of the Reformation. His half-dozen matrimonial exploits, his deposition of Wolsey and his suppression of the monasteries are familiar incidents of history. Less known is the foundation of the modern navy with the establishment of the Navy Office in 1546.

Henry "the Navigator" (1395–1460), a Portuguese Prince, son of John I. He discovered Madeira and the Azores, and was the chief instrument of the national impetus for navigation.

Henschel, Sir George, Mus.D. (1850–1934), English baritone singer, composer and conductor; born in Breslau, he became a naturalised Englishman in 1890. Founder and part conductor of London Symphony Concerts, 1886.

Hepplewhite, George (d. 1786). One of the four great English 18th-century cabinet-makers. He was a contemporary of Chippendale, Robert Adam and Sheraton. His name is identified with the style of furniture which followed the Chippendale period.

Heraclitus (*c.* 535–475 B.C.), a Greek philosopher, chiefly famous for his doctrine that everything

is in a state of flux. He regarded fire as the primordial element.

Herbert, George (1593–1633), the most purely devotional of English poets.

Hereward the Wake, the last of the Saxon nobles to hold out against the Normans. Taking refuge in the Fen country, he long defied the Conqueror's forces, but was at last betrayed into the enemy's hands by monks. William afterwards honoured him with a place at Court.

Herod the Great (*c.* 73–4 B.C.), the tyrannical king of Judæa who secured the title from Marc Antony in 37 B.C. This was the Herod who was ruling when Christ was born and who ordered the massacre of the Innocents.

Herodotus (*c.* 485–425 B.C.), the great Greek historian, called by Cicero the father of history. Has also been called the father of anthropology.

Herrick, Robert (1591–1674), an English lyric poet, unrivalled in his own field. Author of *Gather ye Rose Buds*, *Cherry Ripe*, *Oberon's Feast*, etc.

Herriot, Edouard (1872–1957), French statesman; Pres. of the National Assembly, 1947–54. A much-travelled scholar, Mayor of Lyons for more than a generation, three times Prime Minister, and the recognised spokesman of the Left-Centre party, which was for so long dominant in French politics.

Herschel, Sir John Frederick William, Bt., F.R.S. (1792–1871), a celebrated astronomer who did much to extend the power of the telescope.

Herschel, Sir William, F.R.S. (1738–1822), great astronomer, father of the last-named, discovered the planet Uranus. His sister, **Caroline Lucretia** (1750–1848), was the author of *Index to Flamsteed's Observations of the Fixed Stars* and *Errata*.

Hertz, Heinrich (1857–1894), German physicist whose laboratory experiments confirmed Maxwell's electromagnetic theory of waves.

Herzl, Theodor (1860–1904), founded modern political Zionism.

Hesiod (*floruit c.* 735 B.C.), ancient Greek nature poet, author of the poems *Work and Days*, which tells of life in the country.

Hewart, 1st Viscount, P.C. (1870–1943), Lord Chief Justice of England, 1922–40.

Hill, Octavia (1838–1912), a noted pioneer English social reformer who took a practical interest in the housing conditions of the poor, and a pioneer in slum clearance in London. Helped to institute the Charity Organisation Society, and was one of the first women to sit on a Royal Commission.

Hill, Sir Rowland, K.C.B., F.R.S. (1795–1879), the first propounder of the idea of the penny postal system, and secretary to the Postmaster-General from 1846 to 1854, after which he was Chief Secretary to the Post Office until 1864.

Hindemith, Paul (b. 1895), German composer and violinist belonging to the anti-romantic or neo-classical school. Much of his work is *Gebrauchsmusik* (workaday music written with the aim of establishing closer contact between composer and public). His works are numerous and strikingly varied, and include sonatas and chamber works, songs, operas, ballet music, Symphony in E flat, and the oratorio *Das Unaufhörliche*. Formerly Prof. of Music Yale Univ.; Prof. of Musical Theory, Univ. of Zurich, 1952–.

Hindenburg, Field-Marshal Paul von (1847–1934). President of the German Reich, 1925–34; Chief of the General Staff, 1916–18.

Hinshelwood, Sir Cyril Norman, M.A., D.Sc., F.R.S. (b. 1897), Pres. of the Royal Society and Dr. Lee's Prof. of Chemistry, Univ. of Oxford, 1937–. Shared with Prof. Semenov of Russia the 1956 Nobel Prize for Chemistry for researches into the mechanism of chemical reactions.

Hinton, Sir Christopher, K.B.E., M.A., D.Eng., D.Sc.(Eng.), F.R.S. (b. 1901), as Man. Dir. of the Industrial Group of the U.K. Atomic Energy Authority played important part in the building of Calder Hall. Appointed in 1957 Chairman Central Electricity Generating Board which owns and operates Britain's nuclear power stations.

Hippocrates of Chios (fl. *c.* 430 B.C.), a Greek business-man who specialised in mathematics and was the first to compile a work on the elements of geometry.

Hippocrates of Cos (*c.* 460–*c.* 370 B.C.), Greek physician, the father of medicine, b. on the island of Cos off the coast of Asia Minor. He established medical schools in Athens and elsewhere and separated medicine from superstition and so placed it on a scientific basis.

Hirohito, Emperor of Japan (b. 1901), acceded to the throne Dec. 1926.

Hitler, Adolf (1889–1945). Dictator of Germany, 1933–45. Born in Austria, son of Customs official. Worked in Vienna as artisan: already held anti-semitic and anti-marxist views. Came to Munich in 1912; enlisted in Bavarian Infantry at outbreak of first world war. At the end of the war conditions in Germany favoured the growth of a fascist movement and under his personal leadership the National Socialist (Nazi) Party climbed to power. Appointed Reich Chancellor, 1933. On death of Hindenburg in 1934 became Führer. Commander-in-Chief Wehrmacht, 1935. Under the Hitler regime working class movements were ruthlessly destroyed; all opponents—communists, socialists, Jews—were persecuted and murdered. By terrorism and propaganda the German state was welded into a powerful machine for aggression. There followed the occupation of the Rhineland in 1936, the annexation of Austria and Czechoslovakia in 1938 and 1939, the invasion of Poland and declaration of war by Great Britain and France in Sept. 1939, the invasion of Soviet Russia in 1941. Final defeat came in 1945 and on April 30 Hitler committed suicide in the Chancellery as the Russians closed in on Berlin.

Hobbes, Thomas (1588–1679), English philosopher who published his most famous work, *Leviathan*, in 1651. He favoured strong Government and therefore supported the supremacy of the State even in religion, but his arguments aroused great antagonism even among the Royalists. He was a child of his age in his enthusiasm for scientific enquiry, and his works provoked fresh thought on many sides.

Hobbs, Sir John Berry ("Jack") (b. 1882), first played for Surrey 1905; retired from first-class cricket Feb. 1935. Scored 61,221 runs including 197 centuries.

Hobhouse, Leonard Trelawney (1864–1929), English sociologist, who, after a brilliant career at Oxford, joined the staff of the *Manchester Guardian* in 1897, and became in 1908 editor of the *Sociological Review*. His book *The Theory of Knowledge* established his reputation in 1896, and was sustained by *Mind and Evolution*, 1901, and *Morals in Evolution*, 1906. His greatest work was *Development and Purpose*, 1913.

Ho Chi-minh (b. 1892), leader of the Vietnam revolutionary nationalist party of Indo-China. Successfully led the struggle for independence during and after the second world war. President of North Vietnam.

Hogarth, William (1697–1764), the celebrated engraver and painter who satirised the follies of his time in a series of engravings instinct with character, humour and power. His *Harlot's Progress*, of six engravings, was published in 1734, and gained him immediate fame. In 1735 he produced his equally celebrated *Rake's Progress*, a series of eight engravings. These were followed by numerous others, including *Marriage à la Mode*, *Industry and Idleness*, and *The March to Finchley*.

Hogben, Lancelot, D.Sc., F.R.S. (b. 1895), physiologist; Professor of Natural History, Univ. of Aberdeen 1937–41; Prof. of Social Biology, Univ. of London, 1930–37. Author of *Mathematics for the Million* and *Science for the Citizen*.

Hogg, James (1770–1835), a Scottish poet of force and originality.

Hogg, Quintin (1845–1903), was an educationist and philanthropist who, purchasing the old Polytechnic Institution in 1882, turned it into a popular college, providing efficient instruction in every department of education at moderate rates.

Hokusai, Katsushika (1760–1849), Japanese artist of the Ukiyo-e (popular school), whose work is highly original and of singular beauty and delicacy. He excelled in landscapes.

Holbein, The Elder (*c.* 1460–1524), a famous German painter, father of Hans Holbein.

Holbein, Hans—The Younger (1497–1543), was born at Augsburg, and settled in London in 1530, where he won the favour of Henry VIII, for whom he painted many portraits, and produced the famous *Dance of Death*.

Holden, Charles, F.R.I.B.A. (b. 1875), British architect, designer of modern public buildings, including British Medical Assen. Building, Strand, London Underground Railway Head Offices, Piccadilly Circus, new Univ. of London buildings, Bloomsbury.

Holden, Sir Isaac, Bt. (1807–1897), an inventor and manufacturer who achieved fame and fortune in connection with wool-combing inventions. He was in Parliament from 1865 almost to the time of his death, and was made a baronet in 1893.

Hölderlin, Johann Christian Friedrich (1770–1843), friend of Hegel and contemporary of, though unappreciated by, Goethe and Schiller, he is now considered among the very greatest of German poets. His mind became unhinged in his middle years and was finally overcome by schizophrenia.

Holford, Sir William Graham, M.A., F.R.I.B.A. (b. 1907), British architect and town-planner. Prof. of Civic Design, Univ. of Liverpool, 1936–47; Prof. of Town Planning, London Univ., 1949–; planned post-war redevelopment of City of London, including precincts of St. Paul's Cathedral.

Holland, Rt. Hon. S. G., C.H. (b. 1893), New Zealand Conservative leader; Prime Minister, 1949–57.

Holmes, Oliver Wendell (1809–1894), an American doctor and author of great humour and geniality. His *Autocrat of the Breakfast Table*, *The Professor at the Breakfast Table* and *The Poet at the Breakfast Table* are works of infinite humour and quaintness. He was also the author of three novels.

Holst, Gustav Theodore (1874–1934), a British composer of Swedish descent whose compositions include *The Planets* suite, *The Hymn of Jesus*, an opera *The Perfect Fool*, and a choral symphony. Professor of Music and Music Master at St. Paul's Girls' School, London, 1905–34. Director of Music at University College, Reading, 1919–23.

Holyoake, George Jacob (1817–1906), an eminent secularist lecturer and author, who was identified with many popular movements, especially Co-operation, of which he was the historian.

Homer (*c.* 700 B.C.), the most famous of all epic poets. Is supposed to have been a Greek who lived probably at Chios or Smyrna, and has generally been regarded as the author of the *Iliad* and the *Odyssey*, though tradition rather than ascertained fact connects his name with those great poems.

Hood, Samuel, 1st Viscount Hood of Whitley, G.C.B. (1724–1816), a successful British admiral, who in 1793 was in command of the Mediterranean fleet, and showed great capacity in that post, taking and occupying Toulon, and capturing Corsica among other exploits.

Hood, Thomas (1799–1845), an English poet, who, as a prolific writer of serious as well as humorous poems, stands in his own line unique. Of his serious verse, *The Song of the Shirt*, *The Dream of Eugene Aram* and *The Bridge of Sighs* may be cited as the best examples, while his comic poems, notably those of the punning order, are unequalled.

Hooke, Robert (1635–1703), English physicist, a great experimenter and inventor. He was also an architect and drew up a plan for rebuilding London after the Great Fire.

Hooker, Richard (1554–1600), was Master of the Temple from 1585–91, and afterwards Rector of Boscombe. Is famed for his great book on *Ecclesiastical Polity*, and because of his exquisite choice of words, was known as "Judicious Hooker."

Hopkins, Sir Frederick Gowland, O.M., F.R.S. (1861–1947), an eminent English bio-chemist, noted for his important work on proteins and vitamins. In 1929 was awarded the Nobel Prize in Medicine for his discovery of Vitamin D. Pres. of the Royal Society 1931–36, and of the British Association, 1933.

Hopkins, Harry (1890–1946), Franklin Roosevelt's personal assistant. Particularly assisted the President at the important war-time foreign conferences, as his personal representative abroad, in working out the New Deal, and in the administration of Lend-Lease.

Hopkinson, John, D.Sc., F.R.S. (1849–98), English engineer and physicist. Senior Wrangler and Fellow at Cambridge. Studied engineering in his father's works, and set up as a consultative engineer. Specialised in electrical work, and by developing the theory of alternating current and of the magnetic current in dynamos he paved the way to the common use of electricity in daily life. Was Professor of Electrical Engineering at King's College, London, 1890–98.

Hoppner, John, R.A. (1758–1810), English portrait painter born in Whitehcapel of German parents; studied at the Academy Schools, winning great distinction and painted portraits of many members of the Royal Family.

Horace, or more properly **Flaccus Quintus Horatius** (65–8 B.C.), the famous Roman satirist and poet, who was the friend of Virgil, and attained immortal fame by his *Satires*, *Epodes*, and *Odes*.

Horner, Arthur (b. 1894), general secretary of the National Union of Mineworkers 1946–59 and a leading British Communist.

Horniman, Annie Elizabeth Fredericka, C.H. (1830–1937). English theatre manager and founder of the repertory system in England. She was the daughter of F. J. Horniman, the traveller and collector, who founded the Horniman Museum in Forest Hill and presented it to the L.C.C. in 1901.

Houdini, Harry (1873–1926), the famous American entertainer, who was a locksmith, but went on the variety stage as an expert in escaping from handcuffs, locked chambers, etc. A keen student of psychic manifestations, and in his day was one of the world's greatest illusionists.

Housman, Laurence (1865–1959), English playwright, poet, and novelist, younger brother of **Alfred Edward** (1859–1936) also a poet of distinction, a professor of Latin at Cambridge and an eminent classical scholar, author of *A Shropshire Lad*.

Howard, John (1726–1790), earned celebrity for his philanthropic efforts on behalf of prison reform, the pursuit of which eventually exposed him to a fatal fever attack in Russia.

Howard of Effingham, Lord (1536–1624), commander of the fleet which defeated the Spanish Armada, 1588, and took part in the capture of Cadiz, 1596.

Howe, Elias (1819–1867), an ingenious American who was the inventor of the first sewing machine, by which he made a great fortune.

Howe, Julia Ward (1819–1910), American philanthropist and poetess, famous as the authoress of the *Battle Hymn of the Republic* (1861), a leader of the American Suffragette movement, and the first woman to be elected to the American Academy of Arts and Letters.

Howe, Richard, 1st (and last) **Earl** (of first creation), K.G. (1726–1799), the British admiral who in 1758 destroyed Cherbourg and in 1794 won the famous victory over the French off Brest.

Howells, William Dean (1837–1920), American novelist and author.

Hubble, Edwin Powell, B.Sc., Ph.D. (1889–1953), U.S. astronomer at Mount Wilson Observatory from 1919 until his death. Noted for his work on extragalactic nebulæ and with the aid of the 200-in. telescope at Mount Palomar made important discoveries.

Hudson, Henry (*c.* 1550–1611), was a famous English navigator who discovered the Hudson River, Hudson Strait and Bay, and his two books describing his voyages are of the greatest interest.

Hudson, William Henry (1841–1922), English author and naturalist, who spent his early years in South America, memories of which influenced much of his work. His books include *The Purple Land* (1885), *Green Mansions* (1904), *Afoot in England* (1909) and *British Birds* (1895). The Hyde Park Bird Sanctuary (opened in 1925) was established in his memory, and contains the famous figure of *Rima* by Epstein.

Huggins, Sir William, O.M., K.C.B., F.R.S. (1824–1910), British astronomer who pioneered in spectroscopic photography. Collaborated with his wife, **Margaret Lindsay Murray** (1848–1915), who was also an able astronomer.

Hughes, Thomas (1822–1896), educated at Rugby and at Oxford; practised at the Bar, and became a County Court Judge in 1882. His best-known work is *Tom Brown's Schooldays*.

Hugo, Victor Marie (1802–1885), the great poet, dramatist and novelist who headed the Romantic movement in France in the early part of the 19th century and made himself a name of the

first eminence by his various writings. His dramas of *Hernani*, *Lucrèce Borgia*, *Ruy Blas*, and *Le Roi s'amuse* were in every sense great triumphs. Among his novels, *Notre Dame* belongs to his early period, and *Les Misérables*, *Les Travailleurs de la mer*, and *L'Homme qui rit*, belong to his later life, written while he was living in exile in Guernsey.

Hull, Cordell (1871–1955), U.S. Sec. of State, 1933–44. Awarded the Nobel Peace Prize, 1945.

Humboldt, Baron Friedrich Heinrich Alexander von (1769–1859), the great German traveller and naturalist; his books describing his travels and scientific discoveries—especially in geology and natural history—are most attractive.

Hume, David (1711–1776), the celebrated historian and philosopher whose *History of England* long held chief place in English historical literature. But Hume's enduring fame rests upon his philosophical writings. He developed the empiricism of Locke into the scepticism inherent in it. His main works are *Treatise of Human Nature* and *Dialogues Concerning Natural Religion*.

Hunt, Brig. Sir (Henry Cecil) John, Kt., C.B.E., D.S.O. (b. 1910), soldier and mountaineer; leader of the successful 1953 British Mount Everest Expedition. The story of the climb is told in his book *The Ascent of Everest*.

Hunt, (James Henry) Leigh (1784–1859), an English poet, politician and essayist. In 1813 he was fined £500, and sentenced to two years' imprisonment for libelling the Prince Regent, and while in prison wrote his poem, *The Story of Rimini*, and other works. In later life he was a constant contributor to literature, and from 1847 enjoyed a pension of £200 a year from the Civil List.

Hunt, Wm. Holman, O.M. (1827–1910), one of the three founders of the Pre-Raphaelite movement, and an artist who achieved distinction by several remarkable paintings, the chief of which is, perhaps, *The Light of the World*, an allegorical work.

Hunter, the brothers **William**, F.R.S. (1718–83) and **John**, F.R.S. (1728–93), were both famous Scottish physicians. William had remarkable success as a lecturer and obstetrician. His valuable anatomical collection was bequeathed to the Univ. of Glasgow. John showed real genius for anatomy, became one of the greatest surgeons of his day and made many discoveries. His surgical museum forms part of the Museum of the Royal College of Surgeons.

Huss, or Hus, John (1369–1415), the Bohemian religious reformer, was strongly influenced by Wyclif and himself urged reform both of abuses in the church and of doctrine. Sentenced to death or recantation he suffered martyrdom on July 6, 1415. His death caused a civil war which lasted for many years.

Hussein ibn Talal (b. 1934), grandson of King Abdullah, succeeded his father Talal as King of Jordan, Aug. 11, 1952.

Hutton, James, M.D. (1726–97), an Edinburgh doctor whose geological researches established the fundamental principles of modern geology. Before his time geology did not exist as a science, all was speculation. He drew his evidence from the rocks themselves, and his *Theory of the Earth* is one of the great classics of science.

Huxley, Aldous (Leonard) (*b.* 1894), noted modern writer, grandson of T. H. Huxley and brother of Julian; author of *Crome Yellow*, *Jesting Pilate*, *Brave New World*, *Point Counter Point*, *Ends and Means*, *Grey Eminence*, *The Perennial Philosophy*, etc.

Huxley, Sir Julian Sorrell, M.A., F.R.S. (b. 1887), biologist and writer, grandson of T. H. Huxley. Director-General of the United Nations Educational, Scientific and Cultural Organisation 1946–48. Secy. of Zoological Soc. of London 1935–42.

Huxley, Thomas Henry, F.R.S. (1825–1895) an eminent scientist and author of numerous works covering a great range of research. After the publication of Darwin's *Origin of Species*, Huxley became an ardent evolutionist. His biological work, *Man's Place in Nature*, and his numerous essays were marked by great vigour and clearness of thought, and gave him a leading position. He held numerous important appointments, was President of the Royal Society in 1883, and belonged to many learned societies.

Hyde, Dr. Douglas (1860–1949), the distinguished Irish scholar, historian, poet and folk-lorist. President of Eire, 1938–45.

Hypatia of Alexandria, the only woman mathematician of antiquity. She excited the enmity of Christian fanatics, who raised an agitation against her, and she was put to death in A.D. 415

I

Ibáñez, Vicente Blasco. (*See* **Blasco-Ibáñez, Vicente.**)

Ibrahim Pasha (1789–1848), an able Egyptian statesman, general, and Viceroy, who, adopted by Mohammed Ali as his son, contributed largely to the success of Egyptian policy during the quarter of a century or more of his influence. His conquest of Syria was a notable feat of generalship. He died a few months after being appointed Viceroy.

Ibsen, Henrik Johan (1828–1906), the Norwegian playwright and poet, moralist, and humanist, whose plays, though arousing considerable opposition at the time, are acknowledged as the work of one of the world's greatest dramatists. A master of technique, charging every detail with significance, fusing the comic with the tragic, Ibsen revolutionised the European theatre. His chief works are *Ghosts*, *The Master Builder*, *The Wild Duck*, *A Doll's House*, *Hedda Gabler* and the poetic drama *Peer Gynt*.

Inge, Very Rev. William Ralph, K.C.V.O., D.D. (1860–1954), English divine; Dean of St. Paul's, 1911–34; Assistant Master at Eton, 1884–88; Lady Margaret Prof. Camb., 1907–11. Earned the sobriquet "the gloomy Dean" for his incisive and somewhat pessimistic comments on contemporary affairs. His books include a number on mysticism.

Ingersoll, Robert Green (1833–99), American lawyer, writer, and lecturer, became known by reason of his lectures directed principally against Christianity.

Ingres, Jean Auguste Dominique (1780–1867), a great French historical painter who was elected to the Institute in 1824, and at his death was a Senator of France.

Innocent III. (1160–1216), Pope from 1198, successfully asserted the power of the papacy over such secular princes as the emperor, Philip II. of France, and John of England. He promoted the 4th Crusade, initiated the crusade against the Albigensian heretics, and held the 4th Lateran Council. His pontificate marks the zenith of the medieval papacy.

Inönü, General Ismet (b. 1884), President of Turkey 1938–50. Was Minister for Foreign Affairs and Prime Minister in 1923; Prime Minister 1924–27 and 1927–37.

Ireland, John, Hon. D.Mus. (b. 1879), English composer, best known for his setting of Masefield's *Sea Fever*, his chamber music, his 'cello and pianoforte sonata, and especially sonata for pianoforte and violin.

Irving, Sir Henry (1838–1905), a great English actor who made his first appearance in London in 1866 and whose first distinct success was as Digby Grant in *Two Roses*. His record at the Lyceum Theatre from 1871 onwards covered a brilliant series of productions, including *The Bells*, his first triumph, *Charles I.*, *Eugene Aram*, and a number of Shakespearean impersonations, in some of which, notably Shylock and Hamlet, Irving gave memorable performances.

Irving, Washington (1783–1859), a writer of charming stories and miscellaneous works which won wide and well-deserved favour on both sides of the Atlantic. Among his biographical books may be mentioned Lives of Goldsmith, Columbus, Mohammed and Washington.

Isabella of Castile (1451–1504), reigned jointly with Ferdinand V., her husband. During their thirty years' sway Spain was united as a single monarchy, and achieved the height of its greatness, the discovery of America, the conquest of Granada, and the expulsion of the Moors from Spain being among the events of her reign.

Ismail Pasha (1830–95), grandson of Mohammed Ali, was a man of modern ideas and great public spirit, whose policy rendered Egypt practically

independent of Turkey, the Sultan confirming him in the position and title of Khedive in 1873. It was his adoption of the idea of the Suez Canal that enabled that work to be successfully carried out. By reckless extravagance he involved himself in difficulties, entailing the sale of his Suez Canal shares to England, the establishment of the dual control of England and France, and his own abdication in 1879, when his son Tewfik succeeded.

Israels, Joseph (1824–1911), outstanding Dutch genre painter of the 19th century.

Ito, Hirobumi, Prince (1841–1909), one of the most enlightened statesmen of Japan. The unparalleled social metamorphosis which Japan underwent in the latter half of the nineteenth century owed much to his guidance and influence. Was four times Premier.

Ivan the Great (1440–1505), succeeded in bringing the scattered provinces of Muscovy under one supreme governmental control, and put an end to Tartar rule.

Ivan the Terrible (1530–84), crowned as first Czar of Russia in 1547, was a strong and autocratic ruler. He furthered internal consolidation and Russian eastward expansion and entered into trading relations with Queen Elizabeth.

J

Jacks, Lawrence Pearsall (1860–1955), Principal of Manchester College, Oxford, 1915–31, and Professor of Philosophy in that College, 1903–31. Entered ministry in 1887 as assistant to the Rev. Stopford Brooke. Editor of the *Hibbert Journal*, 1902–47, and author of several books of religious studies.

Jackson, Andrew (1767–1845), American general who was twice President of the United States.

Jackson, Thomas Jonathan (1824–1863), popularly known as "Stonewall Jackson," was the most brilliant general on the Southern side in the American Civil War. Was accidentally killed at the Battle of Chancellorsville. The term "Stonewall" refers to his dogged resistance at the first Battle of Bull Run.

Jacobs, William Wymark (1863–1943), novelist of quaint and peculiar humour, whose stories and sketches of East End riverside life are inimitable.

Jacquard, Joseph Marie (1752–1834), a French mechanic whose Jacquard loom provided a new and effective method of weaving designs in textile fabrics, and was an invention of the very first rank.

Jagellons, Lithuanian-Polish dynasty, ruled in Poland 1386–1572.

James I. (1566–1625), King of England (1603–25) and, as James VI., King of Scotland (1567–1625). He was the son of Mary Stuart and succeeded to the English throne on the death of Elizabeth. Numerous plots were formed against him, including the Gunpowder Plot of 1605. He persecuted the Puritans, granted many monopolies, and saw the Authorised Version of the Bible published. Described by Henry IV of France as "the wisest fool in Christendom."

James II. (1633–1701) King of England and, as James VII., of Scotland (1685–88), second son of Charles I. As Duke of York he was Lord High Admiral in the Second and Third Dutch Wars, during which New Amsterdam fell to England and was renamed New York. As a Roman Catholic he resigned his office after the Test Act of 1673, was nearly excluded from the Succession, and, when he came to the throne in 1685, aroused and united strong opposition by his attempts to obtain better conditions for his co-religionists. The unsuccessful Monmouth Rebellion, the Bloody Assize, the Declaration of Indulgence, and the Seven Bishops' Trial marked a reign which ended in the flight of the King and the Revolution Settlement of 1689.

James, Henry, O.M. (1843–1916), an Anglo-American novelist and younger brother of William James. Produced a number of notable stories, remarkable for their intellectual subtlety and careful characterisations. For the last thirty years of his life he resided mostly in London. His best-known novels are *The American*, *Daisy Miller*, *The Bostonian*, *The Portrait of a Lady* and *What Maisie Saw*. Became a British subject 1915.

James, William (1842–1910), the great American psychologist and philosopher, brother of Henry James, the novelist. He became Prof. of Philosophy at Harvard University, 1882, and was the founder of the philosophical system known as pragmatism. His first important work, *Principles of Psychology*, 1890, stamped him as one of the most lucid, penetrating and engaging writers of his day, and established him as the foremost protagonist of the physical school in psychology. *Pragmatism*, a new name for some old ways of thinking, appeared in 1907, and established him as a speculative philosopher of a high order.

Jeans, Sir James Hopwood, O.M., F.R.S. (1877–1946), a brilliant mathematician and astronomer who was a lecturer in mathematics at Cambridge and Princeton and secretary of the Royal Society, 1919–29. Author of *The Universe Around Us*, *The Mysterious Universe*, etc.

Jefferies, Richard (1848–1887), an English naturalist, who, between 1873 and the time of his death, wrote some of the most beautiful descriptions of natural scenery and the customs and habits of the rural world that we possess. His *Gamekeeper at Home* and *The Life of the Fields* are books of great power and sympathy.

Jefferson, President Thomas (1743–1826), took part in the American Revolution, and drew up the Declaration of Independence. Twice U.S. Pres.

Jeffreys, George, 1st Baron of Wem (1648–1689), won for himself unenviable notoriety by his harsh and cruel judgments, when he held what is known as the "Bloody Assize." He was made Lord Chancellor, but after the fall of James II. was sent to the Tower and there died.

Jellicoe, Adml. of the Fleet, Earl, G.C.B., O.M., G.C.V.O. (1859–1935), Commander-in-Chief of British Fleet, August 1914 to Nov. 1916; and First Sea Lord, Nov. 1916 to Dec. 1917 Gov.-Gen. of New Zealand, 1920–24.

Jenghiz Khan (1162–1227), the famous Mogul ruler who twice conquered China, and forced the Turks within European confines.

Jenner, Edward, M.D., F.R.S. (1749–1823), an English physican who became celebrated by his discovery of the vaccination system of alleviating smallpox, which has been of such incalculable benefit to mankind. Parliament made him grants amounting to £30,000 which left him still out of pocket.

Jerome, Jerome Klapka (1859–1927), a clever journalist and writer, who made his first success with his humorous book, *Three Men in a Boat*. He founded *The Idler*.

Jerome, St. (340–420), a noted theologian of the 5th century, whose Latin translation of the Scriptures (*The Vulgate*) made him famous. He died at Bethlehem.

Jerrold, Douglas William (1803–1857), playwright and humorist, who enjoyed a long career of success by his contributions to *Punch* (including *Mrs. Caudle's Curtain Lectures*); his play *Black-Eyed Susan* was an enormous success.

Jesus Christ (*c.* 4 B.C.–A.D. 30 or 33), the founder of Christianity and the greatest figure of human history. The main source of information on His life and work is the New Testament. Jesus was born at Bethlehem in Judea, and was the first-born of His mother Mary. According to Matthew, He was miraculously conceived and Joseph was His foster-father. The family home was at Nazareth in Galilee. Jesus lived at a critical period in Jewish history. He began His three-year mission when He was about thirty. His teaching is summarised in the Sermon on the Mount.

Jiménez, Juan Ramón (b. 1881), Spanish lyric poet who was awarded the Nobel Prize for Literature in 1956.

Jinnah, Mohammed Ali (1876–1948), Indian statesman. The emergence of a separate Moslem state of Pakistan when the British left India was mainly due to his efforts. He was for many years the active President of the Moslem League, and in 1947 became the first Gov.-Gen. of Pakistan. He was a barrister by profession.

Joachim, Joseph (1831–1907), Hungarian violinist and composer of the classical-romantic school of Mendelssohn, Schumann, and Brahms. He

ranks as the greatest solo violinist the world has ever known.

Joan of Arc, St. (1412–1431), the girl whose heroism inspired the French to drive the English out of Orleans, and enabled Charles to be proclaimed King at Rheims. She was burned as a heretic at Rouen. Canonised at St. Peter's, Rome, 1920.

Joffre, Marshal Joseph Jacques Césaire, G.C.B., Hon. O.M. (1852–1931), Commander-in-Chief of the French Armies 1911–17. His handling of his troops during the war was eminently successful. Entered the Army in 1870, and commanded a battery during the siege of Paris.

John, St., the Baptist (executed A.D. 28), the forerunner of Christ.

John, St., the Evangelist, the son of Zebedee, retired to Patmos after the Crucifixion, but returned from exile to Ephesus later, and there died at a great age, probably *circa* A.D. 99.

John, surnamed **"Lackland"** (1167–1216), King of England from 1199 to his death at Newark after deposition by the Barons in 1216. One of the most detested of English monarchs, but whose reign stands out large in history because of his having granted, under compulsion, the Magna Carta, England's great bulwark of liberty.

John of Gaunt (1340–1399), Duke of Lancaster, son of Edward III. and father of Henry IV., was one of the most powerful English nobles, and was more or less concerned in the leading events of his time. In Wat Tyler's rebellion he had his palace in the Savoy destroyed and was long held in popular hatred.

John, Augustus Edwin, O.M., R.A. (b. 1878), outstanding British painter, especially notable for his portraits. Among others, he has painted Lloyd George, Bernard Shaw, and T. E. Lawrence. His works in the Tate Gallery include *The Smiling Woman* and *Galway*.

Johnson, Amy, C.B.E. (1904–1941), was the first woman aviator to fly solo from England to Australia, when she made a record flight to India (6 days to Karachi). Lost her life when flying as a pilot of the Air Transport Auxiliary over the Thames Estuary.

Johnson, Very Rev. Hewlett, M.A., B.Sc., D.D. (b. 1874), Dean of Canterbury since 1931. Publs. *The Socialist Sixth of the World, Soviet Strength, Soviet Success.*

Johnson, Dr. Samuel (1709–1784), the great lexicographer and writer, who for a number of years was the most prominent literary man in England. His *Dictionary* was published in 1755, before which he had attained eminence by several works including the *Vanity of Human Wishes*. His *Rasselas* appeared in 1759, and for two years he published *The Idler*, a collection of essays after the style of the *Spectator*. His *Lives of the Poets* appeared in 1781. He was greatly honoured during his life, enjoyed a pension of £300 a year from 1762, at his death was buried in Westminster Abbey, and had the best biography in the language written upon him by James Boswell.

Johnston, Sir Harry (Hamilton), G.C.M.G., K.C.B. (1858–1927), was a daring and successful explorer, who led scientific expeditions into the interior of Africa. Helped to crush the Arab slave trade in East Africa and to establish a large British Protectorate north of Lake Tanganyika. Published many valuable works of travel and observation and also a *History of the British Empire in Africa.*

Jókai, Maurus (1825–1904), a distinguished Hungarian novelist, many of whose works have been translated into English, among them *A Modern Midas* and *Black Diamonds.*

Joliot-Curie, Jean Frédéric (1900–58), French physicist. His wife **Irène** (1896–1956), daughter of Pierre and Marie Curie, was also a distinguished scientist. Their discovery of artificial radioactivity brought them a Nobel Prize in 1935. Both were dismissed from the French Atomic Energy Commission because of their sympathy for communism.

Jones, Ernest Charles (1819–69), one of the best-known leaders of the Chartist movement, was sentenced in 1848 to two years' imprisonment for his revolutionary speeches. He was also a political writer and the author of several poems.

Jones, Sir Harold Spencer, K.B.E., F.R.S. (b. 1890) Astronomer Royal, 1933–55; H.M. Astronomer Cape of Good Hope, 1923–33; Pres. Horological Inst. Author of *General Astronomy, Worlds Without End, Life on Other Worlds.*

Jones, Inigo (1573–1652), a noted architect, who became known as "the English Palladio," and built, among other famous structures, the Banqueting Hall at Whitehall and the gateway of St. Mary's at Oxford. He was a Royalist, and suffered severely in the Civil War.

Jones, John Paul (1747–1792), was a Scotsman, who early in life took to the sea, and during the American War of Independence commanded various ships on behalf of the Colonists, and was most daring in his onslaughts upon British vessels. He died in Paris.

Jonson, Ben (1573–1637), a friend of Shakespeare and one of the great poets and dramatists of his age. Was Poet Laureate from 1619. His best plays are *Every Man in his Humour* and *The Alchemist.* Buried in Westminster Abbey.

Josephine, Empress (1763–1814), was the wife of Napoleon I. until he divorced her in 1809 and married Marie Louise. Josephine had previously been married to Vicomte Alexandre Beauharnais, by whom she had two children.

Josephus, Flavius (A.D. 38–*c.* 100), Jewish historian whose *History of the Jewish War* and *Antiquities of the Jews* contained much valuable historical evidence bearing upon Biblical history.

Joule, James Prescott, F.R.S. (1818–1889), one of the greatest of English physicists, famous for his researches on electro-magnetism and for his determination of the mechanical equivalent of heat.

Jowett, Benjamin (1817–93), English scholar remembered as the greatest Master of Balliol College, winning a great reputation for his sympathy and erudition. His outstanding works include translations of the *Dialogues of Plato* and *History of Thucydides*. His Mastership raised Balliol to a proud pre-eminence among the Colleges.

Jowitt, William Allen, Earl, P.C. (1885–1957), Lord High Chancellor in the Labour Governments, 1945–51. Pub. *The Strange Case of Alger Hiss* (1953).

Joyce, James (1882–1941), Irish author who because of the originality, daring, and range of his work exercised a great influence on the younger school of novelists, critics, and poets. Notable among his works are *Portrait of the Artist as a Young Man, Ulysses,* and *Finnegans Wake.*

Juin, Alphonse, Marshal of France (b. 1888), C.-in-C. of French troops in N. Africa, 1942; Res.-Gen. in Morocco, 1947–51; C.-in-C. Allied Forces, Central Europe (NATO), 1951–56.

Julian the Apostate (Flavius Claudius Julianus) (331–363) was Roman Emperor for the last two years of his life, during which period he was an avowed pagan, though previously he had professedly been a Christian. He was slain by an arrow during an expedition against Persia.

Julius Cæsar, (See **Cæsar Caius Julius.**)

Jung, Carl Gustav (b. 1875), Swiss psychiatrist, founder of the Zür School, and a former pupil of Freud (*q.v.*) until 1911, when he formulated a system of analytical psychology.

Junot, Andoche, Duc d'Abrantès (1771–1813), one of Napoleon's great generals, brilliantly successful until defeated by Wellington at Vimeiro.

Jusserand, Jean Adrien Antoine Jules (1855–1932), French author and diplomat; Ambassador to U.S.A., 1902–25. A well-known authority on English literature, his works include *The English Theatre from the Conquest to Shakespeare* (1878), *The English Novel* (1886), *The Literary History of the English up to the Renaissance* (1894).

Justinian I. (Flavius Anicius Justianianus) (483–565) was the Roman Emperor of the East whose fame rests chiefly on his laws. His *Corpus Juris Civilis* remained the accepted text-book of Roman Law to the end of the 9th century, and is still the most important of all monuments of jurisprudence. He reigned from 527 to 565.

Juvenal (Decimus Junius Juvenalis) (60–140), the famous Roman poet and rhetorician of the age of Trajan. His sixteen celebrated *Satires* are the finest in classical literature.

K

Kafka, Franz (1883–1924), Jewish writer, born in Prague, whose introspective work, the bulk of

which was not published till after his early death from tuberculosis, has been widely acclaimed and discussed, and has had a notable influence on later schools, including the Surrealists.

Kālidāsa (*c.* A.D. 400), the most illustrious figure in classic Sanskrit literature and one of the greatest Oriental poets. No facts are known about his life and date, but certain evidence places him in the 5th cent. Seven of his works survive: two lyrics, *Ritu-samhara* (The Seasons), and *Megha-dūta* (Cloud Messenger); two epics, *Raghu-vamśa* (Dynasty of Raghu) and *Kumara-sambhava* (Birth of the War-God); and three dramas, *Śakūntalā*, *Mālavikāgnimitra*, and *Vikramorvaśīya*.

Kant, Immanuel (1724–1804), German scientist and philosopher, whose *Critique of Pure Reason*, published in 1781, was the subject of fierce discussion, and involved him in trouble with the Prussian Government as to his religious belief. His speculations and the transcendental theories he worked out revealed a marvellous capacity of mind, and his works were of immense influence in shaping the philosophical thought of the 18th and 19th centuries.

Kauffmann, Angelica, R.A. (1741–1807), the famous Anglo-Swiss painter, who was one of the foundation members of the Royal Academy, and the first woman R.A.

Kaulbach, Wilhelm von (1805–1874), an eminent German painter who illustrated books by Goethe and Schiller.

Kean, Charles John (1811–1868), an English actor-manager, son of the tragedian, Edmund Kean. Charles Kean married Ellen Tree, and in the 'fifties played with her in a remarkable series of spectacular revivals at the Princess's Theatre in London.

Kean, Edmund (1787–1833), one of the greatest tragic actors in the history of the British stage.

Keats, John (1795–1821), the great English poet who, though dying at the early age of twenty-five, produced a number of poems which in richness of imagination and beauty of thought are not excelled by anything in the language. His *Odes*, his two poems, *Isabella* and *The Eve of St. Agnes*, are exquisite in form and expression.

Keble, John (1792–1866), an English clergyman and poet, whose *Christian Year* is one of the most notable works of its class.

Keene, Charles (1823–1891), one of the most talented of the *Punch* artists.

Keith, Sir Arthur, F.R.S. (1866–1953), an eminent anthropologist. Pres. of British Association, 1927. Author of *The Antiquity of Man*, *Religion of a Darwinist*, *A New Theory of Evolution*.

Kellogg, Frank Billings, LL.D. (1856–1937), was a Judge of the Permanent Court of International Justice, The Hague, 1930–35. American Ambassador to the Court of St. James, 1923–25. Secretary of State, U.S.A., 1925–29; chiefly remembered as the originator of the Kellogg Pact. Awarded Nobel Peace prize, 1929.

Kelly, Sir Gerald Festus, P.R.A. (b. 1879), a successful English portrait-painter whose State portraits of King George VI. and Queen Elizabeth were exhibited at the R.A. in 1945. President of the Royal Academy, 1949–54.

Kelvin, William Thomson, Lord, P.C., O.M., G.C.V.O., F.R.S. (1824–1907), the famous scientist and inventor, introduced the dynamical theory of heat. Shortly afterwards he interested himself in submarine telegraphy, and invented numerous important improvements, also doing splendid work in the direction of electrical invention; he covered a vast field and earned a world-wide reputation.

Kemble, Frances Anne ("**Fanny**") (1809–1893), was a noted actress in the early part of the 19th century. She was the daughter of Charles Kemble (1775–1854), who was also a celebrated actor, associated in many appearances with his brother, John Philip Kemble and their talented, sister, Mrs. Siddons (*q.v.*).

Kemble, John Phulip (1757–1823) was a famous tragedian, and for many years manager of Drury Lane Theatre in London. He was brother to Mrs. Siddons (*q.v.*), who first played with—and overshadowed—him in 1783.

Kempenfelt, Admiral Richard (1718–1782), an English naval officer who saw distinguished service, and sank with his ship the *Royal George* off Spithead, through a shifting of the guns when refitting which caused the vessel to capsize. Some six hundred of the ship's company perished with their admiral.

Kempis, Thomas à (1380–1471), name by which the German mystic and writer Thomas Hammerken was known, was a monk of the St. Augustine order, whose life was mainly spent at a monastery near Zwolle. He was the author of *The Imitation of Christ*, a work which has been translated into all languages, and forms a devotional course which is highly valued.

Kent, William (1684–1748), a leading figure in British art, 1725 until middle of eighteenth century—architecture, landscape gardening, interior decoration, furniture, and painting. Strong Italianate influence. Surviving works: The Great Hall at Holkham, Norfolk, and lay-out at Rousham, Oxfordshire.

Kepler, Johann (1571–1630), renowned German astronomer, assistant to Tycho Brahe (1546–1601), whose measurements he used in working out his laws of planetary motion, which are 1. The planets describe elliptic orbits, of which the sun is one focus. 2. The line joining a planet to the sun sweeps out equal areas in equal times. 3. The square of the period of revolution of a planet is proportional to the cube of its average distance from the sun. The explanation of these laws was given by Newton.

Kesselring, Albert (b. 1885), German general. Commanded the Luftwaffe during the invasion of Poland in 1939 and of the Low Countries in 1940. C.-in-C. in Italy from 1943 until he took over from Rundstedt on the Western Front in March 1945.

Keyes, Admiral of the Fleet, Lord, G.C.B., K.C.V.O., C.M.G., D.S.O. (1872–1945). Commodore of the submarine service during war of 1914–18, and commanded operations against Zebrugge in 1918. Deputy Chief of Naval Staff, 1921–25; Com.-in-Chief Mediterranean Station, 1925–28. Director of Combined Operations, 1940–41.

Keynes, John Maynard, 1st Baron, C.B., M.A., F.B.A. (1883–1946), British economist of international reputation. Bursar and Fellow of King's College, Cambridge. Editor of *Economic Journal*, 1911–46. Principal British Treasury representative at the Versailles peace conference; resigned in protest against plans for reparations, and published his views in *The Economic Consequences of the Peace* (1919). From 1919 onwards engaged in controversial writing on monetary theory. Against the return to the gold standard in 1925. *Treatise on Money* (1930) and *The General Theory of Employment, Interest and Money* (1936) profoundly influenced economic thought and government policy all over the world. Led the British delegation to Bretton Woods and negotiated the American loan agreement of 1945. Married Lydia Lopokova, formerly of the Russian Imperial Ballet, in 1925.

Khrushchev, Nikita Sergeyevich (b. 1894), First Secretary of the Soviet Communist Party since 1953; since 1958, when he succeeded Marshal Bulganin, Chairman of the Council of Ministers (Prime Minister). He visited U.S.A. in 1959.

Kidd, Captain William (*c.* 1645–1701), was a famous pirate who, taking advantage of an appointment to the captaincy of a British ship, engaged in numerous piratical expeditions under cover of the English flag. He was hanged at Execution Dock in London after a sensational trial at the Old Bailey.

Kierkegaard, Sören (1813–55), Danish philosopher and religious thinker whose views have had great influence on contemporary existentialism. His main work is *Either—Or*.

King, Rt. Hon. (William Lyon) Mackenzie, O.M., C.M.G. (1874–1950), Prime Minister of Canada, 1921–25, 1926–30 and 1935–48.

Kingsley Charles (1819–1875), English clergyman and novelist, best known for his historical novels *Hypatia*, *Westward Ho!*, *Hereward the Wake* and children's book *The Water Babies*.

Kipling, Rudyard (1865–1936), poet, novelist, and miscellaneous writer. Made himself celebrated while yet a youth by some exceedingly clever and characteristic sketches of Indian life written for the most part while performing journalistic duties in India. He subsequently settled in London and produced a remarkable succession

of stories, sketches, ballads, and poems, all marked by intense vigour. In 1907 was awarded the Nobel Prize.

Kirchhoff, Gustav Robert (1824–87). German physicist. He did important work in electricity and thermodynamics and put spectrum analysis on a firm basis. Published, among other scientific works, *Researches on the Solar Spectrum*.

Kitchener, of Khartoum, Field Marshal Earl, K.G., K.P., G.C.B., O.M. (1850–1916), British soldier. By his victory at Omdurman in 1898 he crushed the Sudanese dervishes and avenged General Gordon. In the early stages of the South African War he assisted Lord Roberts and took over command himself in 1900. C.-in-C. India, 1902–9; Secretary of War, 1914–16. Drowned June 5, 1916, by the torpedoing of the *Hampshire* while on his way to Russia.

Klee, Paul (1879–1940), Swiss artist, studied at Munich, Paris and Rome and later became Professor at Düsseldorf Academy. He lived in a restless, experimental period. His paintings are small-scale, delicate dream-world fantasies, full of poetical content.

Kneller, Sir Godfrey, Bt. (1646–1723), the most celebrated portrait painter of his day in England, who enjoyed the patronage in succession of Charles II., James II., William III., Anne, and George I. He painted the portraits of the members of the Kit-Cat Club, and was buried in Westminster Abbey.

Knight, Dame Laura, D.B.E., R.A., R.W.S., R.E., a prominent British painter. Pres. of Socy. of Women Artists, 1931. Her husband, Harold Knight, R.A. (b. 1874), is a distinguished portrait-painter.

Knox, John (1505–1572), the famous divine and Reformer, who stirred Scotland to mighty religious impulses in the reign of Mary Queen of Scots.

Knox, Edmund George Valpy ("Evoe") (*b.* 1881), editor of *Punch*, 1932–48.

Knox, Rt. Rev. Mgr. Ronald Arbuthnot (1888–1957), Catholic Chaplain at the University of Oxford, 1926–39, and a well-known author. His works include detective stories, among which are *The Viaduct Murder* and *Footsteps at the Lock*.

Knutsford, 2nd Viscount (1855–1931), was Chairman of the London Hospital for over 30 years.

Koch, Robert (1843–1910), the most noted bacteriologist of the time, whose discoveries in connection with the bacillus of tuberculosis have greatly benefited mankind. He also closely studied the causes of Asiatic cholera and bubonic plague.

Kodály, Zoltán (b. 1882), Hungarian composer and teacher. He worked with Bartok in the collection of folk-tunes and his compositions include chamber music, sonatas, songs, the great choral work *Psalmus Hungaricus* and the orchestral suite *Háry János*.

Koniev, Marshal of Soviet Union, Ivan Stapanovitch (b. 1898), one of Russia's outstanding military leaders in the second world war. C.-in-C. Soviet Army, 1946.

Kosciuzko, Tadeusz Andrzoj Bonawentura (1746–1817), a Polish general and patriot who achieved great distinction in 1794 by his gallant leading of the Polish revolutionary forces against Russia. From 1776 to 1783 took part in the American War of Independence.

Kossuth, Louis (1802–1894), a Hungarian patriot and leader, who in the struggle for his country's freedom in 1849 was for a time successful, but ultimately had to acknowledge defeat, and fled first to Turkey and afterwards to England, where he lived for some years.

Kotelewela, Col. the Rt. Hon. Sir John Lionel, C.H., K.B.E. (b. 1897), Prime Minister of Ceylon, 1953–56.

Kreisler, Fritz (b. 1875), Austrian violinist, studied in Paris under Massart. First played in the United States in 1888. He has composed numerous violin pieces, a quartet, and some operettas. Became an American citizen in 1943.

Křenek, Ernst (b. 1900), Austrian composer of partly Czech descent. He first composed in a neo-classic or anti-romantic style, later the influence of jazz was prominent in his compositions, which include the jazz opera *Jonny spielt auf* and many instrumental works and songs. In 1938 he emigrated to the United States.

Kropotkin, Peter Alexeivich, Prince (1842–1921), anarchist, geographer and explorer, who, after a distinguished career in Russia, his native country, was imprisoned for favouring the political action of a working men's association, but escaped to England. He wrote many important books on socialistic and geographical subjects. Returned to Russia in 1917.

Krüger, Stephanus Johannes Paulus (1825–1904), the Boer leader, was one of the outstanding figures of South Africa in the last half of the nineteenth century. As a small boy he accompanied his family on the Great Trek. He was active in Transvaal politics for many years, and served as President from 1883 to 1900. His attitude towards the Uitlanders (English and other non-Boer white inhabitants of the Transvaal) produced much of the tension which led to the South African War. During the war he made unsuccessful attempts to secure help for the Boers from various European powers.

Krupp, Alfred (1812–1887), the famous German engineer, founded the great gun factories at Essen, which were the largest in the world. By his introduction of the Bessemer plan of casting steel and the steam hammer into Germany, he brought about an important development in heavy breech-loading guns, and built up factories which employed at the time of his death 20,000 workmen.

Kubelik, Jan (1880–1940), Czech violinist—son of a gardener at Michle, near Prague—who at the age of twelve played in public, and was one of the most renowned instrumentalists of his day. His son **Rafael** (b. 1914), a conductor of international repute, became musical director of the Royal Opera House, Covent Garden, in 1955.

Kublai Khan (1216–1294), a famous Mogul emperor and grandson of Jenghiz Khan. He greatly extended the Mogul empire by conquest, and lived in unparalleled splendour.

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Lablache, Luigi (1794–1858), a famous bass singer and actor, especially popular in London. He held the position of singing tutor to Queen Victoria.

La Fayette, Marie Joseph Paul Roch Yves Gilbert du Motier, Marquis de (1757–1834), French soldier and humanitarian politician who fought on the side of the Colonists in the American War of Independence and on returning to France became C.-in-C. of the National Guard of Paris. By signing the demand that the king summon the States-General he became the first leader of the French Revolution, but stood out against its later excesses. In 1830 he was instrumental in setting Louis Philippe on the French throne.

La Fontaine, Jean de (1621–1695), the celebrated French poet and fabulist. His fables have been translated into all languages, and are unique.

Lagerlöf, Selma, Ph.D. (1858–1940), the famous Swedish novelist who was awarded in 1909 the Nobel Prize for literature. In 1914 was elected the first woman member of the Swedish Academy.

Lagrange, Joseph Louis, Comte (1736–1813), noted French astronomer and mathematician.

Lalande, Joseph Jerome Lefrançais de (1732–1807), a famous French astronomer and director of the Paris Observatory. He founded the Lalande yearly prize for the best astronomical work or observation and wrote a well-known treatise on astronomy.

Lamarck, Jean Baptiste Pierre Antoine de Monnet, Chevalier de (1744–1829), the prominent French zoologist who occupied important scientific posts in Paris. A precursor of Darwin, his name rests mainly on his theory of the evolution of animals, known as Lamarckism. His chief work was the *Histoire Naturelle des Animaux sans Vertèbres*.

Lamb, Charles (1775–1834), one of the most delightful of our essayists. His *Essays of Elia* are characterised by great felicity of expression much genial humour and an ardent love both of rural life and London life. He was a clerk in the office of the East India Company for thirty-five years. In some of his writings he was assisted by his sister, Mary Lamb, to whom he was greatly devoted.

Lamb, Sir Horace, F.R.S. (1849–1934), a British scientist, was the leading authority on hydro-

dynamics, and did valuable research work on wave motions and electricity.

Lambert, Constant (1905–51), English composer, conductor and critic; musical director of the Sadler's Wells Ballet. His *Rio Grande* for chorus, piano, and orchestra, shows some jazz influence.

Landor, Walter Savage (1775–1864), a writer and poet of strong genius. He wrote a fine poetic tragedy *Count Julian* in 1812, and in later life published several other volumes of poems. The work by which he is best known, however, is his *Imaginary Conversations*.

Landseer, Sir Edwin Henry, R.A. (1802–1873), the most celebrated English animal painter of his time. He designed the lions for the base of the Nelson Monument in Trafalgar Square.

Lane, Edward William (1801–1876), an English writer to whom we owe the most popular translation of the *Arabian Nights*. He was also the author of a number of books dealing with ancient Egyptian and Arabic subjects, and was one of the most prominent Orientalists of the 19th century.

Lanfranc (c. 1005–89), Italian churchman, b. at Pavia; Archbishop of Canterbury, 1070. Closely associated with Duke William of Normandy (William I. of England); carried out Church reforms and preserved its independence.

Lang, Andrew (1844–1912), Scottish scholar and writer of great versatility, his numerous works including poetry, fiction, history, fairy tales, folk-lore, and translations from the classics.

Lang of Lambeth, Most Rev. Cosmo Gordon Lang, 1st Baron, P.C., G.C.V.O., D.D. (1864–1945), Archbishop of Canterbury, 1928–42; and of York, 1908–28; Bishop of Stepney, 1901–08.

Langland, William (c. 1330–1400), author of the alliterative poem *The Vision of Piers the Plowman*.

Langton, Stephen (1151–1228), was Archbishop of Canterbury from 1213, and one of the chief instruments in forcing the Magna Carta from John.

Lansbury, Rt. Hon. George (1859–1940). British Labour politician; Chairman of Parliamentary Labour Party, 1931–35, Leader of the Labour Party, 1932–35. M.P. Bow and Bromley, 1910–12, and 1922–40.

Lao-Tzŭ, one of the ancient philosophers of China, who flourished about 600 B.C. The classic upon which his fame rests, *Tao-tê-ching*, was written many years later.

Laplace, Pierre Simon, Marquis de (1749–1827), French mathematician and astronomer whose researches on the motions of the solar system and the theory of probability earned him the title of "the Newton of France."

La Rochefoucauld, François, Duc de (1613–1680), a renowned French statesman and writer of the Louis XIV. period. His *Reflections and Moral Maxims* is a classic.

Lasker, Emanuel, Ph.D. (1868–1941), world's chess champion, 1894–1921—defeated by Capablanca (*q.v.*).

Lassalle, Ferdinand (1825–64), founder of the German Socialist movement, and as such exerted deep influence throughout Europe. His life story forms the basis of George Meredith's novel *The Tragic Comedians*.

Lasso, Orlando di (c. 1532–94), Flemish composer and choirmaster, contemporary of Palestrina, and the writer of over 2,000 compositions, including *chansons*, madrigals, and sacred music.

Laszio de Lombos, Philip Alexius, M.V.O. (1869–1937), the most fashionable portrait painter of modern times. President of Royal Society of British Artists, 1930.

Latimer, Hugh (*circa* 1485–1555), the English Reformer who became Bishop of Worcester under Henry VIII., but when Mary came to the throne was condemned as a heretic and burned at the stake.

Laud, William (1573–1645), an eminent ecclesiastic, who, after filling three minor bishoprics, was made Archbishop of Canterbury in 1633. He did much to direct the policy of Charles I., and when trouble followed, he was impeached by the Long Parliament and committed to the Tower. Was tried for treason and beheaded.

Lauder, Sir Harry (MacLennan) (1870–1950), famous singer of Scottish songs and ballads. Composed own songs and wrote own music. Knighted 1919 for services in raising money for war purposes.

Laval, Pierre (1883–1945), French politician, won notoriety over the Hoare–Laval pact in 1935. During the German occupation he was the arch French collaborator, and was afterwards tried for treason and shot.

Lavery, Sir John, R.A. (1856–1941), an eminent portrait painter; Pres. of the Royal Society of Portrait Painters, 1932–41.

Lavoisier, Antoine Laurent (1743–1794), often called the "father of chemistry," was born in Paris, and was the first to establish the fact that combustion is a form of chemical action.

Law, Rt. Hon. Andrew Bonar (1858–1923), Conservative statesman. He became leader of the Opposition in 1911, joined the Coalition in 1915, and served as Prime Minister from 1922 until shortly before his death in 1923.

Lawrence, David Herbert (1885–1930), one of the most powerful and original of modern novelists, and as a poet ranked among the best this century has produced. Author of *The White Peacock*, *Sons and Lovers*, *The Plumed Serpent*, etc.

Lawrence, Sir Thomas, P.R.A. (1769–1830), one of the fashionable portrait painters of his day.

Lawrence, Col. Thomas Edward (1888–1935), known as "Lawrence of Arabia," British soldier, archaeologist and explorer. Organised and led the Arabs against the Turks in the war of 1914–18. Author of *The Seven Pillars of Wisdom* (1926), of which an abbreviated edition, *Revolt in the Desert*, was published in 1927.

Leacock, Stephen Butler (1869–1944), Head of Dept. of Economics, McGill University, Montreal, 1908–36; but best known throughout the world as a humorous writer.

Lecky, Rt. Hon. William Edward Hartpole, O.M. (1838–1903), an eminent historian. His best-known works are *The History of England in the Eighteenth Century* and *The History of European Morals*.

Leclerc (de Hauteclocque), General Jacques Philippe, Marshal of France (1902–1947), French soldier of considerable personal popularity. Was Governor of the Cameroons in 1940, declared for the Free French and later led a Free French force from Lake Chad across the Sahara desert to join the Allied Forces in North Africa. Liberated Paris in 1944; commanded French troops in Indo-China, 1946. Killed in air crash in Algeria.

Le Corbusier, pseudonym of Charles-Edouard Jeanneret-Gris (b. 1887), Swiss-born French architect and town-planner whose works and theories with their emphasis on organic planning have profoundly influenced contemporary architecture. Famous for his *ville radieuse* conception of a city and architect of *L'Unité d'Habitation* at Marseilles and of Chandigarh, the new capital of East Punjab.

Lee of Fareham, Viscount, P.C., G.C.B., G.C.S.I., G.B.E. (1868–1947), First Lord of the Admiralty, 1921–22. Minister of Agriculture, 1919–21. Presented Chequers Court to the nation as a residence for British Premiers, 1917.

Lee, Robert Edward (1807–70), was one of the ablest Confederate generals in the American Civil War, and C.-in-C. when the final surrender was made at Appomattox in 1865.

Lee, Sir Sidney (1859–1926), the great authority on Shakespeare, and joint editor with Sir Leslie Stephen of the *Dictionary of National Biography*, exercising undivided control over the completion of that monumental work during the last ten years of its publication.

Leech, John (1817–1864), perhaps the most popular of all the *Punch* artists, whose sketches and cartoons were the life and soul of the paper for many years.

Lehar, Franz (1870–1948), Hungarian composer, chiefly of light operas, which include *The Merry Widow*, *The Count of Luxembourg*, *Frederica*, *The Land of Smiles*.

Leibnitz, Gottfried Wilhelm, Freiherr von (1646–1716), German writer and philosopher and one of the world's supreme intellects. Invented the infinitesimal calculus which he published in 1684, independently of Newton whose previous work on the same subject was published in 1687.

Leicester, Robert Dudley, Earl of (1531–88), son of John, Duke of Northumberland (*q.v.*), was a favourite of Queen Elizabeth. He commanded

the English troops in the Netherlands, 1585–87, and in England before the Armada. Married to Amy Robsart (*q.v.*).

Leighton, Frederick, Baron, P.R.A. (1830–96), English painter whose popular pictures dealt with classical subjects, characterised by delicacy of finish and splendour of colour. Among his more famous paintings are *Venus Disrobing, Clytemnestra*, and *The Garden of the Hesperides*. He was also a sculptor.

Lely, Sir Peter (1618–80), the famous painter to whom we owe so many of the portraits of the beauties of the Court of Charles II. He was born at Soest and his proper name was Van der Faes.

Lenin, Vladimir Ilyich Ulyanov (1870–1924), an active worker for the Russian Revolution from 1893–1917 both "underground" in Russia and abroad. It was in this period that the revolutionary Social-Democratic party was formed. An uncompromising revolutionary group, known as the Bolsheviks, developed within this party and Lenin was its leading spirit. In April 1917 Lenin returned to Russia. In the 1917 November Revolution the Provisional Government was overthrown by the Bolsheviks and Lenin became President of the New Government, the Council of People's Commissars—the Sovnarkom. From 1917 to his death in 1924 Lenin remained the active head of the Russian Soviet Government.

Leonardo da Vinci (1452–1519), Italian painter, sculptor, architect, scientist, engineer, and musician. His creative power as an artist and scientist mark him as a supreme example of Renaissance genius. He went to Milan *c.* 1482 and worked for 16 years in the service of the powerful prince Ludovico Sforza. He was for a time with Cesare Borgia on his campaigns and died in exile as a pensioner of Francis I of France. Among his works are the famous *Last Supper, Mona Lisa, Madonna of the Rocks*, and *St. John the Baptist*.

Leoncavallo, Ruggiero (1858–1919), Italian composer of opera whose *Pagliacci* was his one outstanding success.

Leonidas was king of Sparta at the time of the invasion of Greece by Xerxes, 480 B.C., and led the defence of the Pass of Thermopylæ, where he fell.

Lermontov, Mikhail Yurevich (1814–41), great Russian poet and novelist, exiled to the Caucasus for the passionate, revolutionary poem addressed to Czar Nicholas I. written on the death of Pushkin. He has often been called the poet of the Caucasus, for the stern, mountainous country of his youth and exile had a great influence on his poetry. His novel *A Hero of Our Time* was written while he was at St. Petersburg in 1839. Lost his life in a duel.

Le Sage, Alain René (1668–1747), author of the famous stories *Gil Blas* and *Le Diable Boiteux*, also a dramatist of note.

Leslie, Charles Robert, R.A. (1794–1859), an eminent British painter; produced many notable pictures, including *The Play-Scene from Hamlet, Sancho Panza and the Duchess*, etc.

Lesseps, Vicomte Ferdinand de (1805–94), an engineer of large ideas who, while Vice-Consul at Alexandria, conceived the plan of the Suez Canal, which work was completed in 1869. He afterwards projected the original Panama Canal, which failed.

Lessing, Gotthold Ephraim (1729–81), a noted German critic and dramatic poet, whose most celebrated work was his *Laokoon*.

Leverhulme of the Western Isles, 1st Viscount (1851–1925). Chairman and founder of the soapmaking firm of Lever Brothers, Port Sunlight, which later, by purchase and amalgamation, increased in size and importance to become Unilever Ltd. He was for many years prominent as a business pioneer and man of affairs and one of the most practical exponents of the industrial partnership movement. Presented Lancaster House to the nation, the home of the London Museum.

Leverrier, Urbain Jean Joseph (1811–77), the French astronomer, co-discoverer with John Couch Adams of the planet Neptune.

Lewis, Cecil Day, C.B.E., M.A. (b. 1904), poet and critic. Prof. of Poetry, Oxford Univ., 1951–6. Besides various poetical works has published translations of *The Georgics* and *The Aeneid* of Virgil; also detective novels under pseudonym of Nicholas Blake.

Lewis, Clive Staples, M.A., F.R.S.L. (b. 1898), author of various books of popular theology, such as *The Screwtape Letters* and *The Great Divorce*, and of the medieval study *Allegory of Love*.

Lewis, Sinclair (1885–1951), an American author who secured his first great success in 1920 with his novel of provincial American life, *Main Street*. *Babbitt*, published two years later, ruthlessly satirised the 100 per cent. disciple of American *Big Business*, and added a new term, "Babbitry," to the American language. Awarded the Nobel Prize for literature, 1931.

Lidgett, Rev. Dr. John Scott, C.H., M.A., D.D. (1854–1953), founder of the Bermondsey Settlement (1891); joint editor of the *Contemporary Review*; leader of Progressive Party on L.C.C., 1918–28; a former President of the National Free Church Council.

Lie, Trygve (b. 1896), Sec.-Gen. of the United Nations 1946–52. Formerly a leading Norwegian politician and Foreign Minister, 1941–46.

Liebermann, Max (1847–1935), German impressionist painter. Among his finest pictures are *The Flax Spinner, The Woman with Goats*, and *The Net-Menders*.

Li Hung Chang (1823–1901), an enlightened Chinese statesman and general, who by sheer ability rose from a humble position to be Chief Minister, and exercised almost supreme control for a number of years.

Lilburne, John (1614–57), an English political agitator and pamphleteer, who became the leader of the Levellers, the democratic party in the English Revolution.

Linacre, Thomas (*c.* 1460–1524), humanist scholar and physician, founder of the College of Physicians. Published translations of Galen's works.

Lincoln, Abraham (1809–65), was a native of Kentucky; in early life he became a lawyer, and was returned to Congress in 1846 from Springfield, Illinois, and in 1861 was elected 16th President of the United States, when he delivered his famous anti-slavery pronouncement, which led to the Civil War of 1861–65. In 1864 he was re-elected, and in the following year was assassinated by John Wilkes Booth.

Lind, Jenny (1820–87), a famous prima donna, "the Swedish nightingale" as she was called, who made a great sensation by her wonderful voice for some seasons in Europe, London and in America, from 1837 onward.

Linnæus, Carl von Linné (1707–78), a tireless Swedish doctor and scientist who became one of the most distinguished of naturalists, and the founder of modern botany. His *Systema Naturæ* was published in 1735, and other monumental works followed. First to expound the true principles for defining genera and species.

Lippi, Fra Filippo (1406–69), one of the great artists of the Italian quatrocento, whose frescoes can be seen in Prato Cathedral. His son **Filippino** (1457–1504) was equally gifted and executed many great works, including frescoes in the Carmine, Florence, and the altar-piece *Virgin and Saints* in the Uffizi Gallery.

Lippmann, Gabriel (1845–1921) French physicist, whose more important work was in the field of colour photography. His numerous inventions include the capillary-electrometer, which bears his name, and many other delicate instruments. Awarded the Nobel Prize for Physics, 1908.

Lippmann, Walter (b. 1889), American journalist, whose column in the New York *Herald Tribune* has a wide influence.

Lipton, Sir Thomas Johnstone, Bt., K.C.V.O. (1850–1931), after an adventurous early career in America, started shopkeeping in his native Glasgow, and in course of a few years became the largest shopkeeper in the world. Was renowned for his charities, and his attempts to win the America's Yachting Cup.

Lister, Lord, P.C., O.M., F.R.S. (1827–1912), achieved renown for his discovery of the antiseptic treatment which has accomplished so much on behalf of surgery. Pres. of Royal Socy. 1895–1900; and of British Assn. 1896.

Liszt, Franz (1811–86). Hungarian pianist and composer, whose brilliant playing astonished

and delighted Europe and rather overshadowed his importance as a composer. He originated the symphonic poem. His daughter Cosima married Wagner.

Litvinov, Maxim Maximovich (1876–1952), Russian diplomat and statesman; Soviet Diplomatic Agent to Great Britain, 1917, Commissar for Foreign Affairs, 1929–39; Soviet Ambassador to United States, 1941–43.

Livingstone, Dr. David (1813–73), the great Scottish explorer and missionary, whose discoveries in Africa included the course of the Zambesi, the Victoria Falls, and Lake Nyasa. He opened up Central Africa to the influences of Christianity, and stirred the public conscience to the horrors of the Slave Trade. In 1871 considerable apprehension was felt in regard to his fate, but he was discovered by H. M. Stanley at Ujiji near Lake Tanganyika.

Lloyd, Rt. Hon. John Selwyn Brooke, Q.C., C.B.E., M.P. (b. 1904), For. Sec. 1955– ; Min. of Defence, 1955; Min. of State at Foreign Office, 1951–55.

Lloyd, Marie (1870–1922), English music-hall artist and genius of Cockney comedy.

Lloyd George of Dwyfor, Earl, O.M. (1863–1945). Chairman of the Liberal Party, 1924–31. Prime Minister, 1916–22. M.P. for Caernarvon 1890–1944. As a War Premier he displayed activity, resourcefulness, and driving power, which proved a tremendous influence in bringing about the defeat of Germany; and at the Peace Conference, in conjunction with Clemenceau and President Wilson, he was a master spirit. His daughter **Lady Megan Lloyd George** who was Liberal M.P. for Anglesey from 1929 to 1951 joined the Labour Party in 1955.

Locke, John (1632–1704), one of the great English liberal philosophers and founder of empiricism, the doctrine that all knowledge is derived from experience. His chief work in theoretical philosophy, *Essay Concerning Human Understanding*, was written just before the revolution of 1688 and published in 1690. Other writings include: *Letters on Toleration*, *Treatises on Government*, and *Education*.

Lombroso, Cesare, M.D. (1836–1909), famous Italian criminologist; in 1889 published his monumental work *L'uomo delinquente*, in which he put forward the theory that there was a definite criminal type which could be distinguished from the normal type, both anatomically and psychologically. He did much by his writings to hasten prison reform.

Lomonosov, Mikhail Vasilyevich (1711–65), Russian poet, philosopher, and scientist, closely associated with the foundation of Moscow University in the reign of the Empress Elizabeth.

London, John Griffith ("Jack") (1876–1916), an American novelist who led an adventurous life and wrote many popular novels and stirring books of adventure.

Longfellow, Henry Wadsworth (1807–82), an American poet who produced a number of volumes of poetry of great purity of thought and beauty of language. Author of *Hiawatha*.

Lonsdale, Dame Kathleen, D.B.E., F.R.S. (b. 1903), Professor of Chemistry and head of the Dept. of Crystallography, Univ. College, Univ. of London. Her publications include *X-Rays and Crystals*, *International Tables for X-Ray Crystallography*, and *Removing the Causes of War*.

Lonsdale, 5th Earl of, K.G., G.C.V.O. (1857–1944), was a well-known sportsman whose special interests were horse-racing, hunting and boxing, the Lonsdale belts having been founded by him.

Lope de Vega Carpio, Félix (1562–1635), founder of the Spanish drama, and one of the great figures of Spanish literature. He was one of the most prolific of writers, his dramatic productions alone numbering 1500 plays, of which some 450 survive.

Louis IX. (1214–70), St. Louis, king of France, crusader, and peace-maker, fulfilled the medieval ideal of the knightly king. Memoirs by the Sire de Joinville.

Louis XIV. (1638–1715), reigned over France from 1643 to his death. He was responsible for corrupting Charles II., for the persecution of the Huguenots, the repeal of the edict of Nantes, and for the war of the Spanish succession. He was a sensual, luxury-loving king, but encouraged arts and literature.

Louis XV. (1710–74), called the Well-Beloved. He was licentious and indolent, and an inveterate hater of England.

Louis XVI. (1754–93), was the apathetic and unfortunate French king who married Marie Antoinette, allowed his country to be swayed by first one statesman and then another, until at last he saw himself divested of every shred of power by the Revolutionists. How he and his Queen were subsequently imprisoned and sent to the guillotine all students of French history know.

Louis, Joe (b. 1914), world's heavyweight boxing champion. Established a record by successfully defending his title twenty-four times in the years 1937–48. Retired from the ring in 1949.

Low, Archibald Montgomery, D.Sc. (1888–1956), a distinguished British scientist who had many inventions to his credit connected with wireless, television, coal and petrol engines, anti-aircraft and anti-tank rocket apparatus.

Low, David Alexander Cecil (b. 1891), the well-known cartoonist, creator of Colonel Blimp. Joined the *Manchester Guardian* in 1953, having previously been on the staffs of the *Daily Herald* and *Evening Standard*.

Lowell, James Russell (1819–91), an American writer and poet of singular power and humour.

Loyola, St. Ignatius (1491–1556), was the founder of the order of Jesuits.

Lucretius (Titus Lucretius Carus) (99–55 B.C.), great Roman poet of antiquity, whose life-work was the poem *On Nature* (*De rerum natura*) in six books, the first two of which set out the atomic theory of matter as understood by Epicurus.

Ludendorf, General Erich von (1865–1937), was Chief of Staff, and shared with Hindenburg the military leadership of Germany during the Great War. Largely responsible for the victory of Tannenberg and the overwhelming successes of 1915.

Ludwig, Dr. Emil (1881–1948), author of many historical works, including biographies of Goethe, Beethoven, Bismarck, Napoleon, and Lincoln.

Lugard, Frederick, Lord (1858–1945), British colonial administrator, a man of abounding energy, initiative, tact and firmness, and possessing considerable military abilities. Helped to build up the British dominions in tropical Africa (Nyasaland, Uganda, Nigeria) and to establish the principles of British African administration, notably the system of "indirect rule" through native rulers. In 1922 published the *Dual Mandate in Tropical Africa*, which set out the thesis that Europe is in Africa for the reciprocal benefit of her own industrial classes and the native races.

Luther, Martin (1483–1546), the great German Reformer. Was ordained a priest in 1507. Became Professor of Theology at the University of Wittenberg and until 1517 was an orthodox Roman Catholic. His first idea of revolt occurred when he saw indulgences being sold, a practice which he openly condemned. For this he was excommunicated, and summoned before the Diet at Worms, where he made a memorable defence. He then separated himself from the Roman Catholics, and began to preach the Reformed Religion, his doctrine being formulated in the confession of Augsburg. He lived to see the principles of the Reformation widely established.

Lutyens, Sir Edwin Landseer, O.M., K.C.I.E., R.A. (1869–1944), was a famous architect; designer of the Cenotaph; New Delhi; new British Embassy, Washington; Roman Catholic Cathedral Liverpool, etc. One of the principal architects for the Imperial War Graves Commission. Pres. of the Royal Academy, 1938–43.

Lycurgus, the Spartan legislator, who flourished about 844 B.C., and drew up a series of laws which endured for 700 years.

Lyell, Sir Charles, Bt., F.R.S. (1797–1875), distinguished geologist, author of *Principles of Geology*, and supporter of the Darwinian theory.

Lysenko, Trofim (b. 1898), Russian biologist whose concept of genetics, that environmental experiences can change heredity, though discredited in scientific circles outside the U.S.S.R.,

was accepted there as an official dogma until 1953.

Lytton, Edward George Earle Bulwer, 1st Baron, P.C., G.C.M.G. (1803–73), a prolific novelist and dramatist, whose romantic stories made him famous, and included *Pelham, The Last Days of Pompeii*, and *The Caxtons*.

Lytton, Sir Henry Alfred (1867–1936), was a noted British actor who scored many successes, chiefly playing Gilbert and Sullivan roles.

M

Macadam, John Loudon (1756–1836), Scottish engineer who invented the process of road-repairing which bears his name.

MacArthur, General Douglas, Hon. G.C.B., D.S.C., D.C.M. (b. 1880), American soldier famous for his gallant defence of the Philippines against the Japanese in 1941–42. Relieved of his commands in the Far East during the Korean campaign by President Truman in April 1951.

Macaulay, Rose, D.B.E. (1881–1958), an English authoress and literary critic. Among her literary successes are *Potterism, Dangerous Ages, Told by an Idiot, Orphan Island* and other novels noted for their keen satirical wit and devastating exposure of the follies of her time.

Macaulay, Thomas Babington, Lord (1800–59), the most brilliant historian of the Victorian era. His fame was assured by his *Essays* and *Lays of Ancient Rome*, and his *History* did more than confirm it. He was a son of **Zachary Macaulay** (1768–1838), the anti-slavery agitator, and sat in Parliament as member for Calne for some years, also serving for five years as a member of the Supreme Council of Calcutta. On his home-coming, he again entered Parliament as member for Edinburgh, and gained a new celebrity by his speeches. He at different times filled the offices of Paymaster-General and Secretary for War. Both Lord Macaulay and his father lie buried in Westminster Abbey.

Macbeth, according to Holinshed's *Chronicle*, was the usurping Scottish king who succeeded Duncan, whom he murdered. Macbeth was slain by Duncan's son Malcolm in 1056, after a reign of seventeen years. His history forms the subject of Shakespeare's celebrated tragedy.

MacCarthy, Sir Desmond, F.R.S.L., Hon. D.Litt., Hon. LL.D. (1877–1952), journalist and critic who became dramatic critic to *The Speaker*, 1904, and *The New Statesman*, 1913, where he soon made a reputation both for the substance and style of his writings. He edited *The New Quarterly*, 1907–10 and later *Life and Letters*. Latterly was literary critic to *The Sunday Times*.

MacCarthy, Justin (1830–1912), Irish politician, novelist, and historian, from 1879 to 1896 was a prominent member of the Irish Party in Parliament, succeeding Mr. Parnell in 1890 in the leadership of the party.

McCormack, (Count) John (1884–1945), was the world famous Irish tenor who became a naturalised American citizen in 1919; received a Papal peerage as Count from Pius XI in 1928.

Macdonald, Flora (1722–90), Scottish Jacobite heroine who saved the life of Prince Charles Edward after the defeat at Culloden Moor in 1746.

Macdonald, Sir John Alexander (1815–91), Canadian statesman of great vigour and imagination who became the first Prime Minister of the Dominion of Canada.

MacDonald, Rt. Hon. James Ramsay (1866–1937), Prime Minister in the first two Labour Governments, 1924, 1929–31, and in a Coalition Government dominated by Conservatives, 1931–35. His son, **Malcolm** (b. 1901), has been Dominions Secretary, High Commissioner in Canada, Gov.-Gen. of Malaya, Comm.-Gen. for S.E. Asia, and since 1955 High Comm. in Delhi.

McDougall, William, F.R.S. (1871–1938), British psychologist. Professor of Psychology at Harvard University 1920–27, and Duke University, North Carolina 1927–38. His *Introduction to Social Psychology* (1908) achieved international reputation.

Machiavelli, Niccolo (1469–1527), a Florentine diplomatist and historian, whose book, *Il Principe*, has maintained its celebrity as a masterly exposition of the method of governing by artifice.

Mackail, Prof. John William, O.M. (1859–1945), British classical scholar, Prof. of Poetry at Oxford, 1906–11, and translator of the *Odyssey*. Father of **Denis Mackail** (b. 1892), novelist and short-story writer, and of **Angela Thirkell** (b. 1890), also a novelist.

McKell, Sir William John, G.C.M.G., K.C. (b. 1891), Gov.-Gen. of Australia 1947–52. Previously engaged in Australian politics.

Mackenzie, Sir (Edward Montague) Compton, O.B.E. (b. 1883), one of the foremost of present-day British novelists; literary critic to the *Daily Mail*, 1931–35; Rector of Glasgow Univ., 1931–34.

Macmillan, Rt. Hon. Harold, M.C., M.P. (b. 1894), succeeded Sir Anthony Eden as Prime Minister in Jan. 1957. First entered Parliament in 1924 as M.P. for Stockton-on-Tees. He has represented Bromley, Kent, since 1945 and has served as Minister of Housing and Local Government, Min. of Defence, Foreign Sec., Chancellor of the Exchequer. He is a member of the well-known publishing family. Chanc. Oxford University, 1960.

McMillan, Margaret, C.H., C.B.E. (d. 1931), Scotswoman, born in America, who with her sister Rachel was a pioneer of child welfare work. Founder of open-air nursery schools. The Rachel McMillan nursery school at Deptford is a memorial to her work.

McNaughton, Gen. Hon. Andrew George Latta C.H., D.S.O. (b. 1887), Canadian soldier, politician, electrical engineer, and representative on the U.N. Atomic Energy Commission.

Macready, William Charles (1793–1873), was the outstanding tragic actor of his time and was extremely successful in Shakespearian and other rôles.

Maeterlinck, Count Maurice (1862–1949), Belgian man of letters whose plays include *La Princesse Maleine, Pelléas et Mélisande*, and *L'Oiseau Bleu*. Well known for his work on bees and ants.

Magellan, Ferdinand (c. 1480–1521), a famous Portuguese navigator, and commander of the first expedition (1519) to sail round the world.

Mahler, Gustav (1860–1911), Austrian composer and conductor; a writer of symphonies and songs, a classical romantic, much influenced by Anton Bruckner and Wagner. He completed nine symphonies (some with voices), and examples of his work in song-cycle form are *Das klagende Lied, Kindertotenlieder*, and *Das Lied von der Erde* (for solo voices and orchestra). From 1907 until his death he conducted a series of concerts in America.

Maintenon, Françoise d'Aubigné, Marquise de (1635–1719), after being the wife of the poet Scarron, drifted into Court circles, and so fascinated Louis XIV. that he ultimately married her. At his death she retired to a convent.

Malibran, Marie Félicité (1808–36), was one of the most famous operatic singers of her time.

Malik, Yakov Alexandrovich (b. 1906), Soviet diplomatist who has been Deputy Min. of Foreign Affairs, Permanent Rep. of U.S.S.R. to U.N., 1948–52, and since 1953 Soviet Ambassador to Great Britain.

Malory, Sir Thomas (c. 1430–70), compiled the *Morte d'Arthur*, which was printed by Caxton in 1485, and relates the story of King Arthur and the Knights of the Round Table.

Malraux, André (b. 1895), French novelist whose works include *La Condition humaine* (*Man's Fate*), *L'Espoir* (*Man's Hope*), and *Psychologie de l'art* (translated into 2 vols., *Museum without Walls* and *The Creative Act*).

Malthus, Thomas Robert, F.R.S. (1766–1834), an English clergyman and political economist who in his essay on *The Principle of Population* proposed to limit the increase of population by discouraging marriage and otherwise.

Malvern, 1st Viscount, Godfrey Martin Huggins, C.H., K.C.M.G., F.R.C.S., Prime Min. of S. Rhodesia, 1933–53 and of the Federation of Rhodesia and Nyasaland, 1953–56.

Manet, Edouard (1832–83), French Impressionist painter, whose pictures *Olympia* and *Lola de Valence* have been acclaimed masterpieces.

Mann, Thomas (1875–1955), German writer who won immediate world recognition at the age of 25 with his novel *Buddenbrooks*. His liberal

humanistic outlook had developed sufficiently by 1930 for him unerringly to expose the nature of National Socialism. He left Germany in 1933 to live in Switzerland and then settled in the United States. Awarded the Nobel Prize for Literature in 1929; E. and W. Germany combined to honour him with the Goethe Prize in 1948. His best-known works, apart from many volumes of essays, stories, and shorter novels, are *The Magic Mountain* (1924), the *Joseph* tetralogy (1935–43), *Dr. Faustus* (1947) and *Felix Krull* (1954).

Mann, Tom (1856–1941), was a prominent British Labour leader for more than 50 years.

Manning, Henry Edward, Cardinal (1808–92), Cardinal Archbishop of Westminster 1875–92, was a prominent Anglican Churchman up to 1851, when he joined the Church of Rome.

Mansfield, Katherine (1890–1923), short-story writer, born in Wellington, New Zealand, whose work was strongly influenced by the short stories of Chekov. Her second husband was John Middleton Murry, author and literary critic.

Manson, Sir Patrick, G.C.M.G., M.D., F.R.S. (1844–1922), an eminent physician who specialised in parasitology and became physician and medical adviser to the Colonial Office. He was the first to formulate the hypothesis that the malarial parasite was transmitted by the mosquito. The joint work of Sir Patrick Manson and Sir Ronald Ross rendered habitable vast areas of the earth hitherto closed.

Manuzio, Aldo Pio (1450?–1515), Italian printer, founder of the Aldine press in Venice, which for just over a century issued books famed for their beautiful type and bindings.

Manzoni, Alessandro Franceso Tomaso Antonio (1785–1873), Italian writer, whose romantic novel *I Promessi Sposi* ("The Betrothed") is generally regarded as the most important work in Italian literature after "The Divine Comedy."

Mao Tse-tung (b. 1893), leader of the Chinese people. Chairman of the Central Committee of the Chinese Communist Party since 1936 and Chairman (equivalent to President) of the People's Republic of China from 1949 (when it was first established following the military defeat of the Nationalist forces) until the end of 1958 when the duties of President were relinquished.

Marat, Jean Paul (1743–93), one of the leading actors in the French Reign of Terror. Killed by Charlotte Corday.

Marconi, Guglielmo Marchese (1874–1937), Italian electrical engineer celebrated for his development of wireless telegraphy. With a home-made apparatus he sent long-wave signals over a distance of 1 mile in 1895. He came to England in 1896 and established the Marconi Company in 1897. Succeeded on Dec. 12, 1901 in transmitting and receiving transatlantic signals. Awarded Nobel Prize for Physics, 1909. The King of Italy made him a marquis in 1929.

Marco Polo. (*See* **Polo, Marco.**)

Marcus Aurelius Antoninus (121–180), the greatest of Roman emperors and a disciple of the stoics.

Maria Theresa (1717–80), Archduchess of Austria, Queen of Bohemia and Hungary; a woman of remarkable strength of character and ability, succeeded her father Charles VI., as monarch of the Hapsburg dominions. She was an enlightened ruler and has been called a "benevolent despot."

Marie Antoinette Josephe Jeanne (1755–93) was daughter of the Empress Maria Theresa and the Emperor Francis I. of Austria, and became wife of Louis XVI. of France. She entered with spirit into the gaiety of French Court life, and drew down upon herself much popular hatred in consequence. In the terrible events which followed the outbreak of the Revolution she was one of the chief sufferers, but bore her fate with dignity and resignation, and met her death on the scaffold with unflinching courage.

Marie Louise (1791–1847), daughter of Francis I. of Austria, became wife of Napoleon in 1810, and bore him a son. (*See* **Napoleon II.**)

Marius, Caius (155–86 B.C.), was one of the most distinguished Roman generals, a tribune of the people, prætor, and six times Consul. He was Proprætor of Spain in 114 B.C.

Mark Antony. (*See* **Antonius, Marcus.**)

Marlborough, John Churchill, 1st Duke of (1650–1722), brilliant soldier, the victor of Blenheim, Ramillies, Oudenarde, and Malplaquet. Married to Queen Anne's favourite, Sarah Jennings.

Marlowe, Christopher (1564–93), one of the greatest of the Elizabethan dramatists. His principal plays are *Dr. Faustus*, *Tamburlaine the Great*, *Edward II.*, and *The Jew of Malta*. He was killed in a tavern brawl at Deptford.

Marryat, Captain Frederick (1792–1848), an exceedingly popular writer of sea stories. Author of *Peter Simple*, *The King's Own*, *Jacob Faithful*, and *The Children of the New Forest*.

Marshall, General George Catlett (1880–1959), American soldier and statesman; Chief of Staff of U.S. Army, 1939–45. Initiated the American offer of aid to Europe, which led to the European Recovery Programme. Awarded Nobel Peace Prize, 1953.

Martial (Marcus Valerius Martialis) (A.D. *c.* 40–A.D. *c.* 104) was born at Bilbilis in Spain, but spent the greater part of his life in Rome, where he acquired much fame as a poet and epigrammatist.

Marvell, Andrew (1620–78), English poet, satirist and diplomatist, friend of Milton, who was best known for his many prose satires and lampoons.

Marx, Heinrich Karl (1818–83), German philosopher and socialist and lifelong partner and friend of Engels with whom he collaborated in writing many important works on socialism and in developing his theories of dialectical materialism. After being expelled from the continent he settled in London where he wrote his monumental work *Das Kapital*. Communism is based on the teachings of Marx.

Mary I. (1516–58), daughter of Henry VIII. and Catherine of Aragon. Was Queen of England from 1553 to her death. She was a strenuous Roman Catholic, and entirely reversed the religious order of things during her brief reign, persecuting, imprisoning, and burning at the stake many of the Protestant reformers, nearly three hundred persons being put to death as heretics. She married Philip of Spain in 1554.

Mary II. (1662–94), daughter of James II. Came to the English throne in 1689, having been married to her cousin, William of Orange, eleven years previously. After assenting to the "Declaration of Rights," they reigned jointly until her demise.

Mary, H.M. Queen, K.G., K.T., G.C.V.O., (1867–1953), Queen Consort of George V.

Mary, Queen of Scots (1542–87), daughter of James V. of Scotland, married to the Dauphin of France at sixteen years of age. On the death of her husband in 1560 she returned to Scotland, and for a time was the acknowledged Queen of the Scots. In 1565 she married Lord Darnley, who a year later was murdered and Mary married Bothwell. The Scottish nobles rebelled against Mary, and she was made prisoner and confined in Loch Leven Castle, compelled to abandon Bothwell and to sign an Act of Abdication in favour of her son. She escaped to England, sought the protection of Elizabeth, and was imprisoned for nineteen years in various castles, and ultimately beheaded on a charge of conspiracy. She was buried in Peterborough Cathedral but after her son James I. of England ascended the throne her remains were removed to Westminster Abbey.

Masaryk, Jan Garrigue (1886–1948), son of Thomas Masaryk. Served as Czech Minister in London, 1925–38 and as Foreign Secretary, 1940–48. His sudden and tragic death removed a cultured and lovable citizen of the world.

Masaryk, Thomas Garrigue (1850–1937), Czech philosopher and statesman; founder and first President of Czechoslovakia, 1918–35.

Mascagni, Pietro (1863–1945), the Italian composer, who attained sudden celebrity by his *Cavalleria Rusticana* in 1890, and afterwards produced a number of operas of a more ambitious character, but perhaps not up to the level of his first effort.

Masefield, John Edward, O.M. (b. 1878), Poet Laureate since 1930. A prolific writer of notable poems as well as numerous plays.

Maskelyne, John Nevil (1839–1917), famous illusionist who exposed the mysteries of the Davenport spiritualistic quacks.

Mason, Alfred Edward Woodley (1865–1948), an English novelist, author of many popular

stories of adventure including *The Four Feathers* and *Fire Over England*.

Massenet, Jules Emile Frédéric (1842–1912), French composer whose melodious compositions include songs, orchestral suites, oratorios, and 23 operas, among them *Manon* and *Thaïs*.

Massine, Léonide (b. 1896), a famous Russian dancer who was for some years Ballet Master at the Roxy Theatre, New York. Among his more famous ballets are *The Good Humoured Ladies, Boutique Fantasque, Pas d'Acier, Les Matelots, Le Beau Danube* and *Les Présages*.

Massingham, Harold John (1888–1952), English author and journalist who wrote on a wide range of subjects and was an authority on bird life and ethnology. He was a noted writer on natural history and also contributed essays to most of the leading periodicals.

Masters, Edgar Lee (1869–1950), American poet who occupies a permanent place in American literature by the publication in 1915 of his *Silver Spoon Anthology*, a hundred poems relating the real character as opposed to the eulogistic inscriptions on their tombstones of the dead in a typical American township.

Matisse, Henri (1869–1954), French painter, and one of the leading representatives of the modern school of painting in France, becoming the foremost member of a group that were known as *les Fauves*. His work is remarkable for its use of pure and brilliant colour and its reliance on colour variations to express form and relief.

Matsys or **Metzys, Quintin** (1466–1530), a distinguished Flemish painter, who was originally a blacksmith. He excelled in Scriptural subjects.

Maugham, (William) Somerset, C.H. (b. 1874), British novelist, playwright, and short-story writer. Born in Paris, he qualified as a doctor, but soon abandoned medicine for literature, achieving a great success with his first novel in 1897, *Liza of Lambeth*, a study of slum life. He has travelled widely which has given him a deep insight into human nature. As a playwright he has been equally successful. His last work *Points of View* was published in 1958.

Maupassant, Henri René Albert Guy de (1850–93), the famous French author and writer of short stories, was a friend of Flaubert, Zola, and Daudet. He was the greatest of all European short-story writers, standing alone in grace, wit and epigram.

Mauriac, François (b. 1885), French novelist whose works are regarded as among the chief literary productions of to-day. In addition to a long series of novels he has written many critical works and essays. Leader-writer for *Figaro*; Nobel Prizewinner, 1952.

Maurois, André, K.B.E. (b. 1885), French biographer, novelist and essayist who has written lives of Shelley, Disraeli, Byron, Voltaire, Fleming, and others.

Mawson, Sir Douglas, O.B.E., D.Sc., F.R.S. (b. 1882), leader of the Australian Antarctic expedition of 1911–14 and of the British-Australian and New Zealand Antarctic expedition 1929–31; previously a member of the Shackleton expedition. His party endured terrible sufferings in 1912; all died except himself. In 1913 he established a scientific station on the Macquarie Islands.

Maxim, Sir Hiram Stevens (1840–1916), the inventor of the famous automatic quick-firing gun.

Maxton, James (1885–1946), was a prominent Socialist politician; M.P. for the Bridgeton Divn. of Glasgow, 1926–46. Chairman of I.L.P. 1926–31 and 1934–39.

Maxwell, James Clerk (1831–79), Scottish physicist who wrote his first scientific paper at the age of 15. Was Professor of Natural Philosophy at Aberdeen, 1856, and for eight years held the same post at King's College, London, 1860–68. In 1871 he became the first holder of the new Professorship of Experimental Physics at Cambridge University. His best-known work is his treatise on electricity and magnetism, published in 1873. He made the discovery that founded the electro-magnetic theory of light, and to his electrical researches the advent of wireless is due.

Mazarin, Jules (1602–61), an Italian Cardinal who became chief Minister of State under Louis XIV., and was for a number of years the practical ruler of France. He succeeded Richelieu.

Mazeppa-Koledinsky, Ivan Stepanovich (1644–1709), the hero of Byron's poem, was a real personage, and a Pole, and was tied naked on the back of a wild horse, and so sent out across the Russian desert, for an intrigue with a noble's wife. He was liberated by Cossacks and afterwards attained an honourable position.

Mazzini, Giuseppe (1805–72), an Italian patriot, who, in his endeavours to secure the independence of Italy, incurred the disfavour of the authorities, and was compelled to leave the country. He started a newspaper called *Young Italy* at Marseilles, and in 1837 came to London, and kept up his attacks upon existing governments. In 1848 he was back in Rome and was elected dictator of the Roman Republic. He was not allowed to hold this position long, however, for the French occupied Rome and Mazzini was driven to England again. The unification of Italy was accomplished in other ways than those advocated by Mazzini, but he lived to see Victor Emmanuel King of United Italy.

Mehul, Etienne Nicolas (1763–1817), French operatic composer, *Joseph* being considered his masterpiece. In his early years much influenced by Gluck.

Melanchthon, Philip (1497–1560), German scholar and humanist who assisted Luther and wrote *Loci communes*, the first great Protestant work on the principles of the Reformation.

Melba, Dame Nellie, G.B.E. (1861–1931), the celebrated soprano, b. in Melbourne, who made her operatic début in Brussels in 1887.

Melbourne, 2nd Viscount (1779–1848), Queen Victoria's first premier, holding office over six years, and identified with many important Liberal measures.

Mendel, Gregor Johann (1822–84), Austrian botanist. After joining the Augustinian order, he moved to the monastery at Brünn where he afterwards became Abbot and taught natural history in the school there. His main interest, however, was the study of inheritance, and his elaborate observations of the common garden pea resulted in the famous law of heredity which to-day bears his name. His hypothesis was published in 1866 but no attention was given to it until 1900.

Mendeleyev, Dmitry Ivanovich (1834–1907), Russian chemist who made important contributions to physical chemistry and general chemical theory. First to discover the critical temperatures and formulated the Periodic Law of atomic weights. Element 101 is named after him.

Mendelssohn-Bartholdy, Jacob Ludwig) Felix (1809–47), German composer, grandson of Moses Mendelssohn, the philosopher. He belongs with Chopin and Schumann to the early 19th century classic-romantic school, and his music has a delightful delicacy and melodic beauty. He was conductor of the famous Gewandhaus concerts at Leipzig for a time and often visited England. Frequently performed are his overtures *A Midsummer Night's Dream* and *The Hebrides* (or *Fingal's Cave*), written in his youth, two oratorios *St. Paul* and *Elijah*, the violin concerto in E minor, the piano works *Variations Sérieuses* and *Songs without Words*, and the *Scotch* and *Italian* symphonies. The name Bartholdy was added to the surname when his father abandoned Jewry.

Mendès-France, Pierre, LL.D. (b. 1907), French statesman. His skilful diplomacy and energy helped to solve the many problems that faced his country when he took office as Prime Minister in June 1954. His government was overthrown on his Algerian policy in Feb. 1955. Leader of the Radical Party minority which did not support the de Gaulle constitution. Defeated in General Election Nov. 1958.

Menuhin, Yehudi (b. 1916), violin virtuoso, one of the greatest musical prodigies of the 20th century. Born in New York of Jewish parentage; made his first London appearance in the San Francisco Orchestra, 1929.

Menzies, Rt. Hon. Robert Gordon, C.H., Q.C. (b. 1894), Australian Liberal leader; Prime Minister, 1939–41 and since 1949.

Mercator, Gerhardus (1512–94), the Flemish geographer who invented a celestial and a terrestrial globe, by which he introduced his famous projection, in which meridians and parallels of latitude cross each other at right angles, both

being indicated by straight lines. This greatly simplified navigation.

Meredith, George, O.M. (1828–1909), novelist and poet, " the Grand old Man of English letters." His works are rich in imagery, poetry, wit, and characterisation, and as a delineator of womanhood he is unsurpassed. Among his great novels are *Ordeal of Richard Feverel*, *Evan Harrington*, *Rhoda Fleming*, *The Egoist*, *Diana of the Crossways*, and *The Amazing Marriage*.

Mesmer, Friedrich Anton (1733–1815), was a German doctor who founded the system of mesmerism or animal magnetism.

Mestrovic, Ivan (b. 1883), a Dalmatian sculptor, recognised as one of the leading European sculptors of the present time. The Tate Gallery and the Victoria and Albert Museum have examples of his work.

Metastasio, Pietro (1698–1782), the celebrated Italian librettist who provided texts for such composers as Gluck, Handel, Haydn, and Mozart. He lived in Vienna as court poet and his real name was Pietro Bonaventura Trapassi.

Metchnikov, Ilya (1845–1916), an eminent Russian biologist; Nobel Prize for Medicine, 1908.

Meyerbeer, Giacomo (1794–1864), was born in Germany, but spent most of his life in Paris, where he produced all his great operas, which include *Robert le Diable*, *Les Huguenots*, and *L'Africaine*.

Meynell, Alice (1849–1922), English poet and essayist, wife of **Wilfred Meynell** (1852–1948), editor of the Catholic paper *Merry England*.

Michelangelo (Michelagniolo Buonarroti) (1475–1564), the renowned Italian painter, sculptor, architect and poet, whose genius was such a power in beautifying the churches of Rome and Florence. Was the last and in some respects the greatest of the Italian sculptors; while his large paintings, particularly *The Last Judgment*, in the Sistine Chapel, are no less famous.

Michelet, Jules (1798–1874), a noted French historian and author.

Michelson, Albert Abraham (1852–1931), American physicist, born in Poland. Designer of an interferometer for estimating the diameters of stars. Collaborated with E. W. Morley in the *Michelson-Morley* experiment to measure the velocity of the earth through the " ether " which led to the conclusion that the ether is non-existent and had great value for Einstein's theory of relativity. Was the first American scientist to win the Nobel prize for Physics, 1907, in which year he was also awarded the Copley Medal.

Mickiewicz, Adam (1798–1855), greatest Polish poet and revolutionary. Chief works *The Ancestors*, *Pan Tadeusz*.

Mill, John Stuart (1806–73), achieved high reputation by his numerous works on philosophical questions. He was an ardent liberal and leader of the utilitarian school of philosophy. Radical M.P. for Westminster, 1865–68, died in Avignon. His chief works are *Principles of Political Economy*, *System of Logic*, *On Liberty*.

Millais, Sir John Everett, Bt., P.R.A. (1829–96), was at one time the most prominent of the English Pre-Raphaelites, but soon cast himself free from their mannerisms, and began the production of a long series of famous pictures. Among his numerous works we have room to mention only *The Eve of St. Agnes*, *Autumn Leaves*, *The Order of Release*, *Effie Deans*, *Chill October*, and *Bubbles*.

Millet, Jean François (1814–75), one of the greatest of French painters of pastoral subjects; his celebrated work *The Angelus* is universally known by its numerous reproductions.

Millikan, Robert Andrews (b. 1868), American physicist who is world famous for his researches on electrons, and for discovering the cosmic rays. Professor of Physics at Chicago University 1910–21, and Director of the Norman Bridge Laboratory of Physics at Pasadena, California 1921–45. Awarded Nobel Prize for Physics, 1923.

Milne, Alan Alexander (b. 1882), English humorist, poet, and playwright who has written much delightful verse and stories for children.

Milner, Alfred, Viscount (1854–1925), imperial statesman, who served in South Africa from 1897 to 1905 and had great influence on the history of that country. Was Secretary for War in 1918 and for the Colonies, 1919–21.

Miltiades (d. 489 B.C.), one of the leaders of the Athenian army against the Persians at Marathon.

Milton, John (1608–74), England's greatest epic poet, whose *Paradise Lost* is the greatest poem of the kind in the language. The best known of his other poems are probably the *Ode on the Morning of Christ's Nativity*, *L'Allegro*, *Il Penseroso*, *Lycidas*, and the sonnet *On his Blindness*. In 1652 he became totally blind, and at his death was buried in St. Giles's Church, Cripplegate, London, a monument being erected to his memory in Westminster Abbey.

Minot, George Richards, M.D. (1885–1950), an eminent American doctor who became Prof. of Medicine at Harvard in 1928, and famous for his researches in the pathology of the blood, and for his discovery of the curative properties of liver in pernicious anæmia. Shared the Nobel Prize for Medicine, 1934.

Mirabeau, Gabriel, Comte de (1749–91), one of the prominent figures of the French Revolution, and a famous orator.

Mistral, Frédéric (1830–1914), French poet who spent his whole life in Provence and wrote many works of great lyrical beauty; founded the Félibrige society (*q.v.* Gen. Inf.); completed *Lou Tresor dóu Félibrige* in 1886, a Provençal dictionary and encyclopædia of Provence. Awarded Nobel Prize for literature in 1904.

Mithridates (*circa* 132–63 B.C.), was King of Pontus from 120–63 B.C., and showed great capacity as a commander conquering a great part of Asia Minor and Greece.

Moffat, James (1870–1944), Scottish divine who translated the Bible into modern English.

Mohammed (570–632), the founder of Islam, the religion of the Moslems, fled from Mecca to Medina in 622, from which date the Mohammedan era opens. By his constant preaching and proclaiming of the one and only Deity Allah he gathered round him a small and loyal, hard-fighting band of followers and was able to return to Mecca eight years later, an acknowledged conqueror. The Sacred Book of Islam, the *Koran*—though presented by him as an original revelation from the Angel Gabriel—may in the main be traced to Biblical and Rabbinical sources.

Moiseiwitsch, Benno, C.B.E. (b. 1890), Russian-born, naturalised British pianist, especially well known for his rendering of the works of the Romantics.

Molière (Jean Baptiste Poquelin) (1622–73), the greatest of French comic dramatists, who, from being a poor strolling player, became the leading dramatist of his time. His greatest comedies were *Le Tartufe*, *Le Misanthrope*, *Le Malade imaginaire* and *Le Médecin malgré lui*.

Molotov, Vyacheslav Mikhailovitch (Skryabin) (b. 1890), Russian diplomat; succeeded Litvinov as Commissar for Foreign Affairs, 1939–49. Chief representative of the Soviet Union at numerous post-war conferences. For. Min., 1953–56; Min. of State Control, 1956–57; Ambassador to Outer Mongolia, 1957–.

Moltke, Field-Marshal Count Helmuth von (1800–91), was responsible for the Prussian strategy in the Danish, Austrian, and Franco-Prussian wars, in all of which he was outstandingly successful.

Mond, Ludwig, Ph.D., F.R.S. (1839–1909), German chemist who in 1867 settled in England as an alkali manufacturer and in partnership with John Brunner successfully manufactured soda by the Solvay process. Founded the Davy-Faraday laboratory.

Monet, Claude (1840–1926), the most representative of the French Impressionists. Exhibited in 1874 his landscape *Impression Soleil levant*, from which the word *Impressionism* was derived. Loved painting water and atmospheric effects.

Monier-Williams, Sir Monier, K.C.I.E., LL.D., Ph.D. (1819–99), a great Sanskrit scholar who laboured with distinction in bringing westward the wisdom of the Orient.

Monk, George, 1st Duke of Albemarle (1608–69), served with distinction as general and admiral, particularly in the Anglo-Dutch wars, and in 1660 effected the Restoration of Charles II.

Monroe, James (1758–1831), Fifth President of the U.S. Was appointed Governor of Virginia in 1799, and in 1803 went to France and carried through the purchase of Louisiana. Best known

as the author of the Monroe Doctrine, which he outlined in his Presidential message of 1823.

Montaigne, Michel de (1533–92), a French essayist of world-wide celebrity, who may be regarded as the inventor of the essay form, and had a great influence on English writers.

Montcalm, General Louis Joseph, Marquis de (1712–59), commander of the French Army against the British in Canada in the final struggle for possession. Defeated by Wolfe in 1759 and mortally wounded.

Montesquieu, Charles Louis de Secondat, Baron de La Brède et de (1689–1755), French philosopher and author. His works include *Les Lettres Persanes*, a witty satire on contemporary life, and his great work *L'Esprit des Lois*, setting out his ideas on politics and law. Showed a genius for generalisation and gave to history a philosophy. Greatly admired England and her constitution, which he misunderstood, and his influence on the authors of the American constitution consequently led to the impractical separation of the executive (the President) from the law-making power (Congress).

Montessori, Maria (1869–1952), M.D., D.Litt., a brilliant educationist. The "Montessori" method she invented for infant education has had wide recognition. (*See also* Gen. Inf.)

Monteverdi, Claudio (1567–1643), an Italian composer of importance by reason of his pioneer work in the operatic form. His most important dramatic work was *Orfeo* (1608).

Montezuma II. (1466–1520) was Emperor of Mexico when Cortes invaded that country, and the last Aztec ruler of Mexico.

Montfort, Simon de, Earl of Leicester (1206–65), was a powerful baron, with liberal views, and a hatred of kingly tyranny. It was his bold action that forced Henry III., his brother-in-law, to grant the first English Parliament. He met his death at the Battle of Evesham.

Montgolfier, Joseph Michel (1740–1810) and **Jacques Etienne** (1745–1799), two French brothers who, during the last twenty years of the 18th century, demonstrated the practicability of a balloon inflated by heated air, making many ascents, and may be said to be the father of modern aeronautics.

Montgomery, Field-Marshal Viscount, K.G., G.C.B., D.S.O. (b. 1887), rose to military fame as Commander of the 8th Army in the North African and Italian campaigns, 1942–44. C.-in-C. British Forces in France and Germany, 1944–46; C.I.G.S., 1946–48. Permanent Military Chairman of the Western Union Defence Committee, 1948–51; Deputy Supreme Allied Commander Europe (NATO), 1951–58. Retired 1958. His *Memoirs* were published in 1958.

Montrose, James Graham, Marquess of (1612–50), brave and inspiring Scottish general who raised the Highland clansmen for Charles I. and again for Charles II. His lyric poetry included *My dear and only love.*

Moody, Dwight Lyman (1837–99), the American revivalist preacher, associated for many years in mission work on both sides of the Atlantic with Ira D. Sankey, the "American Singing Pilgrim."

Moore, George (1852–1933), a well-known Irish novelist; author of *Confessions of a Young Man*, *Esther Waters*, *Evelyn Innes*, etc. Among his later masterpieces were *The Brook Kerith* (1916) and *Héloïse and Abelard* (1921).

Moore, Henry, C.H. (b. 1898), English sculptor, examples of whose work are to be seen in the Tate Gallery, the V. and A. Museum, and St. Matthew's Church, Northampton.

Moore, Sir John (1761–1809), British general, who trained the infantry for the Spanish Peninsular campaigns and conducted a brilliant retreat to Corunna, where he was mortally wounded after defeating the French under Soult.

Moore, Thomas (1779–1852), Ireland's greatest poet, the author of *Irish Melodies*, *Lalla Rookh*, *The Epicurean*, and many other works. He enjoyed immense popularity both in England and Ireland. Was the friend and biographer of Lord Byron.

More, Sir Thomas (1478–1535), succeeded Wolsey as Lord Chancellor under Henry VIII., but fell into disgrace by refusing to take the oath of Supremacy, and was ultimately executed. His *Utopia* is one of the world's most noted books. Canonised 1935.

Morgan, Sir Henry (c. 1635–88), Welsh buccaneer of great skill and daring; operated in the Caribbean against the Spaniards, capturing and plundering Panama in 1671. Knighted by Charles II. and made Deputy-governor of Jamaica.

Morgan, John Pierpont (1837–1913), one of the great financiers of his time who built the family fortunes into a vast industrial empire.

Morland, George (1763–1804), a painter of English rural life.

Morley, John, Viscount, O.M. (1838–1923), Liberal statesman and author, served as Secretary for Ireland in 1886 and 1892–95, and for India, 1905–10. Biographer of Gladstone, Voltaire, Rousseau, Burke, Walpole, Cromwell, and Cobden.

Morris, William (1834–96), poet and craftsman. His hatred of 19th-cent. ugliness, his belief in human equality, and in freedom and happiness for all, conspired to make him a socialist, and he accomplished much for the improvement of domestic decoration. He was a popular lecturer, founded the Socialist League and the Kelmscott Press.

Morrison of Lambeth, Herbert Stanley, Baron, P.C., C.H. (b. 1888), entered Parliament as Labour M.P. for South Hackney in 1923. Leader of the L.C.C. 1933–40. Joined the Coalition Government in 1940 and excelled as war-time Home Sec. Dep. Prime Min. and Leader of the House of Commons in the Labour administration, 1945–51. Pub. *Government and Parliament* (1954). Resigned from parliamentary life in 1959; life peerage conferred, 1959.

Morse, Samuel Finley Breese (1791–1872), an American artist and designer, who became the inventor of the Morse system of electric telegraphs, and of the Morse code of signals.

Mountbatten of Burma, 1st Earl, Admiral of the Fleet, P.C., K.G., G.C.B., G.C.V.O., D.S.O. (b. 1900), naval officer and statesman. Chief of Combined Operations, 1942–43; Supreme Allied Commdr. S.E. Asia, 1943–46; Viceroy of India, Mar.–Aug. 1947 and first Gov. Gen. of Dominion of India, Aug. 1947–June 1948. Resuming his naval career in 1948 he has served successively as Flag Officer Commanding the 1st Cruiser Squadron, Mediterranean, Fourth Sea Lord, C.-in-C. Mediterranean, C.-in-C. Allied Forces, Mediterranean, and First Sea Lord and Chief of Naval Staff, 1955–59, Chief of the Defence Staff, 1959. **Lady Mountbatten** (d. 1960) was before her marriage the Hon. Edwina Ashley, granddaughter of Sir Ernest Cassel, the financier. She took an active part in welfare work, and as the last vicereine of India played a notable part with her husband in the transition of India to independence. She was buried at sea.

Mountevans, Admiral Lord, K.C.B., D.S.O., (1881–1957), "Evans of the Broke," British sailor and explorer. Author of *South with Scott.*

Mussorgsky, Modest Petrovich (1839–81), Russian composer whose masterpiece is the opera *Boris Godunov* after the play by Pushkin. His piano suite *Pictures at an Exhibition* was orchestrated by Ravel.

Mozart, Wolfgang Amadeus (1756–91). The composer who bears this immortal name is universally acknowledged as the world's greatest musical genius. He was born at Salzburg, began his musical career at the age of four, toured the European courts as an infant prodigy, left the service of the Archbishop of Salzburg in his twenty-sixth year to live in Vienna, where his friendship with Haydn began and where his greatest music was written. Mozart's genius lies in the effortless outpouring of all forms of music, in the ever-flowing melodies, in the consistent beauty and symmetry of his compositions, and in the exactness of his method. Among the loveliest and grandest works in instrumental music are his three great symphonies in E flat, in G minor, and in C (called the "Jupiter"), all written in six weeks in 1788. Three of the greatest operas in musical history are his *Marriage of Figaro* (1786), *Don Giovanni* (1787), and *The Magic Flute* (1791). His last composition, written under the shadow of death, was the Requiem Mass, a work of tragic beauty.

Müller, Ferdinand von, Baron (1825–96), German botanist and explorer. Director of the Botanical Gardens at Melbourne, 1857–73. Intro-

duced the eucalyptus into the south of Europe and other regions, and took leading part in promoting Australian exploration.

Munkacsy, Michael von (1844–1900), a celebrated Hungarian painter of historical subjects.

Munnings, Sir Alfred James, K.C.V.O., P.R.A. (1878–1959), British painter whose country scenes and pictures of horses have gained him world-wide fame. P.R.A., 1944–49.

Murdock, William (1754–1839), engineer and inventor, one of the first to introduce gas lighting.

Murillo, Bartolomé Esteban (1617–82), one of the greatest Spanish painters. His chief works are altar-pieces and religious subjects.

Murray, (George) Gilbert (Aime), O.M., D.Litt., D.C.L., LL.D. (1866–1957), classical scholar and humanist whose verse translations of Euripides are known throughout the world. Became Professor of Greek at Glasgow at early age of 23; Regius Professor of Greek at Oxford, 1908–36; Chairman of the League of Nations Union, 1923–38; and President of the United Nations Association until his death.

Mussolini, Benito (1883–1945), Fascist dictator of Italy from October 1922 until July 1943. From 1935 an aggressive foreign policy in Abyssinia, Spain, etc., was at first successful, and in June 1940, he entered the second world war on the side of Germany. The defeat of Italian arms in North Africa and the invasion of Sicily caused the collapse of his Government, but he was rescued from imprisonment by parachutists. Executed two years later by partisans.

N

Nansen, Fridtjof, G.C.V.O., D.Sc., F.R.G.S. (1861–1930), the Norwegian explorer who, after two or three expeditions across Greenland, in 1893 started out on his famous North Polar expedition when he reached the highest latitude until then attained—86° 14′—a feat later eclipsed by the Duke of the Abruzzi and by Peary, as well as by airship or aeroplane. He published a fascinating narrative of his exploration under the title of *Farthest North*. Active in Russian famine relief, 1921. Awarded Nobel Prize for Peace, 1922.

Napier, John (1550–1617), mathematician, who made important contribution to the advance of astronomy and other branches of science by his invention of logarithms (published 1614).

Napoleon I. (Bonaparte) (1769–1821) was born at Ajaccio in Corsica. Sent to France to receive a military education and was a captain at the age of twenty. In 1794 served in Italy with such distinction that he won a generalship, and next year was appointed Commander-in-Chief. A series of most brilliant successes followed. He defeated the Austrian forces in 1797, conducted an expedition to Syria and Egypt in 1798, returned in 1799 to find himself the most popular man in France, and in November of that year he proclaimed himself First Consul. In 1800 he was again in Italy and once more victorious. In 1804 he was made Emperor, and the following year was in the field against England, Russia, and Austria, achieving a splendid series of victories at Austerlitz and elsewhere, and practically became Dictator of Europe, distributing kingships amongst his brothers in the most profuse manner, Joseph becoming King of Naples, Louis King of Holland, and Jerome King of Westphalia. His invasion of Russia was disastrous, the Peninsular War went against him, and in 1814 the Allies entered Paris and forced him to abdicate. He was sent to Elba, but made his escape in the following year, gathered his old army about him and went forth to meet the English and Prussian armies. He was finally completely defeated at Waterloo on the 18th June, 1815, and exiled to St. Helena, where he died six years later. His remains were removed to Paris in 1840, and rest in a magnificent tomb.

Napoleon II. (1811–32) was the son of Napoleon I. and Maria Louisa. Was born in Paris and proclaimed King of Rome, but died of consumption when only twenty-one, being known at the time of his demise as the Duke of Reichstadt.

Napoleon III. (1808–73) was the son of Louis Bonaparte, King of Holland, and of Hortense, daughter of the Empress Josephine. After unsuccessful attempts to secure the French throne and years of imprisonment he took advantage of the revolution of 1848 to return to France and, following the famous *coup d'etat* of December 2, 1851, emerged as master of France and was proclaimed Emperor the following year. Married Eugénie de Montijo in 1853. Dictatorial and discredited at home, unsuccessful in his foreign adventures, his surrender at Sedan in the Franco-Prussian war of 1870 brought ruin to the Second Empire, and France once again became a republic. Louis Napoleon took refuge in England and died at Chislehurst in Kent.

Nash, John (1752–1835), architect. Planned Regent Street, laid out Regent's Park, enlarged Buckingham Palace, and designed Marble Arch and the Brighton Pavilion.

Nash, Paul (1889–1946), distinguished English painter and designer. Official war artist in both world wars. Best known pictures *The Menin Road* of 1918 and *Totes Meer* of 1941.

Nash, Rt. Hon. Walter (b. 1882), New Zealand Labour politician; Prime Min., 1957–.

Nasmyth, James (1808–90), the inventor of the steam-hammer, which became indispensable in all large iron and engineering works.

Nasir (Nasser) Col. Gamal Abd al- (b. 1918), first President of the first Egyptian Republic and influential leader of the Arab world. Fought in Palestine War of 1948–49 and organised the military *coup* of July 23, 1952, which brought the abdication of King Farouk. President of the United Arab Republic (Egypt and Syria), 1958.

Nehru, Pandit Jawaharlal (b. 1889), Indian statesman and one of the world's great leaders; Prime Min. and Min. of Foreign Affairs since 1947. Educated at Harrow and Cambridge where he studied science and law. A leading member of the Congress Party for many years, during which he was frequently imprisoned for his political activities. Played distinguished part in the final negotiations for the independence of India. Since 1947 under his inspiring leadership India has made dramatic technical, industrial, and social advances. As a believer in non-violence and non-interference with other countries he has had notable success as a peacemaker in Korea, Indo-China, and the Middle East.

Nelson, Horatio, Viscount, K.C.B. (1758–1805), the great English naval commander; son of a Norfolk clergyman. Went to sea at twelve years of age, and was post-captain at twenty-one. In 1793 he was captain of the *Agamemnon* and proved his capacity and daring against the French. He lost his right eye at the siege of Calvi in 1794, and his right arm at the siege of Santa Cruz in 1797. In 1798 he achieved a great victory over the French in Aboukir Bay, in recognition of which he was created a Baron and granted a pension of £2,000 a year. He was victorious at Copenhagen in 1801, after which he was promoted to the rank of Viscount. In 1805 occurred the Battle of Trafalgar, in which the French fleet was destroyed and Nelson was killed. He was buried in St. Paul's Cathedral.

Nenni, Pietro (b. 1883), Italian politician and Secretary-General of the Italian Socialist Party since 1944. Minister of Foreign Affairs, 1946–47.

Nernst, Walther Hermann (1864–1941), German scientist who established the third law of thermodynamics. Nobel Prizeman, 1920.

Nero, Claudius Cæsar (A.D. 37–68), the Roman Emperor whose reign of fourteen years was rendered infamous by his cruelty and licentiousness.

Newall, Marshal of the R.A.F. Lord, G.C.B., O.M. (b. 1886), Chief of the Air Staff, 1937–40. Gov.-Gen. of New Zealand, 1941–46.

Newcomen, Thomas (1663–1729), was one of the first to put a steam-engine into practical operation, and in 1705 patented his invention, which was the pumping-engine used in Cornish mines until the adoption of Watt's engine.

Newman, Ernest (1868–1959), English music critic successively of *The Manchester Guardian*, *The Birmingham Post*, *The Observer*, and of *The Sunday Times*, 1920–58. Outstanding among his numerous writings is the *Life of Richard Wagner*.

Newman, John Henry, Cardinal (1801–90). Educated at Oxford, he was incumbent of St. Mary's there from 1828 to 1843, taking an active part in the religious discussions of the time, gradually showing a tendency to adopt Roman Catholic

views, and ultimately allying himself with the Romanists, resigning his living and settling at Edgbaston, Birmingham, as the head of a community of the Order of St. Philip Neri. Here he remained for the rest of his career, devoting himself to an almost monastic life, but from time to time employing his pen in the production of religious works, displaying great controversial power, beauty of thought, and charm of style. In his *Apologia pro Vita Sua* he described the development of his religious thought. The beautiful hymn *Lead, kindly Light*, and the *Dream of Gerontius* were written by him.

Newton, Sir Isaac, F.R.S. (1642–1727), generally acknowledged as the world's greatest man of science. Achieved immortal fame for his work on the nature of white light, the calculus and gravitation Greatest published work, the *Principia*, was produced in 1687, revolutionising the scientific thought of his time. Was Member of Parliament for Cambridge in 1688, Master of the Mint in 1699, and President of the Royal Society from 1703 till his death. Honoured with knighthood in 1705.

Ney, Marshal Michel (1769–1815), was one of Napoleon's most noteworthy generals.

Nicholas II., Ex-Czar of Russia (1868–1918), son of the Emperor Alexander III. Came to the throne in 1894, and had a reign full of trouble, being unable to handle the difficulties by which he was beset. He avowed full harmony with the British and French in the war which opened in 1914, but the acts of the Empress and Court belied these pretensions, and a Revolution resulted in March, 1917, which overthrew the Romanoffs. Nicholas was detained a prisoner together with the Czarina and his children; all were probably shot on July 16, 1918.

Nicholas, St., Bishop of Myra and patron saint of Russia, flourished in the 4th century, and is popularly associated with Christmas under the corrupted name of Santa Claus.

Nicholson, Sir William (1872–1949), English painter, well known for his portraits, engravings and woodcuts as well as for his illustrations in the *Almanack of Twelve Sports* (with Kipling) and *London Types* (with Henley). His son, **Ben Nicholson** (b. 1894), also an artist, is noted for his abstract paintings.

Nicolson, Hon. Sir Harold, K.C.V.O., C.M.G. (b. 1886), author and critic, whose books include *The Congress of Vienna* (1946), *King George V.: His Life and Reign* (1952), *The Evolution of Diplomatic Method* (1954), *Good Behaviour* (1955). Married to the **Hon. Victoria Sackville-West** (b. 1892), the novelist and poet.

Niemöller, Martin (b. 1892), German religious leader. A pastor in the Evangelical (Protestant) Church. Actively opposed the Nazification of the German Church and was incarcerated in a concentration camp throughout the second world war.

Nietzsche, Friedrich Wilhelm (1844–1900), German philosopher, in his younger years greatly influenced by the work of Wagner and Schopenhauer. His "superman" philosophy is eloquently expressed in his many writings, *i.e., Thus spake Zarathustra, Beyond Good and Evil, The Will to Power.*

Nightingale, Florence, O.M. (1820–1910), English nurse and pioneer of hospital reform whose genius for administration was shown during the Crimean War, when she organised in face of considerable official opposition a nursing service to relieve the sufferings of the British soldiers who called her "The Lady with the Lamp." Her system was adopted and developed in all parts of the world, and she was honoured with a testimonial of £50,000, which she applied to the founding of the Nightingale Training School for Nurses, attached to St. Thomas's Hospital, London.

Nijinsky, Vaslav (1892–1950), Russian dancer, who was one of the famous company of dancers, which included Pavlova, Karsavina and Fokine, brought by Diaghilev to Paris and London just before the War of 1914–18, and was in some respects the most remarkable of them all. His sensational dancing in such Ballets as *Les Sylphides, Spectre de la Rose* and *Après-Midi d'un Faune* won him the supreme place among male dancers.

Nikisch, Arthur (1855–1922), famous Hungarian conductor, who appeared as a prodigy pianist at the age of eight, became chief conductor at the Leipzig Opera, 1879, conducted the Symphony Orchestra at Boston, 1889–93, afterwards paying visits to all the important cities of Europe.

Nkrumah, Kwame, M.A. M.Sc., LL.D. (b. 1909), Prime Minister of Ghana (formerly the Gold Coast) which celebrated its emergence as an independent state on March 6, 1957, the first African colonial country to do so.

Nimitz, Admiral of the Fleet Chester William (b. 1885), commanded the American fleet in the Pacific, 1941–45, together with army and marine forces. Chief of Naval Operations, 1945–47.

Nobel, Dr. Alfred Bernhard (1833–96), the inventor of dynamite, was a Swedish engineer and chemist who amassed a large fortune from the manufacture of explosives, a great portion of which at his death in 1896 he set apart as a fund for annual prizes to such persons as during each year shall have contributed most materially to the benefit of mankind. There are five of these prizes, and they are given in the following departments: physics, chemistry, physiology or medicine, literature, and peace.

Norrie, 1st Baron Lieut-Gen. (Charles) Willoughby (Moke), G.C.M.G, G.C.V.O., C.B., D.S.O., M.C. (b. 1893), Gov.-Gen. and C.-in-C. of New Zealand, 1952–57; Governor South Australia. 1944–52. Professional cavalry officer.

Norstad, Gen. Lauris (b. 1907), succeeded Gen Gruenther as Supreme Allied Commander, Europe, 1956.

Northcliffe, 1st Viscount (1865–1922), was one of the most prominent men in modern journalism Started *Answers* in 1888 with his brother, Cecil Harmsworth. In 1894 the Harmsworths purchased the *Evening News*, and in 1896 they started the *Daily Mail.* In 1917 was special British representative in the United States.

Northumberland, John Dudley, Duke of (1502–53), an expert intriguer who dominated the Government of Edward VI. from 1549 onwards and attempted to maintain his influence when the king died by proclaiming as Queen his daughter-in-law, Lady Jane Grey, but failed and was executed.

Nostradamus or **Michel de Notre Dame** (1503–66), French astrologer who acquired great distinction by his labours during the plague. Publ. in 1555 *Centuries*, a book of rhymed prophecies, the fulfilment of some of which greatly added to his reputation. *Centuries* was condemned by the papal court of 1781.

Novalis, the pseudonym of **Baron Friedrich von Hardenberg** (1772–1801), German poet and novelist, representative of German romanticism. His chief work was the novel *Heinrich von Ofterdingen*, unfinished at his death.

Noyes, Alfred, C.B.E., LL.D., Litt.D. (1880–1958), English poet, whose first book of verse, *The Loom of Years*, was published in 1902.

Nuffield, 1st Viscount, William Richard Morris, G.B.E., C.H. (b. 1877), industrialist and philanthropist and until he retired in 1952 Chairman of Morris Motors, Ltd. Established the Nuffield Foundation, endowing it with £10 million, and provided large sums for the advancement of medicine in the University of Oxford.

Numa Pompilius was according to tradition, the second King of Rome and the founder of Roman Ceremonial Law.

O

Oaksey, Geoffrey Lawrence, 1st Baron, P.C., Q.C., D.S.O. (b. 1880), presided over the International Military Tribunal which tried the major war criminals at Nuremberg, 1945–46. A Lord of Appeal in Ordinary since 1947.

Oates, Captain Lawrence Edward Grace (1880–1912), a British explorer who, having seen active service in the South African War, joined Capt. Scott's Antarctic Expedition in 1910. He was one of the sledge party who accompanied Scott in his final dash for the South Pole. On returning, the party became stormbound, and on March 17, 1912, Oates, crippled by frost-bite, went out in the blizzard to die rather than be a burden to his starving comrades. Described in Scott's diary as a very gallant gentleman.

Oates, Titus (1649–1705), a notorious informer against Roman Catholics in reign of Charles II.

O'Casey, Sean (b. 1883), Irish dramatist of re-

markable powers whose plays include *Juno and the Paycock*, *The Silver Tassie*, *Red Roses for Me*, and *Oak Leaves and Lavender*.

Occam (Ockham), William of (*c*. 1270–1349), English scholar and philosopher and one of the most interesting, independent and original thinkers of all time. He belonged to the Order of Franciscans, violently opposed the temporal power of the Pope, espoused the cause of nominalism and laid the foundations of modern theories of government and theological scepticism. He was styled "the Invincible Doctor."

O'Connell, Daniel (1775–1847), the Irish "Liberator," as he was called, was a famous orator and politician and a highly successful barrister. In Parliament he advocated the cause of Ireland with courage and audacity.

O'Connor, Feargus (1796–1855), was an Irish lawyer who became the most influential figure in the Chartist movement.

O'Connor, Rt. Hon. Thomas Power (1848–1929), sat in Parliament from 1880 until 1929, being for many years father of the house, and was one of the most successful journalists and editors of his time. He founded several publications including the *Star* and originated the "Book of the Week" idea.

Oersted, Hans Christian (1777–1851), the Danish philosopher and scientist, whose discoveries in electrical research did much to help forward the invention of the electric telegraph.

Offa was King of Mercia from *circa* 757 to 796, and had a war-like career; he built an embankment from the Dee to the Wye, 100 miles long, which was called Offa's Dyke. He imposed "Peter's Pence" as a gift to the Pope for absolution.

Offenbach, Jacques (1819–80), French composer, born of a Jewish family at Cologne. Was the composer of many light operas, including the posthumous *Les Contes d'Hoffmann* (*Tales of Hoffmann*), the most popular of all his works.

Ohm, Georg Simon (1787–1854), was the discoverer of a law of electric current now known universally as Ohm's law. He was a native of Bavaria, professor at Munich from 1852, and gained much fame as a physicist and mathematician.

O'Kelly, Sean T. (b. 1882), Pres. of Republic of Ireland, 1945–59.

Olivier, Sir Laurence Kerr (b. 1907), British actor and producer, has appeared with great success in many Shakespearean and other rôles. Played in the films of *Wuthering Heights*, *Rebecca*, *Pride and Prejudice*, *49th Parallel*, *Henry V.*, *Hamlet* and *Richard III*. He is married to Miss Vivien Leigh, stage and film actress.

Oman, Sir Charles (William Chadwick), K.B.E. (1860–1946), English historian who was Chichele Professor of Modern History at Oxford, 1905–46 and M.P. for the University from 1919 to 1935. His works include a popular *History of Greece*, *A Short History of England*, which is a familiar school book, and a *History of the Art of War in the Middle Ages*.

Omar I. (581–644) was second Caliph of the Mohammedans, and the first to be designated the Commander of the Faithful. He conquered Syria, Mesopotamia, Persia, Egypt, and Palestine, reigned from 634–644, and died at the hands of a slave.

Omar Khayyám (*c*. 1050–1132), Persian poet and mathematician, called Khayyám (tent-maker) because of his father's occupation. His fame as a scientist has been eclipsed by his Rubaiyat, made known to English readers by Edward FitzGerald in 1859.

O'Neill, Eugene Gladstone (1888–1953), an American playwright who, after spending his adventurous youth in such activities as sailing, gold-prospecting, and journalism, first won success in 1914 with the one-act play, *Thirst*. His later plays include *Beyond the Horizon*, *Anna Christie*, *Strange Interlude*, and *Mourning Becomes Electra*. The Pulitzer Prize for drama was posthumously awarded to him for his play *Long Day's Journey into Night*.

Opie, John, R.A. (1761–1807), a celebrated English painter whose historical pictures were highly valued in his day.

Orchardson, Sir William Quiller (1835–1910), an eminent R.A.; among his best-known works are *Napoleon I. on board H.M.S. Bellerophon* and *Ophelia*.

Orpen, Sir William, K.B.E., R.A. (1878–1931), British portrait-painter; many of his celebrated war pictures were presented to the nation.

Osler, Sir William, Bt., M.D., F.R.S. (1849–1919), British physician, born in Canada, was an authority on diseases of the blood and spleen, and wrote on nearly every branch of medicine, his works including *Principles and Practice of Medicine*, and the *Evolution of Modern Medicine*.

Oswald, St., King of Northumbria from 625 to 642, established Christianity amongst his subjects.

"Ouida" (Mlle. Marie Louise de la Ramée) (1839–1908), an English novelist, born at Bury St. Edmunds of French extraction, whose works have been highly popular.

Otto, Nikolaus August (1832–91), German engineer and inventor of the four-stroke cycle that bears his name.

Otto the Great (912–973), son of Henry the Fowler, crowned King of the Germans at Aachen in 936 and Emperor at Rome in 962. Overawed the papacy, checked the barbarian invasions, founded the East Mark (Austria), and considerably consolidated Germany.

Ovid (43 B.C.–A.D. 18), the famous Latin poet (Publius Ovidius Naso) whose *Metamorphoses* and *Art of Love* are among the best-known examples of Roman literature of the lighter kind.

Owen, Robert (1771–1858), socialist and philanthropist, devoted his life and fortune to the carrying out of his theories, and established socialistic colonies in Lanarkshire, Hampshire and America.

P

Pachmann, Vladimir de (1848–1923), Russian pianist, an unrivalled interpreter of the works of Chopin.

Paderewski, Ignace Jan (1860–1941), achieved unrivalled fame as a pianist and for half a century worked for the freedom of his native Poland. He represented his country at Versailles and became her first Prime Minister. Later he resumed his musical career and died in exile during the Second World War.

Paganini, Niccolo (1782–1840), Italian violinist and composer whose playing became a legend and brought him much fame and wealth. He ranks as first among virtuosi of the violin.

Paine, Thomas (1737–1809), English revolutionary author, lived, wrote and held a number of positions in America from 1774 to 1787. Wrote his famous *Rights of Man* as a reply to Burke's *Reflections on the Revolution in France*. It had an enormous circulation, but the Government prosecuted him for alleged sedition, and he fled to France. In 1793 he published the *Age of Reason*.

Palestrina, Giovanni Pierluigi da (*c*. 1525–94), great Italian composer of unaccompanied church music and madrigals, among whose works are the *Missa Papae Marcelli* and the *Stabat Mater* for 8 voices, which is among the greatest musical glories of all time.

Palgrave, Sir Francis (1788–1861), a much-esteemed historian, who wrote *The Rise and Progress of the English Commonwealth*, *A History of Normandy*, and *A History of the Anglo-Saxons*. He was knighted in 1832. His son, **Francis Turner Palgrave** (1824–97), was a poet of devotional instincts, who was Professor of Poetry at Oxford, and edited the much-esteemed *Golden Treasury*. Another son, **William Gifford Palgrave** (1826–88), was a traveller, diplomatist, and prose writer of considerable ability.

Palissy, Bernard (*circa* 1510–89), a distinguished French potter, who after years of struggle and self-denial discovered the art of producing white enamel, after which he became famous and set up a porcelain factory in Paris, which was patronised by Royalty.

Palladio, Andrea (1518–80), the great Italian architect, who introduced the style of architecture known as Palladian.

Palmer, John (1742–1818), originator of the mail-coach postal service in 1784.

Palmerston, Henry John Temple, 3rd Viscount (1784–1865), English statesman, was long dominant in European affairs because of his vigorous and popular policy. He spent many years of his life in office, serving as Tory Secretary for War from 1808 till 1828 as

Foreign Secretary in all the Whig cabinets between 1830 and 1851, and as Prime Minister in 1855 and from 1859 until his death. He had a lofty conception of the strength and duties of England and was the irreconcilable foe of oppression and injustice.

Pancras, St., the patron saint of children, was the son of a Roman noble, was baptised in Rome in the reign of Diocletian, where he was put to death at the age of fourteen for refusing to renounce Christianity.

Pandit, Vijaya Lakshmi (b. 1900), Indian High Commissioner in London, 1954– . India's first Ambassador to the Soviet Union (1947–49) and to the United States (1949–51), the first woman to be elected Pres. of the United Nations General Assembly (1954) and to be head of a diplomatic mission in London. Sister of **Jawaharlal Nehru**.

Panizzi, Sir Anthony, K.C.B. (1797–1879), an Italian political exile, who in 1831 was appointed to the Assistant Librarianship and Keepership of the Printed Books of the British Museum. In 1856 he became Principal Librarian, retiring in 1866. The great Reading Room was constructed from his designs.

Pankhurst, Emmeline (1858–1928) was a prominent and indefatigable worker for women's suffrage, together with her daughters Dame Christabel and Sylvia.

Papin, Denis (1647–1714), a French mathematician and scientist who settled in England. He invented the condensing pump, and was a pioneer in the development of the steam engine. Not being a mechanic, he made all his experiments by means of models.

Paracelsus, Philippus Aureolus (1493–1541), a famous Swiss mystic and alchemist. He made numerous important discoveries, being the first to employ laudanum and antimony in pharmacy. The English translation of his *One Hundred and Fourteen Experiments and Cures* appeared in 1596. His real name was Theophrastus Bombastus von Hohenheim.

Park Mungo (1771–1806), famous British traveller who in 1799 published an arresting account of his *Travels in the Interior of Africa*.

Parker, Rev. Joseph (1830–1902), a popular Nonconformist preacher and author who built the City Temple, and ministered there up to the time of his death.

Parnell, Charles Stewart (1846–91), the Irish politician, who as leader of the Nationalist Party made it more powerful than it had ever been and successfully enlisted the support of Gladstone for the policy of Home Rule. Accused by *The Times* of complicity in the crimes of the Land League on the basis of letters forged by Richard Pigott, he was completely vindicated by a Royal Commission and awarded heavy damages. Was dropped from the leadership of his party following the O'Shea divorce proceedings and died soon afterwards.

Parry, Rear-Admiral Sir William Edward (1790–1855), an Arctic explorer and naval commander of great distinction, who undertook several expeditions to the Polar regions and made numerous important discoveries.

Parsons, Hon. Sir Charles Algernon, O.M., K.C.B., F.R.S. (1854–1931), was head of the electrical and engineering works of C. A. Parsons and Co., and of the Parsons Marine Steam Turbine Co., Ltd., Newcastle-on-Tyne, and inventor of the steam turbine which has effected a remarkable improvement in the propulsion of war and mercantile vessels.

Partridge, Sir Bernard (1861–1945), began life as a stained glass designer, afterwards worked at book illustrations, and for a time was on the stage. Joined *Punch* staff 1891, and for many years was its principal cartoonist.

Pascal, Blaise (1623–62), a noted French philosopher whose *Provincial Letters* exhibit remarkable wit and genius. A distinguished mathematician, he invented an ingenious arithmetical machine, besides making many brilliant experiments in hydrostatics and pneumatics.

Pasternak, Boris Leonidovich (b. 1890), Russian poet and writer. Translations of his great novel *Dr. Zhivago* appeared in 1958, though it was forbidden in the Soviet Union. In that year he was awarded—though he declined it—the Nobel Prize for Literature "for his important contributions both to contemporary lyric poetry and to the great Russian narrative tradition."

Pasteur, Louis (1822–95), French chemist, whose work was inspired by an interest in the chemistry of life which abided with him until his death. His researches on fermentation led to the science of bacteriology and his investigations into infectious diseases and their prevention to the science of immunology. The pathological bacteriological import of Pasteur's researches came about mainly through his disciples (Lister, Roux, and others) and not directly, though all founded on his early non-medical investigations on organisms of fermentation, etc., which were of great importance in industry, and fundamentally. He spent most of his life as administrator and director of scientific studies at the École Normale at Paris, where he was appointed in 1857. The Institut Pasteur was founded in 1888.

Patmore, Coventry (1823–96), poet of the Victorian era, and author of *The Angel in the House*.

Paton, Sir (Joseph) Noel, R.S.A., LL.D. (1821–1901), sculptor, historical artist, archæologist, and poet.

Patrick, St. (*c.* 387–*c.* 463), the patron saint and Apostle of Ireland, was for many years a great and successful Christian missionary in that country. Few authentic facts about his life are known, but many miraculous stories, such as his alleged extermination of serpents in the island, have been associated with him.

Patti, Adelina Juana Maria (Baroness Cederström) (1843–1919), Italian soprano singer, was born in Madrid. Her marvellous voice and brilliant execution made her immediately famous.

Pattison, Dorothy Wyndlow (1832–78), a sister of Mark Pattison, who devoted a great part of her life to hospital work in Walsall, where, as "Sister Dora," she is revered for her saintly life and devotion to the sick poor.

Pattison, Mark (1813–84), scholar and critic, rector of Lincoln College, Oxford. His wife was **Emilia Francis Strong** (afterwards Lady Dilke), well known as a French art historian and for her work in promoting trade unionism among women workers.

Pavlov, Prof. Ivan Petrovich (1849–1936), an eminent Russian physiologist: Director of the Physiological Institute. Foreign member of the Royal Society and Nobel Prize-winner.

Pavlova, Anna (1885–1931), one of the greatest exponents of the Russian school of dancing.

Peabody, George (1795–1869), an American merchant who lived for the greater part of his life in London, and, acquiring a large fortune, bequeathed immense sums for philanthropic purposes in England and the United States.

Peacock, Thomas Love (1785–1866), English satirist, whose novels include *Headlong Hall* and *Nightmare Abbey*, and who ranks high in English literature for the wit and grace of his style.

Pearson, Sir Cyril Arthur, Bt. (1866–1921), journalist and newspaper proprietor, who founded *Pearson's Weekly*, *The Daily Express*, and other publications. Later retired from business because of blindness and devoted himself to the welfare of other blind people, particularly ex-servicemen, being the founder of St. Dunstan's.

Pearson, Lester Bowles, O.B.E., M.A. (b. 1897), Canadian Minister for External Affairs, 1948–57. Awarded 1957 Nobel Peace Prize.

Peary, Rear-Admiral Robert Edwin (1856–1920), an American Arctic explorer who, in 1891–92, conducted a sledging expedition towards the Pole. In 1893, 1895, and 1898 was again in the Arctic regions; and in 1900–02 reached the highest latitude hitherto attained. In the spring of 1906 he touched 87 degs. 6 min. N. latitude. On April 6, 1909, making the journey by sledge over sea-ice and accompanied by only his native servant, he succeeded in reaching the Pole.

Peel, Rt. Hon. Sir Robert, 2nd Bt. (1788–1850), a prominent British statesman who entered Parliament at twenty-one years of age, and immediately exhibited great capacity, being appointed Under-Secretary for the Colonies in the following year. From 1812 to 1818 he was Secretary for Ireland; and in 1822 he became Home Secretary, introducing, whilst fulfilling that office, the new police service associated with his name. In 1834, Peel was for four months Prime Minister,

and in 1841 formed a second ministry. It was then that the Anti-Corn Law agitation became formidable, and Peel abandoned his former Protectionist attitude, and carried his Repeal measure eventually in 1846. He was thrown from his horse in Hyde Park on June 25th, 1850, and died from injuries.

Penfield, Wilder Graves, O.M., M.D., M.A., D.Sc., F.R.S. (b. 1891), Canadian brain surgeon; Dir. Montreal Neurological Institute; Prof. of Neurosurgery McGill Univ.; Pub. *The Cerebral Cortex of Man* (1950), *Epilepsy and the Functional Anatomy of the Human Brain* (1954).

Penn, William (1644–1718), became a Quaker, and wrote some powerful pamphlets supporting his new faith. He devoted himself to good works, and in 1682, having obtained a special grant from King Charles II., went to America and founded Pennsylvania.

Penney, Sir William George, K.B.E., M.A., Ph.D., D.Sc., F.R.S. (b. 1909), British scientist; Dir. Weapons Group, Atomic Weapons Research Establishment, Aldermaston; succeeded Sir John Cockroft as Member (Scientific Research) of the U.K. Atomic Energy Authority in 1959.

Pepys, Samuel, F.R.S. (1633–1703), naval administrator, sometimes called the "Father of the British Civil Service." The *Diary* was written while he was a comparatively young man and is a unique revelation of a man and his age, besides including eye-witness descriptions of the Great Plague and Fire of London.

Pergolesi, Giovanni Battista (1710–36), Italian composer, best known for his humorous opera *La Serva Padrona* and his *Stabat Mater*.

Pericles (*c.* 490–429 B.C.), the distinguished Athenian statesman, general, and orator, who raised Athens to the point of its fullest prosperity.

Perkin, Sir William Henry, F.R.S., D.Sc. (1838–1907), great organic chemist and famous for his discovery of mauve, the first synthetic dye.

Perkin, William Henry (junior) (1860–1929), foremost organic chemist of his day; Professor of Organic Chemistry at Manchester University, 1892–1912 and later at Oxford. His researches led to important industrial results.

Perrin, Francis (b. 1901), French scientist and socialist; succeeded Joliot-Curie as High Commr. for Atomic Energy in 1951. Prof. Atomic Physics, Collège de France, 1946–.

Persius Flaccus, Aulus (A.D. 34–62), a famous Stoic philosopher.

Perugino, Pietro (1446–1524), Italian artist who excelled in religious subjects and painted many fine frescoes including some in the Sistine Chapel at Rome. Raphael was his pupil.

Pestalozzi, Johann Heinrich (1746–1827), was a rich Swiss reformer and writer, who devoted his fortune to benevolent works, especially in connection with the education of poor children.

Pétain, Marshal Henri Phillipe (1856–1951), became a French national hero after the successful defence of Verdun in 1916 and was made C.-in-C. of all the French armies. In 1940 he became Prime Minister, signed an armistice with Germany, and set up a quasi-independent administration at Vichy. In 1945 he was sentenced to death for treason, the sentence being commuted to life imprisonment.

Peter I, called The Great (1672–1725). Czar of Russia, showed great ability and energy of character, devoting himself largely to the reorganisation of his army and navy. He spent some months at Deptford studying shipbuilding. He founded St. Petersburg (1703), which was his "window on to Europe," and gained control in the war with Sweden of Karelia, Ingermanland, and Livonia. Among the prisoners taken by him at the Battle of Poltava (1709) was Catherine Skavronsky, daughter of a Lithuanian peasant, whom he later married. By her care and understanding she did much to strengthen his power. Peter died without naming an heir, and Catherine became Empress of Russia (1725–27).

Peter, the Hermit (*c.* 1050–1115), was the main instrument of the agitation which brought about the first Crusade. He was a French monk, of great eloquence and earnestness, and lived to see Jerusalem in the hands of the Christians.

Petrarch, Francesco (1304–74), Italian poet and scholar, whose odes and sonnets *To Laura* are unmatched for their lyrical beauty and passion.

Petrie, Sir (William Matthew) Flinders, F.R.S. (1853–1942), British egyptologist who became interested in archæological research at a very early age. He carried out excavations in Britain (1875–90), Egypt (1880–1924), and Palestine (1927–38), and wrote many books on the prehistoric civilisation of Egypt. Edwards Professor of Egyptology at University College, London, 1893–1935.

Phidias, the greatest of Greek sculptors, flourished from about 500 to 432 B.C., was specially famous for his work in gold, ivory and bronze. Nothing now remains to attest his genius although the sculptures in the British Museum, widely known as the Elgin Marbles, may have been from his designs.

Philip II. of France (1180–1223), was a prominent figure in the third Crusade, in which for a time he associated himself with our Richard I. Victor over a strong coalition at the momentous battle of Bouvines in 1214.

Philip II. of Macedonia (382–336 B.C.), trained in military arts in Greece, when he came to the throne instilled martial ideas into his subjects, and entered upon a career of conquest that did not end until he had become master of Greece. Father of Alexander the Great.

Philip II. of Spain (1527–98), succeeded his father the Emperor Charles V. in half his dominions. The Revolt of the Netherlands, the annexation of Portugal in 1580, and the unsuccessful attempt to subdue England by the Armada, were outstanding events of his troubled reign. He was a devout Roman Catholic, strongly supported the Counter-Reformation, built the strange Escorial, and was four times married, his second wife being Mary Tudor.

Philip V. of Spain (1683–1746), founded the Bourbon dynasty in Spain, and was the son of the Dauphin of Louis XIV. and Maria Theresa of Spain. His uncle, Charles II. of Spain, bequeathed the kingdom to him, and this led to the war of the Spanish Succession, which ultimately confirmed him in his kingship.

Phillip, Arthur (1738–1814), first governor of New South Wales. Under his command the first fleet of 717 convicts set sail from Britain to Australia, and with the founding of Sydney in 1788 colonisation of the whole country began.

Phillips, Stephen (1868–1915), dramatist and poet of distinction. Wrote popular verse dramas, including *Paolo and Francesca*, *Herod*, and *Ulysses*.

Piasts, first Polish dynasty in Poland until 14th century and until 17th century in Silesia.

Piazzi, Giuseppe (1746–1826), an Italian astronomer. He was the discoverer of the planet Ceres, the first known of the asteroids.

Picasso, Pablo Ruiz (b. 1881), Spanish painter who received his early training in Catalonia and settled in Paris in 1903. His influence over contemporary art is comparable with that exercised by Cézanne (*q.v.*) over the artists of his time. His work is to be found in public galleries and private collections all over the world and is represented by *Femme Nue dans un Fauteuil Rouge* in the Tate Gallery. His genius has also found scope in sculpture and etchings and he has designed décor costumes for the ballet.

Piccard, August (b. 1884), Swiss physicist, professor of physics at Brussels until the German invasion in 1940. Noted for his ascents into the stratosphere by a special balloon in 1931 and 1932 and for his more recent attempts to study deep-sea life.

Pickford, Mary (b. 1893), was the leading film actress of the silent days and affectionately known as "the world's sweetheart."

Pilsudski, Marshal Joseph Clemens (1867–1935), wielded despotic power as the virtual Dictator of Poland for most of the time from 1920 until his death.

Pindar (522–443 B.C.), the eminent lyric poet of ancient Greece.

Pinero, Sir Arthur Wing (1855–1934), was an able English dramatist and former actor, of Portuguese descent. *Dandy Dick*, *The Second Mrs. Tanqueray* and *Mid-Channel* are among his plays.

Pirandello, Luigi (1867–1936), was a prominent Italian dramatist and novelist, many of whose works have been translated into English. Awarded Nobel Prize for Literature, 1934.

Pissarro, Camille (1830–1903), French Impressionist painter of landscapes; studied under Corot.

Pitman, Sir Isaac (1813–97), founded the Pitman system of phonographic shorthand.

Pitt, William (1759–1806), was the second son of the Earl of Chatham. Entered Parliament at twenty-one, and by his brilliant oratory captivated the House of Commons. In 1782, when only twenty-three, he became Chancellor of the Exchequer, and in the following year was made Premier, and held that office for seventeen years, through the trying period of the French Revolution, when war with France was almost continuous. He was undoubtedly one of the most brilliant statesmen that England has produced, and his death at the early age of forty-six was a great loss to the country. He was buried in Westminster Abbey.

Pius XII. (1876–1958), elected Pope March 2, 1939, a brilliant diplomat, scholar, and linguist. As Cardinal Eugenio Pacelli, he was Papal Secretary of State, 1930–39, and was outspoken in his condemnation of those aspects of the policy of the totalitarian states which he considered anti-Christian. Before he became a Cardinal he was for many years Papal Nuncio in Germany. His Pontificate was marked by the ordeal of world conflict, the rise of Communism in many parts of the world, and the international tension of the cold war.

Pizarro, Francisco (c. 1471–1541), was an adventurous Spaniard who, after Columbus's discoveries in the New World, set out for South America, conquering Peru for the Emperor Charles V. Pizarro's career in Peru was characterised by excessive cruelty, and in the end he was killed by his own soldiers.

Planck, Prof. Dr. Max (1858–1947), German physicist, whose investigations into radiation of energy culminated in 1901 in his law of radiation, which laid the foundation of the quantum theory. Awarded Nobel Prize for Physics, 1918.

Plato (427–347 B.C.), great Athenian philosopher, pupil of Socrates, teacher of Aristotle. He founded a school at Athens under the name of the Academy, where he taught philosophy and mathematics. His great work is his *Dialogues*, which includes the *Republic*, the longest and most celebrated of them all. All Plato's known writings have come down to us, and they constitute one of the most influential bodies of work in history.

Plimsoll, Samuel (1824–98), was a native of Bristol, and while M.P. for Derby got up an agitation on behalf of merchant sailors, procuring the passing of the Merchant Shipping Act of 1876, which by defining a line above which no ship must sink in the water when loaded has ever since made the overloading of ships illegal. The line is known as the Plimsoll Mark.

Pliny: Pliny the elder was a naturalist of high reputation; Pliny the younger, his nephew, achieved renown by a series of historical *Letters* and died A.D. 113.

Plotinus (c. 203–c. 262), Greek philosopher, was the founder of Neoplatonism, which had considerable influence on early Christian thought.

Plutarch (c. 46–120), a pagan Hellenic writer, a contemporary of the authors of the two gospels according to St. Matthew and St. Luke. His *Lives of Agis and Cleomenes* form one of the world's most famous literary productions.

Poe, Edgar Allan (1809–49), was an American poet of unique genius, author of "The Raven," "The Bells," "Annabel Lee," and other poems of haunting melody and dainty fancy. Poe's *Tales of Mystery* are thrilling examples of their class.

Poincaré, Raymond Nicolas Landry (1860–1934), was President of France from 1913 to 1920 and won the confidence and admiration of the French people and their Allies by his services during the first world war. He was Prime Minister in 1912, 1922–24, and 1926–29.

Pollard, Professor Albert Frederick, F.B.A. (1869–1948), English historian and first director of the Institute of Historical Research. His books include *Factors in Modern History*, *The Evolution of Parliament*, and many authoritative works on the Tudor period, such as his *Henry VIII*, *Wolsey*, and *Somerset*.

Polo, Marco (1256–1323), the famous Venetian traveller and explorer, who made journeys through China, India, and other eastern countries, and published the record of his various wanderings, recounting the many wonders and marvels he had seen—a record which seemed for the most part beyond credence to his contemporaries, but now largely confirmed.

Pompadour, Jeanne Antoine Poisson, Marquise de, otherwise known as Madame de Pompadour (1721–64), was for a long time the favourite of Louis XV. of France, over whom she exercised great influence.

Pompey the Great (106–48 B.C.), distinguished himself as a general while young, clearing the Mediterranean of pirates, and ultimately became, with Caesar and Crassus, triumvir.

Pope, Alexander (1688–1744), the celebrated 18th century poet and translator of *Homer*. Author of *The Rape of the Lock*, *Essay on Criticism*, and *Essay on Man*.

Portal of Hungerford, Marshal of the R.A.F. Charles Frederick Algernon, 1st Viscount, K.G., G.C.B., O.M., D.S.O. (b. 1893), Chief of the Air Staff, 1940–45.

Pound, Ezra Loomis (b. 1885). American poet and scholar, famous both for the beauty of his individual verse and for his excellent translations of Provencal, Latin, Chinese, French and Italian poets. Treason charges brought in 1945 against the poet were quashed in 1958 when he was released from the Federal mental hospital where he had been kept. He returned to Italy to live.

Poussin, Nicolas (1593–1665), an eminent French painter patronised by Louis XIII.

Prasad, Dr. Rajendra (b. 1884), first President of the Indian Union, 1950; re-elected for 5 years, 1952; re-elected at the 1957 General Election.

Praxiteles, a great Greek sculptor who lived in the 4th century B.C.

Preece, Sir William Henry, K.C.B., F.R.S. (1834–1913), a Welsh electrician, connected with the Electric Telegraph Service from 1853, and conspicuously successful in his experiments which led to the later developments in telegraphy. He was associated with Marconi in his wireless telegraphic schemes and introduced the block system into England.

Prescott, William Hickling (1796–1859), one of the best known of American historians.

Prichard, James Cowles, M.D., F.R.S. (1786–1848), British ethnologist and physician, whose knowledge of anatomy, psychology, and of languages enabled him to grasp the principle that people should be studied as a whole. He paved the way for future anthropological research.

Priestley, John Boynton, M.A. (b. 1894), novelist, playwright and broadcaster, whose work has received great praise and includes the novels *The Good Companions*, *Angel Pavement*, the plays *Dangerous Corner*, *Time and the Conways*, *The Linden Tree*, and a literary history, *Literature and Western Man* (1960).

Priestley, Joseph, F.R.S. (1733–1804), was the discoverer of oxygen and other gases, and wrote *A History of Electricity*. He was also a great advocate of freedom and progress.

Priestley, Sir Raymond, M.A., D.Sc. (b. 1886), geologist. Took part in the Shackleton Antarctic Expedition of 1907–9 and Scott's Antarctic Expedition 1910–13. President of the British Association, 1956.

Prior, Matthew (1664–1721), a well-known poet and wit who acquired celebrity by writing *The City Mouse and Country Mouse*.

Prokofiev, Serge Sergeyevich (1891–1953), celebrated Russian composer, whose music has a strong folk-song element, rich in melody and invention. He has written operas: *The Love of Three Oranges*, *The Betrothal in a Nunnery*, *War and Peace*, ballets: *Romeo and Juliet*, *Cinderella*, symphonies, chamber music and the music for Eisenstein's films *Alexander Nevsky*, *Ivan the Terrible*, etc.

Protagoras (c. 480–411 B.C.), a Greek philosopher, chief of the Sophists, famous for his scepticism and disbelief in objective truth.

Proudhon, Pierre Joseph (1809–65), a French political economist.

Proust, Marcel (1871–1922), French psychological novelist; author of a series of 15 novels known under the title of *A la Recherche du Temps Perdu*. Proust's works have been admirably translated into English by C. K. Scott Moncrieff.

Prudhon, Pierre Paul (1758–1823), a French historical and portrait painter.

Ptolemy, Claudius Ptolemæus, a famous astro-

nomer and geographer of Alexandria, who flourished from *c.* A.D. 90–168. He founded the Ptolemaic system, which taught that the earth was stationary and the heavenly bodies revolved around it.

Puccini, Giacomo (1858–1924), Italian composer whose operas met with great success and include *Manon Lescaut*, *La Bohème*, *La Tosca*, *Madam Butterfly*, and *Turandot* (finished after his death).

Purcell, Henry (1658–95), one of the great figures in English music; organist of the Chapel Royal and composer to Charles II. Anthems form the greater part of his sacred music, and he wrote not only for the Court but for the stage.

Pusey, Edward Bouverie (1800–82), a famous Anglican cleric; he published *Tracts for the Times*, which inaugurated the Tractarian movement that developed into what became known as Puseyism.

Pushkin, Alexander (1799–1837), the national poet of Russia, several times exiled for his liberal views and held in high honour by contemporary Russia. Died of wounds received in a duel. His poetical tales are full of dramatic power. *Eugene Onegin* is generally considered his masterpiece and *Boris Godunov* is a fine tragedy.

Pym, John (1584–1643), a prominent statesman in the reign of Charles I. A leader of the Puritan opposition in Parliament.

Pythagoras (*c.* 582–*c.* 507 B.C.), most influential of the early Greek scientists. He was born on the island of Samos, off the Turkish mainland, which he left *c.* 530 to settle at Croton, a Greek city in southern Italy. He was a mystic and mathematician and believed in the transmigration of souls. He died in exile. His great works are the *Almagest* and his *Geographical Outline*.

Q

Quaritch, Bernard (1819–99), a famous dealer in rare books, who was a native of Germany but settled in London, and became naturalised in 1847. His knowledge of scarce and valuable books was unique. His shop in Piccadilly was a storehouse of literary treasures.

Quasimodo, Salvatore (b. 1901), Italian poet whose greatness lies in his humanity and his rejection of the Fascist influence. He won the Nobel Prize for Literature in 1959.

Quiller-Couch, Sir Arthur Thomas (1863–1944), was a well-known novelist and essayist, who as "Q" published many delightful stories, including *Dead Man's Rock*, *Troy Town*, and *The Splendid Spur*. Edited the *Oxford Book of English Verse*. Professor of English Literature, Cambridge University, 1912–44.

R

Rabelais, François (*c.* 1495–1553), the great French satirist, first adopted the career of a monk, then studied medicine, and settled at Lyons as a doctor, and it was there that he published his *Gargantua and Pantagruel*, among the wittiest though coarsest books in any language.

Rachel, Mlle (stage name of **Elizabeth Félix**) (1821–58), acknowledged as the greatest tragic actress of her time and reached the height of her fame in Racine's *Phèdre* in 1843.

Rachmaninov, Sergei Vasilyevich (1873–1943), Russian pianist, composer, and conductor. He wrote operas, symphonies, piano concertos, piano pieces, and songs, and was one of the greatest pianists of his age. After the Russian revolution he made his home in America, where he died.

Racine, Jean (1639–99), a distinguished French tragic dramatist, best known by his *Andromaque*, *Phèdre*, and *Athalie*.

Rackham, Arthur, R. W. S. (1867–1939), a noted English artist who excelled in the illustration of books such as *Peter Pan*, *Alice in Wonderland*, Wagner's *Ring Librettos*, *Mother Goose*, Grimm's and Andersen's *Fairy Tales*.

Radhakrishnan, Sir Sarvepalli, Kt., M.A. (b. 1888). Vice-President of the Indian Union, 1952; formerly Spalding Professor of Eastern Religions and Ethics at Oxford.

Raeburn, Sir Henry, R.A. (1756–1823), was a famous Scottish portrait painter, and friend and pupil of Sir Joshua Reynolds.

Raemakers, Louis (1869–1957), Dutch cartoonist, famous for his scathing satires on the Germans during the first world war. His *Cartoon History of the War* was published in 1919.

Raffles, Sir Thomas Stamford (1781–1826), an eminent naturalist. He was the founder and first President of the Zoological Society of London. Founded Singapore, 1819.

Raikes, Robert (1735–1811), a practical propounder of the Sunday School system.

Raleigh, Sir Walter (1552–1618), a scholar, courtier, soldier, sailor, and statesman. In 1584 Queen Elizabeth granted him a patent for the discovery and settlement of unknown countries in the far West. The colonisation of Virginia followed. At one time he was in great favour at Court, but quarrelled with the Queen, and suffered in fortune in consequence. When James I. came to the throne, Raleigh was supposed to be implicated in a conspiracy against that monarch, and was sentenced to death. After that he was a prisoner in the Tower of London for twelve years, and there he wrote his *History of the World*, and other works. In 1615 James set him at liberty in order to head an expedition to Guiana in the hope of finding gold, but being unsuccessful he was again imprisoned on his return, and finally beheaded in Old Palace Yard.

Raleigh, Sir Walter, M.A. (1861–1922), Professor of English Literature at Oxford, and author of many volumes on eminent men of letters, including books on Milton, Wordsworth, and others. His work on Shakespeare, 1907, is his highest achievement.

Raman, Sir (Chandrasekhara) Venkata, F.R.S. (b. 1888), Indian physicist whose main work has been in spectroscopy. For his research on the diffusion of light and for the discovery of the "Raman Effect" he was awarded the 1930 Nobel Prize in Physics.

Rameau, Jean Philippe (1683–1764), French composer and church organist whose *Treatise on Harmony*, 1722, and other works on musical theory profoundly influenced musical development in the 18th century.

Ramón y Cajal, Santiago (1852–1934), Spanish histologist who made many discoveries in the structure of the nervous system. Nobel Prizeman, 1906.

Ramsay, Sir William, K.C.B., F.R.S. (1852–1916), chemist and discoverer with Lord Rayleigh of the hitherto unknown constituent of air, argon. Later discovered helium and detected other inert gases, which he called neon, krypton, and xenon. With F. Soddy carried out research on radium emanation. Awarded Nobel Prize in Chemistry, 1904. President of the British Association, 1911.

Rank, 1st Baron, Joseph Arthur (b. 1888), film magnate, who turned his attention from the family flour-milling business to the cinema and has built up a large and powerful organisation.

Ranke, Leopold von (1795–1886), the painstaking and thorough German historian who laid the basis of modern historical research and demonstrated many of its methods.

Raphael Santi (1483–1520), the distinguished Italian painter whose works excel all others in their beauty of expression and inspired treatment. He lived a considerable period in Rome, where he painted his famous frescoes for the Vatican and St. Peter's and also the celebrated cartoons designed for the tapestries of the Papal chapel, which afterwards were brought to England, and are now at the Victoria and Albert Museum. His last painting was *The Transfiguration*. Examples of his work are to be found in most of the great European collections, including our own National Gallery.

Rasputin, Grigori Yefimovich (1871–1916), Russian monk who lived quietly in his native village until 1904, when he became notorious for his extravagant teachings, which gave him a Messianic-like position, and advocated sin in order to obtain repentance and salvation. In 1907 he was presented to the Court where he soon became all-powerful. A seeming miracle which improved the health of the Tsarevitch Alexis increased his influence with the Czar and

Czarina, although he was hated by the bulk of the nation, and most of the nobility.

Rathbone, Eleanor (1872–1946), social reformer humanitarian, and independent politician. Championed widows' pensions and family allowances and laboured for political refugees, particularly children.

Ravel, Maurice (1875–1937), French composer, pupil of Fauré, one of the leaders of the impressionist movement. He wrote chiefly chamber music, piano pieces, songs, and ballet music, including *Daphnis et Chloé*, specially commissioned by Diaghilev.

Raven-Hill, Leonard (1867–1942), English artist and cartoonist, was well known for his drawings and cartoons in *Punch*, 1896–1935.

Rawlinson, Sir Henry Creswicke, Bt., G.C.B., F.R.S. (1810–95), diplomat, soldier and orientalist. For a number of years he superintended explorations in Assyria and Babylon, accumulating a valuable collection of antiquities now in the British Museum.

Ray, John (1627–1705), an English naturalist, famous for his contributions to the science of botany. He has been called the "father" of English natural history.

Rayleigh, 3rd Baron, O.M., F.R.S. (1842–1919), one of the most eminent of British physicists; an authority on sound vibrations, and the co-discoverer with Sir William Ramsay of argon. In 1904 was awarded the Nobel Prize for physics.

Read, Sir Herbert, Kt., D.S.O., M.C. (b. 1893), English poet and critic. He was assistant keeper at the Victoria and Albert Museum (1922–31), professor of fine art at Edinburgh (1931–33), and edited the Burlington Magazine (1933–39). His writings include *Poems 1914–1934*, *In Retreat*, *Reason and Romanticism*, *Education through Art*, *The Meaning of Art*.

Reade, Charles (1814–84), holds high rank amongst the Victorian novelists. His first story, *Peg Woffington*, was published in 1852. *It's Never too Late to Mend*, *Griffith Gaunt*, and *The Cloister and the Hearth* are his best-known novels.

Réamur, René Antoine Ferchault de (1683–1757), an eminent French chemist, who invented the thermometer which bears his name.

Récamier, Madame Jeanne Françoise Julie Adélaide Bernard (1777–1849), a noted society woman of the days of Napoleon.

Reeves, (John) Sims (1818–1900), was the most celebrated English tenor of his time.

Regnault, Henri Victor (1810–78), a French scientist who made highly successful experiments in regard to the physical properties of bodies and their relation to heat.

Regnault, Jean Baptiste, Baron (1754–1829), a talented French genre painter.

Reith, John Charles Walsham, 1st Baron (b. 1889), British civil engineer, the first Director-General of the British Broadcasting Corporation, 1927–38. Recognised as a man of great organising ability, he has served successively as Chairman of Imperial Airways (1938–39), Chairman of B.O.A.C. (1939–40), Min. of Information (Jan.–May 1940), Min. of Transport (May–Oct. 1940), Min. of Works and Buildings (Oct. 1940–Feb. 1942), Dir. of the Admiralty's Combined Operations Material Dept. (1943–45), Chairman Commonwealth Telecommunications Conference (1945), Chairman Commonwealth Communications Council (1946), and Chairman Colonial Development Corporation, 1950–59.

Rembrandt, Harmens van Rijn (1606–69), one of the greatest of the Dutch school of painters who produced many remarkably successful portraits, as well as numerous figure subjects, all of them distinguished by their masterly qualities. He was an etcher of high ability also, and a number of his works are in the British national collections.

Renan, Ernest (1823–92), a noted French author who wrote much upon religious subjects, and won special fame by his *Life of Jesus*, published 1863.

Reni, Guido. (*See* **Guido Reni.**)

Rennie, John, F.R.S. (1761–1821), a Scottish civil engineer. He was the constructor of the Waterloo and Southwark and new London bridges over the Thames, the London Docks, the East and West India Docks, the Plymouth breakwater, and many other works at Liverpool, Leith, Dublin, Hull, and elsewhere.

Renoir, Auguste (1841–1919), great French artist of the Impressionist school, whose vision was carefree and romantic. Some of his greatest achievements were in still-life and landscape. *La Loge*, *Les Parapluies*, *La Première Sortie*, *Grandes Baigneuses* are famous pictures.

Reuter, Baron Paul Julius de (1821–99), was the pioneer of telegraphic press services.

Reymont, Vladislav Stanislav (1868–1925), Polish novelist; Nobel Prize 1924 (*The Peasants*).

Reynolds, Sir Joshua, P.R.A. (1723–92), was the first President of the R.A. from 1768 till his death, and the most eminent English portrait painter of his time.

Rhodes, Rt. Hon. Cecil John (1853–1902), born at Bishop's Stortford. Went to South Africa in 1871, entered upon a diamond-mining enterprise at Kimberley, and acquired a considerable fortune. Was a member of the Cape Legislature in 1881, and became Premier in 1890. He was at the head of the British South Africa Chartered Company, for which a vast amount of territory was annexed, the holding obtaining the name of Rhodesia. Mr. Rhodes was Cape Premier again in 1896; then followed the Jameson Raid and his retirement from political life. During the Boer War he was detained in Kimberley and did not live to see the campaign closed. He left the bulk of his fortune for the founding of scholarships at Oxford.

Ricardo, David (1772–1823), a celebrated English political economist of Hebrew descent, whose *Principles of Political Economy* gained him a high place among the exponents of the science

Richard I. (1157–99) was King of England from 1189 to his death. He laid heavy burdens upon the people in order to equip an army for the third Crusade. At first he was victorious and did such valiant deeds that he received the name of "Cœur de Lion." Being ultimately defeated, he signed a truce with Saladin, and on his way back to England was shipwrecked. Disguised as a pilgrim, he was identified in Austria, and handed over to the Emperor of Germany, who imprisoned him in a remote castle. A large sum was demanded and paid for his ransom, and after over a year of durance he returned to England, and was crowned at Winchester. Later he was engaged in a war with France, and was mortally wounded by a bolt from a crossbow while besieging the castle of Chaluz in the province of Limousin.

Richard II. (1367–1400), son of the "Black Prince," succeeded his grandfather, Edward III., in 1377, when but ten years old, a Regency being appointed during his minority. In the Wat Tyler rising of 1381 the King confronted the rioters and promised them redress, an undertaking which he did not fulfil. For a time he was greatly under the influence of his uncle, Thomas, Duke of Gloucester, but on coming of age dismissed him, and ruled with some approach to dignity for the next seven years. After 1396 he developed a highly tyrannical disposition and banished or put to death many of the leading statesmen, practically freeing himself from Parliamentary control. The opposition against him came to a head in 1399, when Bolingbroke defeated him, and he was made prisoner and died—probably by violence—in Pontefract Castle.

Richard III. (1452–85) last Plantagenet king of England who usurped the throne on the death of his brother Edward IV. in 1483, murdering his two younger nephews in the Tower. This led to a rebellion in favour of the Earl of Richmond (later Henry VII.) and he was slain on Bosworth Field. His character has been the subject of dissension among historians but there is no doubt that despite his unscrupulousness he was a brave soldier and able administrator.

Richards, Sir Gordon (b. 1904), British jockey who had one of the most successful riding records in the history of the British Turf: 21,834 mounts, 4870 winners, including the Derby (1953). Retired, 1954.

Richardson, Sir Albert Edward, K.C.V.O., P.R.A., F.S.A., F.R.I.B.A. (b. 1890), British architect and Pres. of the Royal Academy, 1954–56.

Richardson, Henry Handel, pseudonym of Henrietta Richardson Robertson (1870–1946), Aus-

tralian novelist whose major work, outstanding in Australian fiction, is the trilogy *The Fortunes of Richard Mahony*.

Richardson, Sir Owen Williams, D.Sc., F.R.S. (1879–1959), distinguished English physicist. Awarded Nobel Prize in 1928 for his researches on the emission of electricity from hot bodies.

Richardson, Sir Ralph David (b. 1902), actor who has made many appearances on stage, screen, and radio. Among his films are *South Riding, Anna Karenina*, and *The Fallen Idol*.

Richardson, Samuel (1689–1761), author of *Pamela, Clarissa*, and *The History of Sir Charles Grandison*, exercised considerable influence on the development of the novel in England.

Richelieu, Armand Jean du Plessis, Cardinal Duc de (1585–1642), the eminent French ecclesiast and statesman, who was Minister to Louis XIII. for eighteen years. He was practically Master of France during the best part of this Cardinalate.

Ridley, Nicholas (1500–55), was Bishop of Rochester in 1547 and Bishop of London in 1550. He took an active part in the Reformation. He was burned at the stake along with Latimer.

Rienzi, Cola di (1313–54), a Roman patriot of humble birth who inflamed the people against their rulers, and aroused such enthusiasm that they proclaimed him "Tribune." During the seven months that he was permitted to exercise supreme power, he proved himself the true friend of the poor. Ultimately, however, his enemies proved too strong for him and he was imprisoned for three years at Avignon. Later murdered in a popular uprising.

Rilke, Rainer Maria (1872–1926), German lyric poet, born in Prague. His work, marked by great beauty of style, culminated in the *Duineser Elegien* and *Sonette an Orpheus*, both published in 1923.

Rimbaud, Jean Nicolas Arthur (1854–91), French poet of great originality and friend of Paul Verlaine. All his poems were written between his sixteenth and nineteenth years.

Rimsky-Korsakov, Nikolai Andreyevich (1844–1908), Russian composer whose works include the operas *The Maid of Pskov* (also known as *Ivan the Terrible*), *The Snow Maiden, Le Coq d'Or*, and the symphonic suite *Scheherezade*. He was a brilliant orchestrator and rescored many works, including Borodin's *Prince Igor*.

Rizzio, David (*c.* 1540–66), was the Italian secretary of Mary Queen of Scots and an accomplished musician. Suspected of a too great attachment to Mary, he was murdered by Darnley and his friends in the Queen's presence in the Palace of Holyrood.

Robbia, Luca Della (1400–1482), a famous Florentine sculptor. He was the introducer of enamelled terra-cotta work.

Roberts, Field-Marshal Earl, V.C., K.G., P.C., K.P., G.C.B., O.M., G.C.S.I., G.C.I.E. (1832–1914), the distinguished soldier, first saw service in the Indian Mutiny, when he won the V.C. In 1880 during the Afghanistan campaign made his historic march from Kabul to Kandahar where he won a complete victory. After serving as C.-in-C., India, 1885–93, and as C.-in-C., Ireland, 1895–99, took over in South Africa in December, 1899, and entirely reversed the unhappy military situation before handing over to Kitchener a year later. C.-in-C. from 1901 until the office was abolished in 1904, and was latterly an ardent advocate of conscription.

Robertson, Sir Charles Grant, C.V.O. (1869–1948), English historian who was Vice-Chancellor of Birmingham University, 1927–38, and Principal 1920–38. His works include *The Rise of the English Nation*, 1895, *England under the Hanoverians*, 1911, and *Bismarck*, 1918.

Robertson, Field-Marshal Sir William, Bt., G.C.B., G.C.M.G., G.C.V.O., D.S.O. (1860–1933), the only British soldier to rise from Private to Field-Marshal, served as C.I.G.S., 1915–18. His son, **General Sir Brian Hubert,** G.C.B. (b. 1892), has had a distinguished military career and was appointed Chairman of the British Transport Commission in 1953.

Robeson, Paul Le Roy (b. 1898), the famous Negro singer and actor, who through his singing of spirituals has increased our knowledge and understanding of the Negro. Was a great success in London in 1930 playing *Othello*.

Robespierre, Maximilien François Marie Isidoire de (1758–94), was a country advocate until the outbreak of the French Revolution, when he went to Paris, became an enthusiastic leader of the Jacobin Party, and was made a Member of the Assembly. In the Reign of Terror as President of the Committee of Public Safety he sent vast numbers to the guillotine. Then a counter-movement was set on foot and he was denounced in the Assembly, and, trying to escape, was shot and subsequently guillotined.

Robey, Sir George, C.B.E. (**George Edward Wade**), (1869–1954), famous British comedian of the music-hall.

Robinson, William Heath (1872–1944), English book illustrator, but especially known for the fantastically comic designs of his cartoons and stage scenery.

Rob Roy (the traditional nickname of **Robert McGregor**) (1671–1734), a noted Highland outlaw who levied blackmail on the farmers and rich people of the country-side in return for certain protective services. He belonged to the clan McGregor.

Robsart, Amy (1532–1560), daughter of Sir John Robsart, and wife of Robert Dudley, afterwards Earl of Leicester. While living in seclusion at Cumnor Place under the charge of Anthony Forster, she met her death either by accident or foul play, by the latter according to common belief, Elizabeth's favourite having reason to wish her out of the way. She was discovered dead at the bottom of an old staircase.

Rockefeller, John Davison (1839–1937) was said to be the richest man in the world. Was born on a small farm in New York State, and there worked until sixteen. Migrated to Cleveland, and found employment in an office for a few years. About this time the oil trade was in a disorganised condition, owing to the reckless trading and crude methods of refining. Rockefeller saw what was wrong, and resolved upon trying to remedy it. Later he began oil-refining, and entered into the business with such vigour of purpose, and made so many improvements, that he became a millionaire in a very few years. From the exertions of himself and associates grew the Standard Oil Trust, beginning with a capital of £200,000 in 1870, and extending at such a rate that in 1892 the capital had reached twenty-two millions sterling. During his life-time he gave some 750 million dollars to education and charity.

Rodin, Auguste (1841–1917), the most celebrated French sculptor of recent days, who possessed a bold and original genius. His numerous statues and his fine historic monuments, especially that for Calais commemorating the bravery of Eustache de Saint-Pierre, brought Rodin well-deserved fame.

Rodney, 1st Baron, K.B. (1719–92), a famous English admiral who, having gained numerous victories, routed the French fleet under the Comte de Grasse, whom he took prisoner, the result of this crowning success being the Peace of Versailles, 1783.

Rogers, William Penn Adair (**"Will"**) (1879–1935) was America's foremost humorist and a famous stage and film star; was killed with Wiley Post on a holiday flight to Alaska Aug. 15, 1935.

Roland de la Platière, Madame Manou Jeanne (1754–93), was one of the leading figures of the French Revolution. Her husband, **Jean Marie Roland de la Platière** (1734–93), who was one of the Ministers during the Girondist period, escaped from Paris on the disruption of his Party, but his wife remained behind, and was sent to the guillotine. During her incarceration she wrote an *Appeal to Posterity*, remarkable for its beauty of sentiment and patriotic enthusiasm. Her husband committed suicide on receiving the news of her execution.

Rolland, Romain (1866–1944), an eminent French author whose finest work, *Jean-Christophe*, in ten vols., gained him the Nobel Prize for Literature, 1915.

Romilly, Sir Samuel, K.C. (1757–1818), a famous English lawyer who was Solicitor-General in 1806 and for many years had a distinguished career both in Parliament and at the Bar. He effected many improvements in the Criminal Law.

Rommel, Field-Marshal Erwin (1891–1944), was probably the ablest German general engaged in

the second world war. His conduct of the war during the North African campaign won high praise and brought the redoubtable Afrika Corps nearly to Alexandria. He was also engaged in the campaigns in Western Europe in 1940 and 1944.

Romney, George (1734–1802), was born in North Lancashire, studied portrait painting with a Kendal artist, and for a few years obtained a living by local portrait painting. Going to London in 1762, his talent gained him speedy recognition; and after studying for a couple of years in Rome, he set up as a portrait-painter in Cavendish Square, and became highly successful. His portraits are among the finest examples of that kind of art that England has produced, and to-day realise large prices.

Röntgen, Professor Wilhelm Konrad (1845–1923), the eminent German scientist who discovered the Röntgen rays in 1895. He made other important laboratory investigations, resulting in the solution of difficult chemical problems.

Roosevelt, President Franklin Delano (1882–1945), great American statesman. Was Assistant Secretary to the Navy under Wilson and unsuccessful Democratic candidate for the vice-presidency in 1920. In 1921 was stricken with infantile paralysis, but recovered sufficiently to re-enter public life and become Governor of New York in 1929. From 1933 until his death served as President of the U.S.A., being the first American to be elected for more than two terms. His New Deal programme (see Gen. Information Section) was outstanding in his domestic policy. His "good neighbor" attitude towards the other American countries, his hamstrung efforts to restrain Axis aggression in the 1930s, his inspired and generous adoption of Lend-Lease, his war-time meetings with Churchill and Stalin, and his energetic prosecution of the war after Pearl Harbour, were the more important features of his foreign policy. His "fireside" talks on the radio brought him into close contact with the American people and his passing in the hour of victory was mourned all over the world. In 1905 married his distant cousin, **Eleanor Roosevelt** (b. 1884), who has become known on her own account as a sociologist and newspaper columnist. She became Chairman of the U.N. Human Rights Commission in 1947.

Roosevelt, Theodore (1858–1919), Republican President of the U.S.A., 1901–2, and unsuccessful third party candidate in 1912 following a dispute with Taft. His daring exploits in the Spanish-American war won him wide popularity and he was elected vice-president in 1900 becoming president on McKinley's assassination. For his efforts in promoting peace, notably between Russia and Japan, was awarded the Nobel Prize in 1906. The great struggle with the Trusts marked his years of office.

Rops, Félicien (1833–98), Belgian artist, famous for drawings, etchings, and illustrations. His work is highly original, spirited, humorous and a valued commentary on the life at the time. Was an engraver of magnificent technical skill and a painter of merit.

Ross, Sir James Clark, F.R.S. (1800–62), most experienced polar explorer of the century. He accompanied his uncle, Sir John Ross, and Captain Parry on their expeditions. In the *Victory* commanded by his uncle he located the north magnetic pole in 1831. He commanded the expedition of the *Erebus* and the *Terror* to the antarctic (1839–43), discovering Victoria Land, Mounts Erebus and Terror, and the Ross ice barrier.

Ross, Rear Admiral Sir John, K.C.B. (1777–1856), the eminent explorer who made several voyages to the arctic and searched for the North-west Passage. He discovered Boothnia peninsula, and his nephew reached the magnetic pole.

Ross, Colonel Sir Ronald, K.C.B., K.C.M.G., F.R.S. (1857–1932), professor of tropical sanitation and a leading authority on tropical diseases generally, was for many years in the Indian Medical Service, and was awarded the Nobel Prize for Medicine in 1902. Discovered the malaria parasite.

Rossetti, Dante Gabriel (1828–82), was the son of Gabriele Rossetti (1783–1852), an exiled Italian author who settled in London in 1824. Dante showed great talent as a painter from boyhood, and became one of the Pre-Raphaelite Brotherhood, formed in 1848. He also distinguished himself as a poet. His sister, **Christina Georgina Rossetti** (1830–94) was also noted as a poet.

Rossini Gioacchino Antonio (1792–1868), Italian operatic composer. His first opera *Tancredi* was produced at Venice when he was 21, and between 1816 and 1823 he wrote 21 operas, including *Il Barbiere di Seviglia*, *La Cenerentola*, *Otello*, *La Donna del Lago*, and *Semiramide*. After writing *Guillaume Tell* in 1829, which was hailed as his masterpiece, he gave up composing, producing only a *Stabat Mater* (1832–41) and a mass (1864).

Rostand, Edmond Eugene Alexis (1868–1918), dramatist and member of the French Academy, whose *Cyrano de Bergerac* created a sensation in 1898.

Rothenstein, Sir William (1872–1945), English painter and writer. Prof. of Civic Art in Sheffield University, 1917–26; Principal of Royal College of Art, 1920–35; Trustee, Tate Gallery, 1927–33. His paintings include *Doll's House*, *Aliens at Prayers*, *Jews Mourning in a Synagogue*. His son, **Sir John Rothenstein,** C.B.E. (b. 1901), is Director and Keeper of the Tate Gallery.

Rothschild, Anselm Meyer (1743–1812), the founder of the famous financial family was born at Frankfurt-on-Main. After some experience in a bank as clerk, set up for himself first as a moneylender, then as a banker and displaying a genius for finance acquired a large fortune. His son, **Nathan Meyer Rothschild** (1777–1836), took charge of the London house, and conducted its affairs with great success, and was made an Austrian Baron in 1822. He was succeeded by his eldest son, **Baron Lionel de Rothschild** (1808–1879), who was the first Jewish member of the House of Commons.

Roubillac, Louis François (1695–1762), a French sculptor who contributed many monuments to Westminster Abbey.

Rouget de Lisle, Claude Joseph (1760–1836), a French poet who was the author of the words and the music of the *Marseillaise*, the revolutionary song and national anthem of France.

Rousseau, Jean-Jacques (1712–78), French philosopher, political writer, and composer. He was born at Geneva, and after a hard and wandering life made the acquaintance of Madame de Warens, who became his patroness and with whom he resided during the years 1731–41. He then proceeded to Paris, where he made the acquaintance of Diderot, to whose *Encyclopédie* he contributed the musical section. With the production of his pastoral melodrama *Le Devin du village* in 1722 he appeared as a successful composer. Meanwhile he had been studying social questions with great ardour, and in 1761 published his novel *Julie, ou la Nouvelle Héloïse*, which was followed in 1762 by *Emile*, a treatise on education in novel form. These two works contained so much that was at variance with convention, and so opposed to all ideas of moral restraint, that they called forth the condemnation of the orthodox, and Rousseau was obliged to leave France for a time. It was while in England that he wrote his remarkable *Confessions* and his celebrated *Le Contrat Social*. He gave to France a new field of thought, and laid down principles of government and conduct which bore fruit in the French Revolution.

Royden, (Agnes) Maude, C.H. (Mrs. Shaw) (1876–1957), noted woman preacher, Assistant preacher at the City Temple, 1917–20.

Rubens, Sir Peter Paul (1577–1640), one of the most notable of Flemish painters. In 1629 he painted for Charles I., who knighted him. His *Adoration of the Magi* was sold in 1959 for the record price of £275,000.

Rubinstein, Anton Grigorovich (1829–94), a famous Russian pianist and composer and founder of the Conservatory St. Petersburg (now Leningrad). His brother Nicholas (1835–81), also a pianist, founded the Conservatory of Moscow.

Rupert, Prince (1619–82), the brilliant Royalist cavalry general and an admiral opposing Cromwell and later the Dutch, was also an early mezzotinter, an experimental scientist, and the first governor of Hudson's Bay Company.

Ruskin, John (1819–1900), writer and art critic, the son of a wealthy London wine merchant

His *Modern Painters* exhibited a masterly perception of the principles of art and a boundless gift of literary expression. Other volumes appeared at intervals including *The Seven Lamps of Architecture* and *The Stones of Venice*, two memorable works which considerably enhanced the author's fame. His writings undoubtedly hastened the recognition of Turner and the Pre-Raphaelite painters. Always taking a deep interest in economic questions, Ruskin delivered and published numerous lectures on a wide range of subjects—art, pleasure, religion, war, work, and so forth; and he was acknowledged to be one of the greatest thinkers of the time. Often his views were impracticable and even eccentric, but behind them there was always evident a sincere desire to promote the well-being of the people.

Russell, Bertrand (Arthur William) 3rd Earl, O.M., F.R.S., M.A. (b. 1872), great English philosopher and mathematician, whose vigorous and sceptical writings are having a profound effect on present-day thought. He writes and speaks in a clear and elegant style and regards the task of the philosopher as one of clarification rather than of speculation. In recent years Lord Russell has been actively engaged in the campaign against nuclear warfare. His numerous writings include *The Principles of Mathematics* (1903), *Principia Mathematica* (1910), written in collaboration with A. N. Whitehead, *Problems of Philosophy* (1911), *Marriage and Morals* (1929) *History of Western Philosophy* (1945), *Human Knowledge* (1948), *Commonsense and Nuclear Warfare* (1959). Nobel Prize for Literature, 1950.

Russell, Sir (Edward) John, O.B.E., D.Sc., F.R.S. (b. 1872). A leading expert on soil chemistry, he has visited most countries of the Commonwealth, the U.S.A., U.S.S.R., and many European countries lecturing and advising on agricultural problems. President of the British Association, 1949.

Russell, George William (1867–1935), Irish poet generally known by his pen name of A.E. or Æ. Widely known as a leader in co-operative enterprise and a pioneer of Abbey Theatre, Dublin.

Russell, John, 1st Earl, K.G., P.C. (1792–1878), third son of the 6th Duke of Bedford. Entered Parliament as Lord John Russell on attaining his majority, and, ranging himself on the Liberal side, showed great capacity for affairs. Introduced first great measure of Reform, which was passed in 1832. Held several offices before succeeding Peel as Prime Minister in 1846. Remained in power until 1852, and was again Prime Minister from 1865 to 1866, resigning when he failed to carry a further reform bill. He also wrote lives of Thomas Moore and Charles James Fox.

Russell of Kilowen, Baron, P.C., G.C.M.G. (1832–1900), Lord Justice of England 1894–98. Was one of the greatest British judges and advocates of the 19th century.

Rutherford, Lord, O.M., F.R.S. (1871–1937), of New Zealand birth. Physicist, pre-eminent in the field of atomic research. Conducted his experiments at Montreal, Manchester, and at the famous Cavendish Laboratory at Cambridge, which attracted brilliant young scientists from all over the world. In 1911 announced his nuclear theory of the atom, and in 1918 succeeded in splitting the atom for the first time. His work paved the way for future nuclear research.

Ruysdael, Jacob van (*c.* 1628–82), great Dutch landscape painter, some of whose pictures are in the National Gallery.

Ruyter, Admiral Michiel Adriaanzoon de (1607–76), the Dutch admiral who in 1667 invaded England with a fleet of Dutch war vessels, advancing up the Thames and Medway and setting fire to considerable shipping. He soon saw fit to retreat, and more serious trouble was averted.

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Sachs, Hans (1494–1576), the German shoemaker-poet of Reformation times, was an earnest worker in the Protestant cause, and wrote over 5,000 different pieces, poetry and prose.

Sadi, or Saadi (Muslih-Uddin) (*c.* 1184–1292), the Persian poet who flourished in the 13th century, and won national fame by his poems *The Garden of Roses* and *The Orchard*.

Sainte-Beuve, Charles Augustin (1804–69), French critic, and one of the most accomplished men of letters under the Second Empire. Author of *Causeries du lundi* and *Histoire de Port Royal*.

Saint-Just, Antoine (1767–94), one of the later leaders of the French Revolution closely associated with Robespierre.

St.-Laurent, Rt. Hon. Louis Stephen, Q.C. (b. 1882), Prime Minister of Canada, 1948–57.

Saint-Saëns, Charles Camille (1835–1921), French composer. He made his debut at a pianist at 10, studied at the Paris Conservatoire, and was for 20 years organist at the Madeleine. His compositions have a classical style and elegance and include symphonic and chamber music and the opera *Samson et Dalila*, which was produced by Liszt at Weimar in 1877.

Saint-Simon, Claude, Comte de (1760–1825), a French scientist and socialist who had great influence upon the thought of his time.

Saintsbury, George Edward Bateman (1845–1933). Professor of Rhetoric and English Literature, Edinburgh University, 1895–1915. Author of numerous critical works on literary subjects, on which he was a leading authority.

Saladin (1137–93), the great Sultan of Egypt and Syria who led the Moslems against the Christians in the Third Crusade. In 1187 he had driven the Christians from Jerusalem after a brilliant victory at Hattin near Tiberias. This gave rise to the Third Crusade led by the Emperor Frederick I., Philip II. of France, and Richard I. of England, which achieved little. Besides being a great warrior, Saladin was a wise and cultured man, renowned for his chivalry.

Salazar, Antonio d'Oliveira (b. 1889), Prime Minister and virtual dictator of Portugal since 1932 and responsible for drafting the Portuguese constitution of 1933. Foreign Minister, 1936–47.

Salisbury, Robert Arthur Talbot Gascoyne Cecil, 3rd Marquess of, K.G. (1830–1903), led the Conservative Governments of 1885–86, 1886–92, and 1895–1902. Has been considered one of the best Foreign Secretaries England has ever had, holding the office from 1878 to 1880, when he attended the Congress of Berlin, and for much of his premiership. Retired from political life after peace was declared in South Africa. His grandson, **Robert Arthur James Gascoyne-Cecil, 5th Marquess of Salisbury,** K.G. (b. 1893), was Leader of the House of Lords, 1942–45 and again 1951–57 when he resigned from the Government over its Cyprus policy. As Viscount Cranborne served as Sec. of State for the Dominions and for the Colonies.

Salter, James Arthur, 1st Baron, P.C., K.C.B., G.B.E. (b. 1881), British economist. Successively Min. of State for Econ. Affairs, 1951–52, and Min. of Materials, 1952–53. Assisted the Government in the direction of shipping in both world wars. Independent member for Oxford University, 1937–50.

Samuel, 1st Viscount, P.C., O.M., G.C.B., G.B.E. (b. 1870), High Commissioner for Palestine, 1920–22; Postmaster-General, 1910–14, and again May to Dec. 1915; Home Secretary, 1916, and again 1931–32. M.P. for Cleveland Division (N. Riding, Yorks), 1902–18, and Darwen Div. of Lancs., 1929–35. Was Under-Sec. to the Home Dept., 1905–9; Chancellor of the Duchy of Lancaster, 1909–10 and 1915–16. Leader of the Liberal Party in the Commons, 1931–35, and in the Lords, 1941–55.

Sand, George (1804–76) the leading French authoress of her time—proper name, Armandine Lucile Aurore Dupin, baronne Dudevant—who, both as novelist and dramatist, achieved the highest success. A friend of men of such singular power as Alfred de Musset, Chopin and Sandeau.

Sanger, Frederick, B.A., Ph.D., F.R.S. (b. 1918), British scientist; Prof. of Biochemistry, Cambridge. Awarded 1958 Nobel Prize for Chemistry for his work in determining the clinical structure of the protein insulin.

Sankey, Ira David (1840–1908), the celebrated American evangelist, singer, and composer, associated with Dwight L. Moody, the revivalist (1837–1899) in mission-work in America and Great Britain for many years.

Santayana, George (1863–1952), philosopher and poet, born in Madrid of Spanish parentage. He was Professor of Philosophy at Harvard University (where he graduated in 1886) from 1907–12, when he moved to France and thereafter spent his time wandering from country to country. His books include *The Life of Reason* (1905–6), the four volumes of *Realms of Being* (1923–40), *Persons and Places* (1945), and *The Middle Span* (1948).

Santos-Dumont, Alberto (1873–1932), Brazilian aeronaut, his most notable flights being made in Paris, and at Monte Carlo. He visited London in 1903.

Sappho (flourished 611–592 B.C.) was the famous lyric poetess of ancient Greece, whose romantic story of *Unrequited Love* is better known than her poetry, of which only a few samples survive.

Sardou, Victorien (1831–1908), French dramatist who had a long series of successes—*Nos Intimes, Séraphine, Rabagas, Divorçons, Fédora, Théodora, Patrie, La Tosca, Madame Sans-Gêne, Robespierre*, and *Dante*, the last-named written specially for Sir Henry Irving. He was elected to the French Academy in 1877.

Sargent, Sir Harold Malcolm Watts, A.R.C.O., F.R.C.M., F.R.S.A. (b. 1895), one of the best known modern British conductors. Succeeded Sir Adrian Boult as permanent conductor of the B.B.C. Symphony Orchestra, 1950–57.

Sargent, John Singer, R.A. (1856–1922). He was of American parentage and received his art education in Paris. As a portrait-painter he had few equals.

Sarolea, Charles, D.Ph., D.Litt., LL.D. (b. 1870), a great scholar and authority on literature. Belgian by birth, but now a naturalised Englishman.

Sartre, Jean-Paul (b. 1905), French philosopher, dramatist, and novelist. Founder of the French *Existentialist* school of philosophy. Imprisoned by the Germans, 1940–41, and joined Resistance Movement after his release. Author of the plays *Huis Clos, La Putain Respectueuse, Crime Passionnel.*

Sassoon, Siegfried (Lorraine), C.B.E. (b. 1886), English poet and writer who received the Hawthornden Prize, 1929, for *The Memoirs of a Fox-hunting Man.*

Savonarola, Girolamo (1452–98), Florentine preacher and reformer, a Dominican friar, who denounced vice and corruption not only in society but also in the Church itself, especially attacking Pope Alexander VI. He was excommunicated, imprisoned, and with two of his companions hanged in public. His passion for reform made him impatient of opposition and incapable of compromise. He understood men's hearts but not their limitations. Yet he was a noble figure rightly commanding the respect of later ages. George Eliot's historical romance *Romola* gives a fine portrait of Savonarola.

Sayce, Prof. Archibald Henry, D.Litt., LL.D., D.D. (1845–1933), a distinguished Assyriologist and philologist who was Prof. of Assyriology at Oxford University, 1891–1919. His most important works are *Introduction to the Science of Language*, 1879, *Ancient Empires of the East*, 1884, *The Principles of Comparative Philology*, 1874, and *Egypt and Babylonian Religion*, 1903.

Sayers, Dorothy Leigh (1893–1957), English authoress who became famous as a writer of detective fiction.

Scarlatti, Alessandro (1659–1725), Italian musician whose influence on the history of opera has been great, founded the Neapolitan school. He composed over 100 operas, 200 masses, and over 700 cantatas and oratorios. His son **Domenico** (1685–1757) was a harpsichord virtuoso and his work has had an important influence in the evolution of the sonata. The chief years of his life were spent at the Spanish Court in Madrid.

Schiaparelli, Giovanni Virginio (1835–1910), famous Italian astronomer who was Director of the Milan Observatory, 1862–1900, and did valuable work on meteors and double stars, but is best known for his discovery of so-called canals on Mars.

Schiller, Johan Christolph Friedrich (1759–1805), the famous German dramatist and poet. Was born at Marbach in Württemberg. Educated at the Military Academy at Stuttgart, and intended for a soldier, he evinced an irresistible desire for literary fame, and in 1782 had his first play, *The Robbers*, successfully produced at the Mannheim Theatre, to which he was subsequently appointed dramatic composer. Later he went to Dresden, where he completed his *Don Carlos*; from 1789 to 1793 he held the chair of history at Jena Univ. when he wrote his *History of the Thirty Years' War*, and gained the friendship of Goethe, at whose suggestion he removed to Weimar, and during the next ten years produced his greatest works—*Wallenstein, Mary Stuart, The Maid of Orleans*, and *William Tell*. A favourite among his many ballads is "The Song of the Bell."

Schlegel, August Wilhelm von (1767–1845), German poet and scholar, best known for his translations of Shakespeare (which established Shakespeare in Germany), Dante, Calderón, and Camões. His *Lectures on Dramatic Art and Literature* are outstanding for their scholarship.

Schliemann, Heinrich (1822–90), German archæologist who made many notable excavations, discovered Troy and other Homeric sites. (*See* **H3**).

Schnabel, Artur (1882–1951), American pianist of Austrian birth, regarded as the greatest exponent of Beethoven's pianoforte sonatas.

Schönberg, Arnold (1874–1951), Austrian composer who emigrated to the United States during the Nazi regime. Among his works are the choral orchestral *Gurre-Lieder* and *Pierrot Lunaire*, a cycle of 21 poems for voice and chamber music

Schopenhauer, Arthur (1788–1860), was a German philosopher of a pessimistic cast of mind. His mysticism partakes somewhat of the higher Buddhism. His chief works are *The World Considered as Will and Idea* and *The Two Fundamental Problems of Ethics.*

Schreiner, Olive, pen name of Mrs. Cronwright Schreiner (1855–1920), a noted South African novelist, born in Basutoland. She first attracted attention with her successful *Story of an African Farm* (1883) by which work she is best known. She excelled in depicting veldt scenery and Dutch character.

Schubert, Franz Peter (1797–1828), Austrian composer, born in Vienna, the son of a schoolmaster He was a contemporary of Beethoven and wrote not only symphonies, sonatas, string quartets, choral music, and Masses but also over 600 songs of unsurpassed lyrical beauty. It is as creator of the German *Lied* that his name is immortal. He died in Vienna at the age of 31, in poverty, before the full flowering of his musical genius.

Schumann, Robert Alexander (1810–56), composer of the early 19th-century German Romantic school. He wrote much chamber music, four symphonies, a piano concerto, and choral music, but it is his early piano pieces and songs that give constant delight. His wife **Clara** (1819–96) was one of the outstanding pianists of her time, especially as interpreter of Chopin.

Schweitzer, Albert, D.Theol., Dr. Phil., Dr. Med. (b. 1875), missionary in Lambaréné, a musical critic and authority on Bach's music, a famous organist, and a noted biblical critic who became a Doctor of Medicine in order to devote his life to missionary work in Equatorial Africa. Awarded 1952 Nobel Prize for Peace and Hon. O.M. in 1955.

Scipio, Publius Cornelius (*circa* 232–183 B.C.), the greatest of the Scipios known as Scipio Africanus the elder. A distinguished Roman general in the 2nd Punic War.

Scott, Charles Prestwich (1846–1931), English journalist who was editor of the *Manchester Guardian*, 1872–1929, which under his editorship became one of the leading journals of the country.

Scott, Sir George Gilbert, R.A. (1811–78), architect who gained special fame for his restorations of Gothic churches and cathedrals, incl. Westminster Abbey, designer of the Albert Memorial, St. Pancras Station, the Martyrs' Memorial at Oxford, and St. Anne's Church in Alderney.

Scott, Sir Giles Gilbert, O.M., R.A., F.R.I.B.A. (1880–1960), architect whose work includes the great modern Gothic Liverpool Cathedral (begun 1904 and still under construction) and Waterloo Bridge. Grandson of the above.

Scott, Peter Markham, M.B.E., D.S.C. (b. 1909), son of Captain Scott, is known as yachtsman, broadcaster, author of *The Battle of the Narrow Seas*, and bird-artist.

Scott, Captain Robert Falcon, C.V.O. (1868–1912),

commanded the National Antarctic Expeditions in 1901–4 and in 1910. His ship, the *Terra Nova*, left England on June 1, 1910. In Jan. 1911, winter quarters were established at Cape Evans, and in the following November Scott and a select party left Hut Point for the South Pole, which they reached on Jan. 18, 1912, finding there the Amundsen records. On the return journey every member of the party perished. Seaman Edgar Evans died from concussion of the brain on Feb. 17; Capt. Oates from exposure on March 17; and on March 29 the rest of the party (Scott, Wilson and Bowers) died from starvation and exposure in a blizzard when only 11 miles from One Ton Depot.

Scott, Sir Walter, Bart. (1771–1832), one of the greatest of British novelists and a distinguished poet. He was educated for the Bar. His *Minstrelsy of the Scottish Border* was published in 1802. This was followed in 1805 by *The Lay of the Last Minstrel*, in 1808 by *Marmion; The Lady of the Lake*, *Rokeby* and *The Lord of the Isles* coming afterwards in quick succession. In 1814 he published *Waverley* anonymously, which obtained instant success. Other stories followed and the Waverley novels and their author, "The great Unknown," were everywhere the subject of discussion. *Guy Mannering*, *The Antiquary*, *Old Mortality*, *Rob Roy*, and the *Heart of Midlothian* were all published before the secret of their authorship was disclosed. The chief works of his last years were *Woodstock*, *Life of Napoleon*, and *Tales of a Grandfather*. He died at Abbotsford. Created a baronet in 1820.

Scott-Paine, Hubert (1891–1954), pioneer in the design and construction of aircraft and sea craft, in particular flying-boats and high-speed motor-boats.

Scriabin, Alexander (1872–1915), Russian composer and pianist. He studied at the Moscow conservatoire, where he was later professor of the pianoforte, 1898–1904. He was deeply interested in theosophy, and in such works as *The Divine Poem* and *Prometheus: a Poem of Fire* he attempted to unite music and philosophy.

Seeley, Sir John Robert, K.C.M.G. (1834–95), was an historian of note, but acquired his chief fame as a writer by his *Ecce Homo* and *Natural Religion*.

Segovia, Andrés (b. 1894), Spanish concert-guitarist. He has adapted works by Bach, Haydn, Mozart, and other classical composers to the guitar.

Selfridge, Harry Gordon (1858–1947), the American who revolutionised the British department store when he opened the famous shop of Selfridges in Oxford Street in 1909. Noted for his ambitious advertising and lavish entertaining.

Seneca, Lucius Annaeus (*circa* 4 B.C.–A.D. 56), the famous stoic philosopher, who was tutor to Nero, and one of that emperor's most influential advisers; he was sentenced to end his own life, a sentence which he courageously carried out.

Senefelder, Alois (1772–1834), was the son of an actor at Munich, and himself engaged in dramatic composition. Being too poor to bear the cost of having his works printed, he turned his attention to inventing lithography, the main feature of the invention being discovered by accident.

Severus, Lucius Septimius (146–211), was Roman Emperor from 193 to his death. After many victories in the East he passed over to Britain with an army, subjugated the Caledonians, and repaired and partly rebuilt the famous Hadrian's wall from the Solway Firth to the mouth of the Tyne. He died at York.

Sévigné, Marie de Rabutin-Chantal, Marquise de (1626–96), French woman of letters. Her letters to her daughter Françoise written in an unaffected elegance of style give a moving picture of fashionable society in 17th-century France.

Sgambati, Giovanni (1841–1914), Italian pianist and composer who revived interest in classical instrumental music in an age of opera. Well known is his quartet in D flat.

Shackleton, Sir Ernest (Henry), C.V.O., O.B.E. (1874–1922), commander of the Nimrod Farthest South expedition of 1907–9, reached within 100 miles of the South Pole, and embarked on a new expedition in 1914. He died whilst on a scientific voyage to the Antarctic.

Shaftesbury, Anthony Ashley-Cooper, 7th Earl of (1801–85), a distinguished philanthropist, identified himself with the Ten-Hours Bill, connected with the Ragged School Union, Reformatories, Refuges, and Christian Associations of many kinds.

Shakespeare, William (1564–1616), England's greatest poet and dramatist, was born at Stratford-on-Avon, and was the son of a tradesman of that town who must have been at one time fairly well-off, seeing that he was made an alderman, and afterwards served as High Bailiff. Later on, however, he appears to have been unfortunate and fallen into straitened circumstances. William was the eldest son, and was probably educated at the Stratford Grammar School, but very little is known of his career up to his eighteenth year, when we have it on record that he married Anne Hathaway, who was eight years his senior. Five years after his marriage he went to London, and the next we hear of him is that he was connected with the Globe Theatre and appeared in sundry small parts. He first appeared before the public as a poet in 1593, with his *Venus and Adonis*, following this in 1594 with *The Rape of Lucrece*. Shortly afterwards he was proprietor of the Globe Theatre, and also had an interest in the Blackfriars Theatre. Then he began that remarkable career of play-writing which has since been the wonder of the world. Thirty-eight plays comprise the Shakespeare canon. Thirty-six were printed in the First Folio of 1623 (the first collected edition of his dramatic works), of which eighteen had been published during his lifetime in the so-called Quartos. *Love's Labour's Lost* and *The Comedy of Errors* seem to have been among the earliest, being followed by *The Two Gentlemen of Verona*, and *Romeo and Juliet*. Then followed *Henry VI*, *Richard III*, *Richard II*, *Titus Andronicus*, *The Taming of the Shrew*, *King John*, *The Merchant of Venice*, *A Midsummer Night's Dream*, *All's Well that Ends Well*, *Henry IV*, *The Merry Wives of Windsor*, *Henry V*, *Much Ado about Nothing*, *As You Like It*, *Twelfth Night*. Then came some of his greatest plays, *Julius Cæsar*, *Hamlet*, *Troilus and Cressida*, *Othello*, *Measure for Measure*, *Macbeth*, *King Lear*, *Timon of Athens*, *Pericles*, *Antony and Cleopatra*, *Coriolanus*, *Cymbeline*, *A Winter's Tale*, *The Tempest*, *Henry VIII*, and *The Two Noble Kinsmen*. It was evident that his plays were remunerative, inasmuch as in a few years he was able to purchase property at Stratford, and when he retired from his profession (about 1610 or 1612) he returned to his native town to live in a house which he had himself built. He died at Stratford at fifty-two, and was buried in Stratford Church.

Sharp, Granville (1735–1813), slavery abolitionist and founder of the colony of Sierra Leone.

Shaw, George Bernard (1856–1950), brilliant Irish dramatist who conquered England by his pungent wit and devastating exposure of hypocrisy, cant and national weaknesses, and persistently expressed a highly individual opinion whether in his musical criticisms, socialist pamphlets or plays. He wrote many plays including *Man and Superman*, *Heartbreak House*, *Back to Methuselah*, *Saint Joan*, *The Apple Cart*, *Buoyant Billions*, most of which have important prefaces, sometimes equalling the play in length. Was music critic (1888–94) successively to the London *Star* and *World* and during this period wrote *The Quintessence of Ibsenism* and *The Perfect Wagnerite*. Joined the Fabian Society in 1884 and was awarded Nobel Prize for Literature in 1925. He was greatly interested in the reform of the alphabet to save time and labour, and left on trust part of his estate for the carrying out of his ideas. His house at Ayot St. Lawrence was taken over by the National Trust.

Shelley, Percy Bysshe (1792–1822), one of the most brilliant poetic geniuses of the 19th century, renowned for the daring and unorthodox opinions which he held. His *Queen Mab* (written when he was nineteen), his *Alastor*, *The Revolt of Islam*, *The Witch of Atlas*, and *Adonais* all breathe the true spirit of poetry,

securing him a place in the first rank of British poets. He showed fine dramatic gifts in the *Cenci* and *Prometheus Unbound*, almost reaching sublimity in the latter masterpiece. His *Adonais* was a splendid tribute to the genius of Keats. His first wife, whom he married while very young, committed suicide. He afterwards married Mary Wollstonecraft Godwin, and formed other attachments of a complicating nature. Was always at war with his family, and finally, after spending some time with Byron and Leigh Hunt and other friends in various parts of Italy, was drowned in the Gulf of Spezia by the capsizing of his boat in a storm.

Shepard, Ernest Howard (b. 1879), chief cartoonist of *Punch* since 1945. Illustrator of *Winnie-the-Pooh* and other books by A. A. Milne.

Sheppard, Very Rev. Hugh Richard Lawrie (Dick), C.H., D.D. (1880–1937), Vicar of St. Martin-in-the-Fields, London, 1914–27, where he established a reputation by his broadcast sermons and attracted large crowds of listeners. Dean of Canterbury, 1929–31; Canon of St. Paul's, 1934–37. Buried in Canterbury Cathedral.

Sheraton, Thomas (1751–1806), was the last of the great English cabinet-makers of the 18th century. The Sheraton style which he introduced marks a reaction against Chippendale (*q.v.*).

Sheridan, Rt. Hon. Richard Brinsley Butler (1751–1816), one of the greatest of English playwrights, whose comedies are frequently revived. Was born in Dublin, and educated partly at Harrow. Showing considerable capacity for dramatic composition he obtained an introduction to the Covent Garden management, and it was at the Covent Garden Theatre in 1775 that his first comedy, *The Rivals*, was produced, with such a gratifying result that Garrick, who was then at Drury Lane, opened up negotiations with the dramatist which ended in Sheridan becoming part (and ultimately sole) proprietor of Drury Lane. *The Duenna*, a musical comedy, was produced in 1775, and ran through the winter. From 1777 Sheridan managed Drury Lane, opening with an adaptation of Vanbrugh's *Relapse*. This was followed by the production of the greatest of his comedies, *The School for Scandal*, which had a wonderful success. In 1779 *The Critic* was given, and after that Sheridan wrote no more plays until 1789, when *Pizarro* was produced. In the meantime he had gained a high reputation in another sphere. In 1780 he obtained a seat in Parliament and although he only spoke on certain set occasions, he acquired a reputation for oratory which stood him in very good stead, and he filled one or two minor Ministerial offices, remaining in Parliament until 1812.

Sherman, General William Tecumseh (1820–91), a famous American soldier who, after taking part in the War with Mexico (1846–48), volunteered at the outbreak of the Civil War (1861). He took part in the battles of Bull Run and Shiloh, and was placed in command of the Army of the Tennessee (1863) and of the military division of the Mississippi with a force of 100,000. In 1864 there occurred the famous 300-mile march across Georgia to the sea. In 1865 his second march, through the Carolinas, culminated in the defeat of Johnston, which led directly to the termination of the war.

Sherrington, Sir Charles Scott, O.M., G.B.E., F.R.S., M.D., D.Sc. (1857–1952), one of the greatest of British scientists, and a leading authority on the physiology of the nervous system, whose research work over many years led to great advances in the surgery of the brain. Pres. of the British Association 1920, and of the Royal Society, 1920–25. Awarded Nobel Prize for Medicine, 1932.

Shirley, James (1596–1666), was an eminent dramatist and poet, imbued with the Elizabethan traditions. He and his wife are said to have died from shock after the Great Fire.

Shostakovich, Dmitry Dmitryevich (b. 1906), one of the most celebrated of present-day Russian composers. His music is complex, profound, and deeply significant of the Soviet age in which he lives. His works include operas, ballets, symphonies, chamber music, and music for films.

Sibelius, Jean Julian Christian (1865–1957), Finnish composer, generally acknowledged as the greatest of the century. Works include seven symphonies, violin concerto, several tone poems, about 200 pianoforte compositions and songs.

Sickert, (Walter) Richard (1860–1942), British painter and etcher; became President of Royal Society of British Artists, 1928.

Siddons, Sarah (1755–1831), the daughter of Roger Kemble, a theatrical manager. The greatest tragic actress of her time.

Sidgwick, Henry (1838–1900), Professor of Moral Philosophy at Cambridge, and besides being an eminent educationist in the broader sense, devoted himself with special success to the cause of women's education, Newnham and Girton being largely the outcome of his efforts.

Sidney, Sir Philip (1554–86), statesman, poet and soldier; was one of Queen Elizabeth's favourites, and a man of singular ability and bravery. While living in temporary retirement he composed his famous *Arcadia*, but did not allow it to be published in his lifetime. He did not lack for literary fame, however, his *Apology for Poetry* and *Defence of Poesy*, as well as numerous miscellaneous pieces all distinguished for their beauty of expression and tender sentiment, having won much favour, especially in the circle of the Court. In 1586 he was given a command in the Netherlands and was killed at Zutphen

Siemens, Sir William, F.R.S. (1823–83), a German born scientist and inventor, chiefly in the field of heat and electricity. Constructed many overland and submarine telegraphs. Brother of Werner v. Siemens, founder of the famous firm of Siemens-Halske.

Sienkiewicz, Henryk (1846–1916), famous Polish novelist; Nobel prizewinner, 1905 (*Quo Vadis*)

Sikorski, Wladyslaw (1881–1943), Polish general and statesman; Prime Minister during second world war.

Simpson, Sir James Young, Bt., F.R.S. (1811–70) the discoverer of the utility of chloroform as an anæsthetic, was a native of Scotland, and was a most accomplished experimental surgeon.

Sinclair, Upton (b. 1878), American novelist whose documentary novel *The Jungle* about the Chicago slaughteryards caused a sensation in 1906. Made a bold bid for election as Democratic candidate for the Governorship of California in 1934, but was defeated.

Singer, Isaac Meritt (1811–75), American mechanical engineer who devoted himself to the improvement of the early forms of the sewing-machine and patented a single-thread and chain-stitch machine.

Sisley, Alfred (1839–1899), French Impressionist painter of English origin. Painted with great delicacy and sensitivity, landscapes, villages, trees, and rivers. Influenced by Corot and Manet.

Sitwell, Edith (Louisa), D.B.E. (b. 1887), English poet whose works include *Bucolic Comedies*, *Gold Coast Customs* and *Collected Poems*. Her two brothers are **Osbert** (b. 1892), a well-known poet and novelist, and **Sacheverell** (b. 1900), a poet and critic.

Slim, Field-Marshal Sir William J., K.G., G.C.B., G.C.M.G., G.C.V.O., G.B.E., D.S.O., M.C. (b. 1891), Gov.-Gen. of Australia 1953–59. In 1943 took command of the 14th Army in Burma, later becoming commander of the Allied Land Forces, S.E.A.C., and then Commandant of the Imperial Defence College. In 1947 joined the Railway Executive, but left a year later to succeed Lord Montgomery as Chief of the Imperial General Staff (1948–52).

Sloane, Sir Hans, Bt., F.R.S. (1660–1753), was born in County Down, Ireland, but settled in London, and became famed as a physician and naturalist. For some years he held the office of President of the Royal College of Physicians, and was elected President of the Royal Society in succession to Sir Isaac Newton. His Library of 50,000 vols., and treasures in natural history and MSS., worth from £50,000 to £80,000, were offered by his will to, and bought by the nation for £20,000, and with that nucleus the British Museum was founded.

Slowacki, Julius (1809–49), Polish romantic poet. He was a revolutionary, lived in exile and died in Paris. His tragedies include *Kordian*, *Belladyna* and *Lilli Weneda*.

Smeaton, John (1724–92), who rebuilt Eddystone Lighthouse, which had been burned down; he

subsequently constructed many important works in connection with harbours and canals. He was also the inventor of an improved blowing apparatus for iron-smelting.

Smetana, Bedřich (1824–84), Czech composer, creator of a national style. He was principal conductor of the Prague National Theatre, for which he wrote most of his operas, including *The Bartered Bride* and *The Kiss*. Best known of his other compositions are the cycle of symphonic poems *My Country* and the string quartets *From My Life*. He became totally deaf in 1874, suffered a mental breakdown, and died in an asylum.

Smiles, Dr. Samuel (1812–1904), was in early life a medical practitioner; achieved wide popularity by his *Self Help*, a book that has had an enormous sale.

Smith, Adam, F.R.S. (1723–90), the father of the science of political economy. Author of *Theory of Moral Sentiments* and *Wealth of Nations*, which immediately obtained the admiration of the leading men of the day, and secured him the friendship of Gibbons, Hume, Burke, Reynolds, and Dugald Stewart.

Smith, Sir Grafton Elliot, M.A., Litt.D., D.Sc., F.R.S. (1871–1937), Australian anatomist and archaeologist who was successively Professor of Anatomy in the University of Manchester, in the Egyptian Government School of Medicine, Cairo, in University College, London, and from 1933 until his death in Jan. 1937 Fullerian Professor of Physiology at the Royal Institution. He conducted brilliant researches on the structure of the mammallian brain, and stood in the front rank of comparative anatomists. His works include *The Royal Mummies* (1912), *Tutankhamen* (1923), *The Evolution of Man* (1924), and the *Diffusion of Culture* (1933).

Smith, Captain John (1580–1631), the noted seafarer and adventurer who in 1605 was the leading spirit of an expedition to Virginia, and founded Jamestown.

Smith, Joseph (1805–44), founder of Mormonism, son of a Vermont farmer. Claimed to have been granted revelation of the *Book of Mormon*, which came to be held as equal in authority and as a necessary supplement to the Scriptures. Smith, who was murdered, was not a polygamist; Brigham Young, who succeeded him, was. *See* Mormonism. Gen. Inf.

Smith, Sydney (1771–1845), an Anglican divine, who enjoyed a great reputation as a wit and writer. Founder of and contributor to the *Edinburgh Review* and author of *Peter Plymley's Letters*, supporting Catholic Emancipation.

Smollett, Tobias George (1721–71), a famous English novelist and humorist, whose *Roderick Random*, *Peregrine Pickle*, *Count Fathom* and *Humphrey Clinker* abound in fun and genial characterisation, while their pictures of sea-life are inimitable.

Smuts, Field-Marshal Rt. Hon. Jan Christiaan, O.M., C.H., K.C. (1870–1950), South African soldier and statesman, one of the dominating political figures of our century. Born in Cape Colony, studied at Cambridge University, and called to the Bar. Was an outstanding Boer commando leader during the South African War, but afterwards worked for friendship with the British and took office in Botha's Government when the Union was set up in 1910. In the first world war joined the Imperial War Cabinet. As Prime Minister, 1912–24, helped to launch the League of Nations, and more recently was associated with the United Nations. Prime Minister, Foreign Minister and Minister of Defence from 1939 to 1948 when he was defeated at the General Election by the Nationalists under Dr. Malan. He was a keen botanist; Pres. of British Association, 1931. His book *Holism and Evolution*, published in 1926, was widely discussed in the scientific world.

Smyth, Dame Ethel Mary (1858–1944), English composer, the daughter of a general, and a militant suffragette. She studied in Germany, where her most important opera *The Wreckers* was first produced. She also wrote chamber music, a comic opera *The Boatswain's Mate*, and a *Mass in D*.

Snyders, Frans (1597–1657), a great Flemish still-life and animal painter who studied under Breughel.

Soane, Sir John, R.A. (1753–1837), an eminent architect who designed numerous public buildings. By his will he left his museum, library, pictures, etc., for the use of the public, and the house in which he lived at Lincoln's Inn Fields still constitutes the Sir John Soane Museum.

Sobieski, John III. (1624–96), King of Poland from 1674, and heroic defender of his country from Cossacks, Tartars, and Turks.

Socinus, Lælius (1525–62), an Italian Protestant thinker and anti-Trinitarian, founder with his nephew Faustus Socinus (1539–1604), of the Socinian system of theology.

Socrates (470–399 B.C.), Greek philosopher and great intellectual leader, was the son of a sculptor and for some time followed that calling himself, but, having other ambitions, joined the army, and was present at the battle of Potidæa, and also at the battle of Delium, saving the life of Alcibiades in the first, and of Xenophon in the second. Returning to Athens he devoted himself to study and began to exhort the people on public questions and the conduct of life. Socrates wrote nothing himself, but we know of his teachings through the writings of his pupils Xenophon and Plato. In 399 B.C. he was charged with impiety and with corrupting the morals of the young, found guilty, and sentenced to death, events immortalised in Plato's *Apology*, *Crito*, and *Phaedo*.

Soddy, Frederick, M.A., LL.D., F.R.S. (1877–1956), Prof. of Inorganic and Physical Chemistry, Univ. of Oxford, 1919–36. Nobel Laureate in Chemistry 1921. The foundation of the isotope theory was laid by him in Glasgow about 1912 before the physicists became prominent in that field.

Solon (638–558 B.C.), was one of the Seven Sages of Greece, and became an eminent legislator, after having made a reputation as a poet. Solon's Laws were so highly esteemed that they were adopted by the Romans in the Twelve Tables.

Solyman (1490–1566), the celebrated Ottoman Sultan known as "the Magnificent," who won fame as a conqueror, law-giver, administrator, and patron of learning.

Somerset, 1st Duke of (1506–52), was Protector of England in the early part of the reign of Edward VI., but was deposed from power, tried for felony, and executed. A liberal and tolerant ruler who opposed enclosures and pursued a moderate religious policy.

Sophocles (495–406 B.C.), the famous Athenian dramatist who enjoyed the highest popularity at Athens, and in a contest with Æschylus was crowned the victor. Of the 100-odd plays of Sophocles only seven have survived: *Antigone*, *Electra*, *Œdipus*, *Ajax*, *Trachiniæ*, *Philoctetes*, and *Œdipus at Colonus*.

Soult, Marshal Nicolas Jean de Dieu, Duke of Dalmatia (1769–1851), was one of Napoleon's favourite and most capable generals, distinguishing himself in the Swiss and Italian campaigns, and also in the Peninsular War, where he was Wellington's bravest opponent.

Sousa, John Philip (1854–1932), American bandmaster and composer of numerous stirring marches. His father was Portuguese and his mother German.

Soustelle, Jacques, D. ès. L. (b. 1912), French scientist and controversial figure in French politics. As leader of the U.N.R. (Union for a New Republic) he planned and carried through the revolution which brought General de Gaulle back to power in 1958. Dismissed from Government, Feb. 1960.

Southey, Robert (1774–1843), poet and author. In 1803 he went to live near Keswick to be near Coleridge where he resided until his death. In 1813 he was made Poet Laureate. In poetry he was overshadowed by the greater genius of Byron and Shelley, but in prose he was eminently successful, his *Life of Nelson*, his *Doctor*, *Commonplace Book*, and other works being as strong and vigorous as his verse was tame.

Southwell, Robert (1561–95), a famous Jesuit and religious poet of Elizabethan times. Beatified in 1929.

Spaak, Paul-Henri (b. 1899), Belgian statesman; first President of the U.N. General Assembly in 1946 and of the Assembly of the Council of Europe during its first session in 1949. Sec. Gen. of NATO, 1957–.

Spaatz, General Carl Andrew (b. 1891), American soldier who held high commands in Europe, North Africa, and the Pacific, 1942–46.

Spartacus, a Thracian who became a Roman slave and gladiator in Capua, and headed an insurrection in Italy in 73 B.C. The slaves he raised routed several Roman armies, but he was eventually defeated by Crassus in 71 B.C. and slain.

Speke, Capt. John Hanning (1827–64), was the discoverer, along with Lt.-Col. J. A. Grant, of the Kagera, the main source of the White Nile, in 1862. In 1856 he discovered Lake Tanganyika and in 1858 Victoria Nyanza.

Spencer, Herbert (1820–1903), was the son of a Derby schoolmaster. For some time followed the profession of civil engineer. His first book was published in 1851, under the title of *Social Statics*, when he was filling the position of sub-editor of the *Economist*. In 1855 his *Principles of Psychology* appeared, in which he seems to have anticipated Darwin's theory of Evolution. The *System of Synthetic Philosophy* began to appear in 1860, and the last of its ten volumes was issued in 1896.

Spencer, Sir Stanley, C.B.E., R.A. (1891–1959), British artist whose work shows great visionary and spiritual power. His paintings include the Resurrection pictures and the Cookham Regatta series.

Spenser, Edmund (1552–99), was born in London, educated at Cambridge, and early attracted notice by his poetic writings. After the publication of his *Shepheardе's Calendar*, he was made known to Queen Elizabeth, and in 1580 received the appointment of Secretary to the Lord Deputy of Ireland, and in the division of confiscated lands that afterwards took place, Spenser received Kilcolman Castle and 3,000 acres of land. Here he wrote his *Faerie Queene*. In 1598 a rebellion broke out, and Spenser's castle was burned to the ground. He then returned to London, and there died.

Spinoza, Baruch or Benedict (1632–77), one of the greatest of modern philosophers, was born at Amsterdam, the son of a Portuguese Jew who had settled there as a merchant. He had a sceptical turn of mind and having expounded philosophical doctrines antagonistic to Judaism, was excommunicated by the rabbis as a heretic. He owed much to Descartes and in 1663 published his work on the Cartesian philosophy. The attainment of truth was his one object in life. Indifferent to money, he spent his life in study and earned his living as a lens grinder. His writings have had an extensive and enduring influence though during his lifetime some of his works, including his *Ethics*, were not allowed to be published.

Spofforth, Reginald (1770–1827), a writer of glees, including *Hail, Smiling Morn*.

Spurgeon, Rev. Charles Haddon (1834–92), a renowned Baptist who preached at The Tabernacle, near the Elephant and Castle, London, from 1861 until his death.

Squire, Sir John Collings (b. 1884), Englishman of letters. He engaged in journalism, and edited the *New Statesman* 1913–18, and was the founder and editor of the *London Mercury*, 1919–34, with which his name is inseparably connected. A prolific writer, he published among other works *Grub Street Nights*, *Steps to Parnassus*, *Collected Parodies*, *American and other Poems*, *Outside Eden*, also many volumes of collected criticism.

Staël, Madame de (Anne Louise Germaine Necker, Baronne de Staël-Holstein) (1766–1817), the daughter of Necker, the famous Finance Minister under Louis XVI., was married to Baron de Staël (Swedish Minister) at twenty. She was a brilliant woman, deeply imbued with philosophical sentiments. Two years after her marriage she made a considerable impression by her *Letters on Rousseau*, and was regarded as in sympathy with the Revolution. Later on, however, she was in disfavour, first with the Revolutionary leaders, and then with Napoleon, and was in turn exiled by both and during this time wrote *Corinne* and other able works.

Stalin, Generalissimo Joseph Vissarionovich (Djugashvili) (1879–1953), Soviet statesman who for nearly thirty years was leader of the Russian people. Studied for the priesthood at the Tiflis theological seminary. From the age of 17 was an active revolutionary and took important part in the civil war after 1917. After the death of Lenin became the outstanding figure in Russia and his aim to make Russia a great industrial power was carried into effect by modernizing agriculture on socialist lines and by a series of five-year plans, the first of which was introduced in 1929. Assumed military leadership against the German invasion, June 1941. Attended the Allied war conferences at Teheran, Yalta, and Potsdam. The denunciation of Stalin and the "personality cult" by M. Khruschev at the Soviet Communist Party Congress in Feb. 1956 has led to profound and far-reaching political consequences in other Communist countries.

Stanford, Sir Charles Villiers, Mus. D. (1852–1924), Professor of Music at Cambridge University, and Professor of Composition and Orchestral Playing in the Royal College of Music. An organist and conductor of remarkable ability, and a composer of much fine instrumental choral, operatic, and other music.

Stanley, Sir Henry Morton, G.C.B., (1841–1904), English explorer, after an adventurous early career during which he fought for the Confederates in the American Civil War, joined the *New York Herald* as a correspondent in 1867 and was commissioned by Gordon Bennett to search for Livingstone. In 1871 he discovered the great missionary at Ujiji and with him explored the northern end of Lake Tanganyika. After further exploration he founded the Congo Free State in 1879. Among his books were *How I found Livingstone*, *Through the Dark Continent*, *In Darkest Africa*, and an *Autobiography*.

Steele, Sir Richard (1672–1729), b. in Dublin, founder of *The Tatler*, which made a great hit his friend Addison contributing many papers Two years later he and Addison were associated in *The Spectator*, Addison, however, being the leading contributor; the *Guardian* was another of Steele's ventures. He sat in Parliament for some time, and was knighted by George I.

Steer, Philip Wilson, O. M. (1860–1942), was the most distinguished of British landscape painters, and a fine portraitist.

Stefansson, Vilhjalmur (b. 1879), a famous Arctic explorer, born in Manitoba of Icelandic parents. Took part in the Anglo-American (1908–12) and Canadian (1913–18) Arctic expeditions.

Stein, Sir Aurel, K.C.I.E. (1862–1943), was a famous British archæologist who conducted expeditions, chiefly to Chinese Turkestan, resulting in priceless additions to the British Museum and the Delhi Central Indian Museum. Explored Baluchistan, 1926–28, and South Iran, 1932–33. Was Superintendent of Archæological Survey, North-West Frontier Circle, India 1910–29.

Stendhal, pseudonym of the French novelist, Marie Henri Beyle (1783–1842); *Le Rouge et le Noir*, *La Chartreuse de Parme*.

Stephen (1105–54) was King of England from 1135 to his death, usurping the crown that belonged to Matilda, the daughter of Henry I.

Stephen Sir Leslie, K.C.B. (1832–1904), an eminent writer, critic and biographer. Edited the *Cornhill Magazine* (1871–82), and the *Dictionary of National Biography* (1882–91). He was the father of Mrs. Virginia Woolf.

Stephenson, George (1781–1848), was born at Wylam, near Newcastle, and up to 1804 was mainly engaged in ordinary colliery occupations. In 1804, however, an engagement as brakesman at Killingworth colliery brought him in touch with the working of Watt's steam engine, and his first efforts in invention were in improving one of those engines, showing so much ability that he was offered an engine-wright's position at Killingham, which he held for some time. Then it was that he began to think seriously of producing a locomotive engine, and managed to construct an engine that would draw coal trucks at the rate of four miles an hour. In 1821, when the Stockton and Darlington Railway was undertaken, he was appointed engineer, and when the railway was opened in 1825, as a line for the transport of coal only, Stephenson won his first great triumph, by putting a locomotive on the line that was able to draw a train of thirty-eight carriages, laden with goods and passengers, at a rate of twelve miles an hour. George Stephen-

son, subsequently, assisted by his son Robert, constructed the Liverpool and Manchester line, and after that the railway era commenced.

Stephenson, Robert, F.R.S. (1803–59), the only son of George Stephenson, attained great eminence as a civil engineer, constructing numerous important railways and bridges, being designer and contractor for the High Level Bridge at Newcastle, the Menai and Conway Tubular Bridges, the Victoria Bridge across the St. Lawrence at Montreal, and two notable bridges over the Nile.

Sterne, Laurence (1713–68), one of Britain's greatest humorists. His great work *Tristram Shandy*, the first two volumes of which were published in 1759, and the last in 1767, was so unique in character and so sparkling with wit and high spirits that, despite a certain coarseness, it made him famous. He also wrote *The Sentimental Journey*, and published some volumes of sermons.

Stevenson, Robert, F.R.S.E. (1772–1850), a native of Glasgow, and famed as a builder of lighthouses, including that on Bell Rock. He also invented the "flashing" system of throwing light at sea.

Stevenson, Robert Louis (1850–94), was the Scottish author of a remarkable series of essays, stories, and poems, including *Travels with a Donkey*, *Virginibus Puerisque*, *Treasure Island*, *Kidnapped*, *Dr. Jekyll and Mr. Hyde*, and *A Child's Garden of Verses*. He always suffered from delicate health and travelled extensively, finally settling in Samoa with his Californian wife, formerly Mrs. Osbourne. His literary influence was considerable, particularly on the generation which followed him.

Stinnes, Hugo (1870–1924), German industrialist who built up a huge coal-mining, iron and steel, and transport business, and also developed a large shipping concern. His group controlled the greater part of Germany's coal, iron and steel supply. In 1920 he entered the Reichstag, and later became a newspaper proprietor.

Stirling, Elizabeth (1819–95), English organist whose recitals in London exercised much influence and made Bach's music more widely known. She wrote the part-song "All among the barley."

Stoker Bram (Abraham) (1847–1912), b. in Ireland, author of *Dracula* and *Personal Reminiscences Of Henry Irving*, which records his association with the actor in managing the Lyceum Theatre.

Stokes, Sir George Gabriel, LL.D., F.R.S. (1819–1903), a distinguished Irish mathematician and physicist who became Lucasian Professor of Mathematics at Cambridge, 1849; Secretary of the Royal Society 1854–85 (President 1885–90) and was President of the British Association, 1869. To him is due the modern theory of viscous fluids, while in optics his theory of diffraction opened up hitherto unexplored fields of research.

Stopes, Marie Carmichael, D.Sc., Ph.D., F.L.S., F.R.L.S. (1880–1958), woman scientist who published many works on birth control.

Stowe, Harriet Elizabeth Beecher (1811–96), authoress of *Uncle Tom's Cabin* which exposed the horrors of slavery and did much to advance the cause of abolition.

Strachey, Rt. Hon. Evelyn John St. Loe (b. 1901), Labour M.P. for Dundee West. Writer of lucid and vigorous books on socialist economics which include *The Coming Struggle for Power* (1932), and *The End of Empire* (1959).

Stradivari, Antonio (1644–1730), an Italian maker of violins, first in his art in the world of all time.

Strafford, Thomas Wentworth, Earl of (1593–1641), the distinguished statesman, sent by Charles I. to Ireland as Lord Deputy in 1631. Was the founder of the Irish linen manufacture. He obtained the name of "Thorough" by his sweeping measures for asserting the King's authority, but was ultimately impeached on a variety of charges, found guilty, and executed.

Strauss, David Friedrich (1808–74), German theological writer, who made a great stir in the religious world by his *Life of Jesus*, published in 1835, which attempted to prove that the evangelical history mainly rested on a series of myths.

Strauss. Family of Viennese musicians. **Johann Strauss** (1804–49), "the elder," was a composer of dance music who with Joseph Lanner established the Viennese waltz tradition. His son, **Johann Strauss** (1825–99), "the younger," although not so good a violinist or conductor as his father, is the more famous as the composer of over 400 waltzes, which include *The Blue Danube* and *Tales from the Vienna Woods*. Two of his brothers **Joseph Strauss** (1827–70) and **Eduard Strauss** (1835–1916) were also composers and conductors.

Strauss, Richard (1864–1949), German composer and conductor, the son of a horn player in the opera orchestra at Munich. He succeeded von Bülow as court musical director at Meiningen. Among his compositions which are widely acclaimed are the operas *Salome*, *Elektra*, and *Der Rosenkavalier*, the symphonic poems *Don Juan*, *Till Eulenspiegel*, and *Don Quixote*, and many songs of great lyrical beauty.

Stravinsky, Igor (b. 1882), Russian composer and conductor, pupil of Rimsky-Korsakov. His early ballets *The Fire Bird* and *Petrushka* (regarded by some as his greatest work) were commissioned by Diaghilev and are representative of his early, romantic style. *Pulcinella*, *Apollon musagète*, *Persephone*, and the opera *Oedipus Rex* are later works in his neo-classical style. Younger composers have been much influenced by his music. He became a French citizen in 1934, and a U.S. citizen in 1945.

Strindberg, Johan August (1849–1912), Swedish writer of intense creative energy. His work is subjective and reflects his personal conflicts. He married three times but never happily. He produced some fifty-five plays as well as novels, stories, poems, and critical essays. *Lucky Peter*, *Gustav Adolf*, *Till Damascus*, *The Father*, *Miss Julie* are some of his plays.

Strong, Leonard Alfred George (1896–1958), poet, novelist, short story writer, and critic. Author, among other books, of *Dublin Days*, *The Brothers*, and *The Last Enemy*, and with Cecil D. Lewis editor of *A New Anthology of Modern Verse*.

Stuart, Arabella (1575–1615), daughter of the Earl of Lennox and cousin of James I., whose next heir she was both to the English and Scottish thrones. In 1610 she married William Seymour, afterwards Earl of Hertford and Duke of Somerset, and thereby incurring the king's displeasure, she was incarcerated in the Tower of London, where she died insane.

Suckling, Sir John (1609–42), wit, courtier, and poet; served under Gustavus Adolphus and in Charles I's first Scottish war (1639). Being concerned in a plot to rescue the Earl of Strafford from the Tower, he fled to France, where he may have killed himself. He wrote poems, ballads, songs, and prose work and is said to have invented cribbage.

Sudermann, Hermann (1857–1928), German dramatist, poet and novelist. His brilliant novel, *Frau Sorge* (1887), translated into English as *Dame Care* (1892), reached its 125th edition in 1912. From 1890 he produced a succession of realistic plays and novels.

Sukarno, Achmed (b. 1901), President of Indonesia since 1945.

Sullivan, Sir Arthur Seymour, C.V.O. (1842–1900), gifted composer, gained his first musical experiences as choir-boy at the Chapel Royal, and later studied at Leipzig. He composed oratorios but at the same time cultivated a lighter vein with pronounced success. Became famous for the light operas written in collaboration with W. S. Gilbert, which include *Trial by Jury*, *The Sorcerer*, *H.M.S. Pinafore*, *Pirates of Penzance*, *Patience*, *The Mikado*, *The Yeomen of the Guard*, *The Gondoliers*.

Sully, Maximilien de Béthune, Duc de (1560–1641), a French Protestant statesman, a friend and companion of Henry of Navarre. His *Memoirs* made notable reading.

Sun Yat Sen, Dr. (1867–1925), the founder and first President of the Chinese Republic, 1912, resigning almost immediately in favour of Yuan Shih Kai. Was the first graduate of medicine at Hongkong, 1891. Founded in 1905 the China Revolutionary League in Europe and Japan, and played a large part in the revolution of 1911, being elected President of the Southern provinces by the Nanking Convention in 1912.

Sutro, Alfred (1863–1933), author and dramatist.

His most successful plays were *The Walls of Jericho* (1904) and *John Glayde's Honour* (1907).

Swedenborg, Emanuel (1689–1772), Swedish philosopher, scientist, mystic. In later life he announced that Divine authority had been given him to explain natural and spiritual evidences. He published in quick succession *Arcana Coelestia*, *The Apocalypse Revealed*, *Four Preliminary Doctrines*, and *The True Christian Religion*. He also claimed that his soul had been permitted to travel into hell, purgatory and heaven. His works became the scriptures of the sect named Swedenborgians.

Sweelinck, Jan Pieterszoon (1562–1621), famous Dutch organist and composer of sacred music. In his fugues he was the first to make independent use of the pedals, and thus prepared the way for Bach.

Swift, Jonathan Dean (1667–1745), was born at Dublin, educated at Trinity College at the expense of an uncle, became secretary to Sir William Temple, and looked for political preferment, but it did not come. Entering the Church, he was made Dean of St. Patrick's in 1713. Getting entangled in political controversy, and changing his views from the Whig to the Tory side, he lost favour with the popular party, but consoled himself with a devotion to literature, which he greatly enriched by some powerful satires, poems and discourses. *Gulliver's Travels*, *A Tale of a Tub* and *The Battle of the Books* are among the best-known works. His romantic attachment to "Stella" (Hester Johnson, whom he is believed to have married privately) and "Vanessa" (Esther Vanhomrigh), and their devotion to him, are familiar stories.

Swinburne, Algernon Charles (1837–1909), was educated at Oxford, and in the early 'sixties of last century gave to the world a number of poems of singular poetic beauty and musical charm, which procured him a high rank among English poets. Swinburne's most famous productions include *Atalanta in Calydon*, *Songs before Sunrise*, *Bothwell*, and *Mary Stuart*. Perhaps the best of his writings is his essay on William Blake.

Swithin, St. (*circa* 800–862), Bishop of Winchester in 852, and on the translation of his remains to a shrine in the interior of the cathedral from the graveyard, fixed for July 15th, 971, violent rain intervened, and, it is said, continued for forty days; hence the superstition as to rain upon St. Swithin's Day.

Symonds, John Addington (1840–93), acquired fame as a poet and writer on *The Renaissance Period in Italy*.

Synge, John Millington (1871–1909), Irish poet and playwright. His best known work, *The Playboy of The Western World*, met with a hostile reception when first produced in Dublin in 1907, but English audiences were at once enthusiastic.

Szigeti, Joseph (b. 1892), famous Hungarian violinist, who made his début in 1905, toured through Europe and settled for some years in England. He made an immense reputation on the Continent, and was Prof. at the Geneva Conservatorium, 1917–24.

Szymanowski, Karol (1833–1937), Polish composer and director of the Conservatoire at Warsaw.

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Tacitus, Caius Cornelius (55–*circa* 120). His chief claim to remembrance is that he was one of the ablest of Roman historians, and left behind him a number of works; among them a life of Agricola and his *Annales*, which have formed the ground-work of much that has since been written on the period he covered.

Tacitus, Marcus Claudius (205–276), the Roman Emperor who succeeded Aurelian in A.D. 275. His short reign was wise and marked by moderation.

Taft, Wm. Howard (1857–1930), Chief Justice United States 1921–30. President of the United States 1908–12.

Tagore, Rabindranath (1861–1941), a Bengal poet who won the Nobel Literature Prize in 1913.

Talbot, William Henry Fox, F.R.S. (1800–1877), English scientist who first discovered the principles of photography in 1833. Inventor of the calotype or Talbot-type process of which modern photography is a development.

Talleyrand-Périgord, Charles Maurice de (1754–1838), French politician and diplomat, led a mission to England in 1792 and was Foreign Minister from 1797 until 1807. He represented France at the Congress of Vienna.

Tallis, Thomas (*c.* 1510–85), a distinguished musician, who was, as organist, attached to the Chapel Royal under Henry VIII., Edward VI., Mary, and Elizabeth, and was the composer of some of the finest of our Church music.

Tamerlane, or Timûr the Tartar (1335–1405), descendant of a follower of Jenghiz Khan, and founder of the Mogul Dynasty in India. He succeeded as chief of the Berlas Turks in 1361, and in turn conquered Turkestan, Persia, and Syria. He was a masterful warrior, and a terrible butcher, the scourge of the East in his day, and, after establishing himself in India, died whilst preparing for the invasion of China. His familiar name is a corruption of Timûr-lenk = "Timur the Lame."

Tannhäuser, a mythical German minnesinger of the 13th century, who belonged, according to the legend handled so romantically in Wagner's opera, to the Salzburg family of Tanhusen, and was the beloved of Lisaura.

Tarkington, (Newton) Booth (1869–1946), a leading American novelist, author of a wide variety of books, of which probably the best known is *Monsieur Beaucaire*, a sentimental romance, the dramatic version, in which he collaborated achieving a great success.

Tarquin Superbus (or "**the Proud**"), the last King of Rome. Was banished 510 B.C. After his deposition came the Consuls.

Tarquin the Elder, 5th King of Rome, succeeded Ancius Mastius 615 B.C., reformed the laws, embellished the city, and was assassinated.

Tartini, Giuseppe (1692–1770), Italian violinist. He discovered the "third sound" resulting from two notes sounded together, a scientific explanation of which was later given by Helmholtz. His best-known sonata is *The Devil's Trill* written after a dream in which the devil played to him.

Tasman, Abel Janszoon (*circa* 1602–59), a famous Dutch navigator; in 1642 he discovered the island of Tasmania and New Zealand shortly thereafter.

Tassigny, Jean de Lattre de, Marshal of France, Hon. G.C.B. (1890–1952), outstanding commander of the Free French Movement in Second World War; High Commissioner and C.-in-C. Indo-China, 1950–52. C.-in-C. Land Forces, Western Europe, 1948–50.

Tasso, Torquato (1544–95), was one of the great Italian poets of the 16th century.

Tauber, Richard (1893–1948), Austrian tenor, sang Mozart and German Lieder impeccably; made first appearance in England, 1931, in Lehar's *The Land of Smiles* which brought him world-wide fame.

Taylor, Brook, LL.D., F.R.S. (1685–1731), an English mathematician of high attainments, who solved the problem of the centre of oscillation, and is best known as the discoverer of "Taylor's theorem."

Taylor, Jeremy (1613–67), an English divine of great influence. The most famous of his works was his *Holy Living and Holy Dying*.

Tchaikovsky, Peter Ilich (1840–93), Russian composer. His music is melodious and intensely emotional and he excelled in several branches of composition. Amongst his works are ten operas, including *Eugene Onegin* and *The Queen of Spades* (both from stories by Pushkin), six symphonies, including the *Little Russian* and the magnificent *Pathétique*, his last completed work, ballets, including *Swan Lake*, *The Sleeping Beauty*, and *The Nutcracker*, the fantasies *Romeo and Juliet* and *Francesca da Rimini*, the piano concerto in B flat minor, the violin concerto in D, and numerous songs.

Tedder, Marshal of the R.A.F., Arthur William, 1st Baron, G.C.B., B.A. (b. 1890), was Deputy Supreme Commander under Eisenhower for the invasion of Europe, Chief of the Air Staff, 1946–48; Chairman, Western Europe Chiefs of

Staff committee, 1948–50; Vice-Chairman of the Governors of the B.B.C., 1952–54; Chancellor Univ. of Cambridge, 1950.

Telford, Thomas (1757–1834), was a Scottish working stone-mason who became a great engineer and attained special fame as a builder of bridges, the Menai Suspension Bridge being, perhaps, his greatest work. He constructed the Ellesmere Canal, made many hundreds of miles of difficult mountain roads, was chief engineer of the Caledonian Canal, and altogether did an immense amount of public work.

Tell, William, a legendary figure in Swiss folk-lore. The story of his having been compelled by order of the imperial governor, Gessler, to shoot an apple from the head of his own son and his dramatic revenge is regarded as a legendary feat which has its origins in Teutonic myth. The Swiss hero of the Uri, however, played a great part in freeing his country from the Austrian yoke in the early part of the 14th century.

Temple, Most Rev. Frederick (1821–1902), a famous Anglican Churchman who became Headmaster of Rugby in 1858; in 1860 attained notoriety as the author of the first of the much-controverted *Essays and Reviews*, advocated the disestablishment of the Irish Church in 1868, was appointed Bishop of Exeter in 1869, translated to London in 1885, and in 1890 was raised to the Primacy. He made a strong Archbishop, and dominated the Church with his vigorous personality.

Temple, Most Rev. William, P.C., D.Litt., D.D. (1881–1944), one of the outstanding Christian leaders of his time and the son of Frederick Temple, was Archbishop of Canterbury, 1942–44, after being Headmaster of Repton, 1910–14, Bishop of Manchester, 1921–29, and Archbishop of York, 1929–42. His influence was felt among Christians of all denominations, and he strove for the unity of the Churches.

Temple, Rt. Hon. Sir William, Bt. (1628–99), English statesman and author; was Ambassador to The Hague in Charles II.'s time, and is understood to have been instrumental in bringing about the marriage between William of Orange and the Princess Mary. William III. twice offered him the position of Secretary of State, but he declined the honour, spending the years of his retirement at Moor Park (where Swift served him for a time as private secretary). Married **Dorothy Osborne** (1627–95), the letter-writer.

Templer, Field-Marshal Sir Gerald Walter Robert, G.C.B., G.C.M.G. K.B.E., D.S.O. (b. 1898), Chief of the Imperial General Staff, 1955–58, formerly High Commissioner and Director of Operations in Malaya.

Templewood, Samuel John Gurney Hoare, 1st Viscount, P.C., G.C.S.I., G.B.E., C.M.G. (1880–1959), Conservative politician; Sec. of State for Air, 1922–29; Sec. of State for India, 1931–35; Foreign Sec., June–Dec. 1935; Home Sec., 1937–39; Special Ambassador to Spain, 1940–44.

Teniers, David (the younger) (1610–94), was born at Antwerp, and his paintings of the old rustic Flemish life are unsurpassed in their humour and fidelity. He died at Brussels. His father, **David Teniers** the elder (1582–1649), was also one of the leading landscape painters of the time.

Tenniel, Sir John (1820–1914), for over fifty years leading artist of *Punch*, illustrated numerous books, including *Alice in Wonderland*.

Tennyson, Alfred Lord (1809–92), was Poet Laureate from 1850 to his death. Born at Somersby, in Lincolnshire, he showed poetic gifts while quite young, and in 1827, joined his brother Charles in the publication of *Poems by Two Brothers*. In 1847 he published *The Princess*; in 1850 *In Memoriam*, a poem of great beauty and depth of thought, in which he enshrined his affection for the memory of his dead friend Arthur Hallam; and in 1855 *Maud* appeared. His other works include *The Idylls of the Kings*, *Enoch Arden*, *Queen Mary*, *Harold*, and *Becket*.

Terence, Publius Terentius Afer (*c.* 184–159 B.C.), a Latin poet and dramatist, an African (Berber), who rose from the position of a slave to that of one of the most honoured men in Rome.

Teresa, St., or Theresa (1515–82), a Spanish saint and author, born at Avila, entered the Carmelite order in 1534, established a reformed order in 1562, became famous for her ascetic life and mystic visions, and died at Alba de Liste. Her religious writings include *The Way of Perfection* and *The Castle of the Soul*. She was canonised by Pope Gregory XV.

Terry, Dame Ellen, G.B.E. (**Mrs. James Carew**) (1848–1928), one of the most distinguished of English actresses. Played Shakespeare with Sir Henry Irving at the Lyceum and later appeared in plays of Bernard Shaw, who was her friend.

Tertullian, Quintus (*circa* 150–230), a Father and writer of the Latin Church. His chief work was his *Apologeticus*, a defence of Christianity.

Tetrazzini, Luisa (1871–1940), was an Italian prima donna who sprang into sudden prominence in 1907 by her wonderful singing at Covent Garden. She was hailed as a second Patti, and achieved a brilliant success.

Tetzel, John (*c.* 1460–1519), the German Dominican monk and Inquisitor, the scandal of whose sale of indulgences roused Luther to publish his memorable ninety-five theses at Wittenberg in 1517, and led up to the Reformation.

Thackeray, William Makepeace (1811–63), English novelist, author of *Vanity Fair*, *Pendennis*, *Esmond*, *The Newcomes*, *The Virginians*, *Philip* and *Lovel the Widower*. He edited the *Cornhill Magazine* from the first number, January, 1860, for a few years his most notable contributions being his *Roundabout Papers*. His *Yellowplush Papers* and *The Book of Snobs* (republished from *Punch*) were widely read and admired; and the lectures he delivered in America on *The Four Georges* were pungently powerful.

Thales of Miletus (*c.* 624–565 B.C.), a geometer, astronomer, and philosopher, and one of the seven wise men of ancient Greece. The earliest of the Ionian philosophers, he created a sensation by the pre-calculation and prediction of an eclipse of the sun, which took place 585 B.C. and he looked upon water as the basis of all material things.

Themistocles (*c.* 514–449 B.C.), Athenian soldier and statesman. By fortifying the harbour of Piræus as the port of Athens, by the remission of taxes on aliens, and by the creation of the Athenian navy, he established Athenian prosperity and made possible the later Athenian empire. Defeated the Persian fleet at Salamis in 480 B.C.

Theocritus (285–247 B.C.), one of the great Greek poets. Thirty *Idylls* have come down to us and a number of *Epigrams*.

Theodoric the Great (455–526), a celebrated King of the East Goths, born at Pannonia. In mediæval German romance he is known as "Dietrich von Bern," and had a reputation for good government, akin to that ascribed in England to King Alfred. He was the founder of the Gothic Kingdom of Italy.

Theodosius the Great (346–95) was Roman Emperor of the East for nearly twenty years. He gained victories over the Goths, and the year before his death became sole Emperor. Noted in ecclesiastical history for his conversion to Christianity, and for his submission to the penance imposed by St. Ambrose.

Theophrastus (*c.* 372–287 B.C.), succeeded Aristotle as President of the Lyceum at Athens. His *History of Plants* and his *Moral Characters* are the best known of his writings.

Thibaud, Jacques (b. 1880), famous French violinist.

Thierry, Jacques Nicolas Augustin (1795–1856), a distinguished French historian, known by his *History of the Norman Conquest*.

Thiers, Louis Adolphe (1797–1887), a French statesman and man of letters, author of *History of the French Revolution*.

Thomas, Dylan (1914–53), Welsh poet whose *Eighteen Poems* (1934) brought him instant recognition as an original and gifted artist. Other works include *Twenty-five Poems* (1936), *Deaths and Entrances* (1945), *Under Milk Wood*, a play for voices.

Thomson, James (1834–82), a Scottish poet who wrote *The City of Dreadful Night*.

Thomson, Sir (John) Arthur (1861–1933), was a well-known biologist.

Thomson, Sir Joseph (John), O.M., D.Sc., F.R.S. 1856–1940), physicist and mathematician;

Master of Trinity College, Cambridge, 1918–40; Cavendish Prof. of Experimental Physics, Cambridge, 1884–1919. Awarded Nobel Prize in 1906 for his work on conduction of electricity through gases; also discovered the electron. Wrote learnedly on electricity, magnetism, radio-activity, etc. His son, **Sir George Paget Thomson,** (b. 1892) F.R.S., is also a physicist and Nobel Prizeman; Master of Corpus Christi College, Cambridge.

Thoreau, Henry David (1817–62) was a natural philosopher and nature-worshipper, who forsook trade and devoted himself to a primitive kind of existence in the American woods. He was the friend of, and for a time lived with, Emerson, but in 1845 adopted his career of solitude, and pursued those studies of nature which afterwards gained him a high reputation. His *Walden, or Life in the Woods*, is a unique book.

Thorez, Maurice (b. 1900), Secretary General of the French Communist Party.

Thorndike, Dame Sybil, D.B.E., LL.D. (b. 1885), a celebrated British actress. She had a great success in *Macbeth*, also in G.B. Shaw's *St. Joan* and in several Greek tragedies. Wife of Sir Lewis Casson, the actor.

Thornycroft, Sir William Hamo, R.A. (1850–1925), English sculptor whose works include the Gladstone Memorial, the statue of General Gordon in Trafalgar Square, of Queen Alexandra in the Royal Exchange, Lord Granville in the Houses of Parliament, Cromwell at Westminster, and John Bright in Rochdale.

Thorpe, Sir (Thomas) Edward, C.B., Ph.D., D.Sc., F.R.S. (1845–1925), a noted English chemist. His chief research work was done on paraffin hydrocarbons, and the derivatives of fluorine and phosphorus. Was the author of a standard *Dictionary of Applied Chemistry* and a *History of Chemistry*.

Thorwaldsen, Bertel (1770–1844), a famous Danish sculptor.

Thucydides (*c.* 460–399 B.C.), the first scientific historian, was an Athenian and took part in the Peloponnesian War, about which he wrote his *History*. Attempted an impartial account, weighing the testimony of eye-witnesses and keeping to carefully verified facts. The *History* is a graphic narrative, but Thucydides was not merely a chronicler; he saw the general significance of particular events and wished to pass on the political lessons of the past to the future. The speeches which he put into the mouths of the various actors reveal the political ideas and climate of opinion of contemporary Greece, and include the famous Funeral Oration of Pericles.

Tiberius, Claudius (42 B.C.–A.D. 37), the second Emperor of Rome, had an evil reputation but was an able ruler and successful soldier. Spent his later years in Capri.

Tillett, Benjamin (1860–1943), M.P. for North Salford 1917–24 and again 1929–31, came into prominence in the great dock strike of 1889. He was the organiser and secretary of the Dockers' Union; for several years alderman of the L.C.C.; and an active labour leader. Chairman of the General Council T.U.C. 1928–29.

Tillotson, John (1630–94), a celebrated preacher at Lincoln's Inn, "Popery" and "Atheism" being the main objects of his attacks: in 1691 became Archbishop of Canterbury.

Tindal, Matthew (*c.* 1653–1733), noted English Deist.

Tintoretto (1518–94), Venetian painter whose aim it was to unite the colouring of Titian with the drawing of Michelangelo. He is among the most original and decorative of artists whose numerous paintings, mostly of religious subjects, were executed with great speed, some of them on enormous canvasses. His real name was Jacopo Robusti, and he was called Il Tintoretto (little dyer) after his father's trade. Three of his six children were painters.

Titian, or **Tiziano Vecelli** (1477–1576), one of the greatest of painters. He studied under the Bellinis, and made his first essays in painting for the public in conjunction with Giorgione, whom he soon surpassed. In 1511 he was at Padua, where he painted some notable frescoes; in 1512 he was back in Venice, with a studio on the Grand Canal, employed on important commissions. From this time forward he was in great demand, and exercised his marvellous powers almost to the end of his life, dying of the plague at ninety-nine.

Titiens (or **Tietjens**), **Teresa** (1831–77), a famous German operatic prima donna and concert-room singer.

Tito, Marshal (Josif Broz) (b. 1892), Prime Minister of the Federal People's Republic of Yugoslavia since 1945. Leader of the partisan forces which successfully fought against German occupation. President National Liberation Committee, 1943.

Titus (40–81), the Roman Emperor, and son of Vespasian. Attained great renown by his successful part in the Jewish war which terminated in the capture and destruction of Jerusalem: he was deemed a profligate and a tyrant, but no sooner was he in sole power than he exerted himself to the utmost to please the people, completed the Colosseum, gave plenty of exhibitions, built splendid baths, and otherwise made himself popular.

Tizard, Sir Henry Thomas, G.C.B., F.R.S. (1885–1959), scientist and administrator; Pres. British Association, 1948. Played important part in the higher scientific direction of the second world war and as Chair. Advisory Council on Scientific Policy, 1947–52.

Tocqueville, Alexis, Comte de (1805–59), author of *De La Démocratie en Amérique* and *De L'Ancien Régime*, which set out nineteenth-century liberal ideas.

Todd, Sir Alexander Robertus, D.Sc., F.R.S. (b. 1907), Prof. of Organic Chemistry at Cambridge, 1944– ; Chair. Advisory Council on Scientific Policy, 1952– ; Won Nobel Prize in 1952.

Tolstoy, Count Leo Nikolayevitch (1828–1910), was the most distinguished personality in modern Russian literature. Born of a good family, he was for a time in the army, but was so greatly moved by the trials and sufferings of the people that, out of pure sympathy of heart, he was impelled "to take up his pen and write." At twenty-four he published his *Childhood*, and in 1854, while in camp in the Crimea, wrote his *Tales from Sebastopol*, which procured him considerable literary fame. Later on he was a persistent advocate of progressive ideas, and, before the Emancipation Act for freeing all Russian serfs was enforced, he himself had given the serfs on his own estate their freedom. In 1862 he married, and settled down to a quiet country life, shortly afterwards publishing his *War and Peace* and *Anna Karenina*. In his latter years Tolstoy developed a sort of religious mysticism. Among his later works are *The Power of Darkness*, *The Kreutzer Sonata*, *The Cossacks*, *Ressurrection*, and *The End of the Age*.

Tooke, John Horne (1736–1812), English politician and pamphleteer, was a supporter of Wilkes and later Pitt. His tracts advocated reform. After the French Revolution was tried for high treason, but was acquitted.

Toole, John Lawrence (1832–1906), for half a century a popular English comedian.

Torquemada, Tomas de (1420–98), the chief officer of the Spanish Inquisition.

Torricelli, Evangelista (1608–47), Galileo's pupil. He invented the barometer and improved both the microscope and the telescope.

Toscanini, Arturo (1867–1957), famous Italian conductor, La Scala Theatre, Milan, 1898–1908 and 1920–29; at the Metropolitan Opera House, New York, 1908–15; and of the Philharmonic Symphony Society of New York, 1926–36. Returned to Milan in 1946 after a ten-year exile.

Toulouse-Lautrec, Henri de (1864–1901), French painter, whose pictures portray with stark realism certain aspects of Parisian life in the nineties.

Tovey, Sir Donald Francis (1875–1940), pianist and composer who for 25 years held the chair of music at the University of Edinburgh. As a child he showed remarkable talent, both as a pianist and in understanding the art of music. He graduated at Oxford with classical honours. Outstanding among his many writings is *Essays in Musical Analysis*, and his compositions include chamber music, a piano concerto, and an opera *The Bride of Dionysus*.

Toynbee, Arnold (1852–83), after graduating at Oxford, devoted himself to practical philanthropy and social reform. From his self-deny-

ing efforts sprang the settlement in East London —Toynbee Hall.

Toynbee, Arnold Joseph, C.H., Hon.D.Litt. (Oxford, Cambridge, and Birmingham) (b. 1889), eminent scholar and historian, nephew of above. Dir. of Studies Royal Inst. of Int. Affairs, 1925–55. Major work *A Study of History* (10 vols.) was completed in 1954.

Trajan (*circa* 52–117) was Roman Emperor from 98 to his death. His rule was enlightened, and he was esteemed by his people.

Tree, Sir Herbert Beerbohm (1852–1917), the London actor-manager who scored successes at the Haymarket and His Majesty's Theatre.

Trenchard, Marshal of the R.A.F., Viscount, G.C.B., O.M., G.C.V.O., D.S.O. (1873–1956), Chief of Air Staff, 1918–29; Chief Commissioner of Police, 1931–35; often known as the father of the Air Force and largely responsible for the establishment of the R.A.F. College at Cranwell and the Hendon Police College.

Trent, 1st Baron, of Nottingham (Jesse Boot) (1850–1931), founder of Boots Cash Chemists, Ltd.; a great benefactor of Nottingham, especially of the University of Nottingham.

Trevelyan, George Macaulay, O.M., C.B.E. (b. 1876), English historian, son of Sir George Otto Trevelyan and great nephew of Thomas Babbington Macaulay. Regius Professor of Modern History at Cambridge 1927–40; Master of Trinity College, 1940. Chancellor of Durham University, 1949. His chief works are: *History of England*; a trilogy of books on *Garibaldi*; *England under the Stuarts*; *England under Queen Anne*; *Grey of Fallodon*; *English Social History*; *An Autobiography and other Essays*.

Trevelyan, Rt. Hon. Sir George Otto, 1st Bt., O.M. (1838–1928), Liberal statesman and historian. Became Chief Secretary for Ireland in 1882, and was later Secretary of State for Scotland. Wrote a biography of his uncle, Lord Macaulay, which was highly praised. Father of Professor G. M. Trevelyan.

Trevithick, Richard (1771–1833), a Cornish mine-manager's son, who invented the road-locomotive, putting upon the highway on Christmas Eve, 1801, the first steam-propelled vehicle for passengers.

Trollope, Anthony (1815–81), author of many novels. His Barchester series depicts a number of scenes of higher clerical life with great fidelity and success.

Trotsky, Leon, name assumed by Lev Davidovich Bronstein (1879–1940), one of the leaders of the Bolshevist revolution. War Minister of the Bolshevist Government and its leading representative at the Brest-Litovsk conference of 1917–18. He differed from the Communist Party on policy and was dismissed from office in 1925. In 1929 took up exile in Mexico where he was assassinated.

Truman, Harry S. (b. 1884), President of the United States, 1945–52. Inherited the Presidency on the death of Roosevelt in 1945 and won the Pres. election in 1948. He took the historic decision to enter Korea in 1950, dismissed Gen. MacArthur in 1951, and will perhaps best be remembered for his "Point Four" programme of raising levels of living in backward, and underdeveloped countries.

Tulsi Das (1532–1623), mediæval poet of India whose great masterpiece *Rām-Charit-Mānas* (popularly known as the *Rāmayana* and based on the Sanskrit epic of Vālmiki) is venerated by all Hindus just as the Bible is in the West.

Turenne, Henri de la Tour d'Auvergne, Vicomte de (1611–75), a famous French commander and Marshal of France, who was highly successful in the Thirty Years' War.

Turgenev, Ivan Serveyvich (1818–83), was a friend of Gogol and Tolstoy, and a famous Russian novelist and short-story writer. His works were frequently satirical and directed against the oppression of the peasants by the nobles. Was the inventor of the term "nihilist" to describe the Russian anarchist movement.

Turner, Joseph Mallord William, R.A. (1775–1851), was the son of a London barber, but while quite a child showed the possession of artistic genius. In 1789, after some miscellaneous schooling, he entered the Royal Academy classes, and soon began to make headway. Of his larger pictures may be mentioned *The Sun Rising through Vapour*, *Crossing the Brook*, *Dido Building Carthage*, *The Fighting Téméraire*, and *Calais Pier*. Ruskin, in his *Modern Painters*, wrote with great eloquence and critical insight regarding Turner's work, and brought about a fuller appreciation of his genius. Turner never married, and took little interest in anything outside his art. He left the oil paintings and drawings he had preserved to the National Gallery.

Tussaud, Madame Marie (1760–1850), a Swiss who while practising the art of modelling wax in Paris at the time of the French Revolution, made her escape to England and set up a small exhibition of wax figures in the Strand, later carried on by her son, grandson and great-grandson at Baker Street and in 1884 transferred to Marylebone Road.

Tut-ankh-amen (*circa* 1350 B.C.), an Egyptian Pharaoh of the 18th dynasty, whose tomb was discovered by Howard Carter in 1922, with the mummy and gold sarcophagus intact. The magnificence of the objects found aroused world-wide interest.

Twain Mark. (*See* **Clemens, Samuel L.**)

Tweedsmuir, John Buchan, 1st Baron, C.H. (1875–1940), Gov.-Gen. of Canada 1935–40, journalist, politician, and author, wrote numerous biographies, historical novels, and adventure stories, including *Montrose*, *The Path of the King*, *Greenmantle*, and *Sick-Heart River*, and an autobiography *Memory Hold the Door*. Under the pen name "O. Douglas" his sister, Anna (d. 1948), published some charming tales of domestic life.

Tyler, Wat (d. 1381), the leader of the peasants' revolt of Richard II.'s time against the iniquitous poll-tax. Over 100,000 peasants followed Tyler into London in June 1381, and the king met them in Smithfield and made promises of redress that were never fulfilled. It was at this meeting that Sir William Walworth, Lord Mayor of London, stabbed Tyler with a dagger, and afterwards handed him over to his followers to kill outright.

Tyndale, William (*c.* 1492–1536), was educated at Oxford, and conceived a strong desire to be the medium of presenting the Bible to his country-men in their own language. He completed the translation of the New Testament at Wittenburg, where he was associated with Luther. This version was first published at Antwerp, and then found its way to England, where it was publicly burnt at St. Paul's Cross. Tyndale afterwards was associated with Miles Coverdale in a translation of the Old Testament, but only completed the Pentateuch and the book of Jonah. Antwerp was Tyndale's retreat during this later period, and in 1535 he was arrested for heresy and put to death by strangling and burning.

Tyndall, Prof. John, F.R.S. (1820–93), was an eminent scientist. His books on light, sound, and heat are well-known text-books.

U

Ulanova, Galina (b. 1910), Russian ballet dancer, made her début in 1928 and is the world's greatest living exponent of the art. She danced in Florence in 1951 and in London in 1956.

Undset, Sigrid (1882–1949), Norwegian novelist, daughter of a distinguished Norwegian antiquary, from whom she derived her knowledge of life in ancient and mediaeval Norway. Her first success came with *Jenny* (1911), and the great works based on mediaeval history, *Kristin Lavransdatter* (1920–22) and *Olav Audunsson* (1925–27), won for her the 1928 Nobel Prize for Literature.

Unwin, Sir Raymond (1863–1940), English architect and expert on Town Planning, who became known as the architect of the first garden city at Letchworth, and of the Hampstead Garden Suburb.

Ursula, St., is said to have been an English princess, who with 11,000 virgins set out on a pilgrimage, but compelled by a fierce storm to take refuge in Cologne, was there put to death with her following by an army of Huns.

Usher or Ussher, James (1581–1656), Irish prelate and scholar, one of the most distinguished

theologians of his day. He worked out a system of dates setting the creation at 4004 B.C.

V

Valentine, St., was a Christian martyr of the reign of the Emperor Claudius II (d. 270 A.D.). His festival was commemorated on February 14 before Gregory the Great's time. The custom of sending valentines had its origin in a heathen practice associated with the worship of Juno about this date in the calendar, and had no connection with the saint.

Vanbrugh, Sir John (1664–1726), was a prominent architect as well as a successful dramatist.

Vancouver, George (1758–98), a British navigator who served under Captain Cook and later explored the Gulf of Georgia and the Straits of San Juan de Fuca, as also the shores of Vancouver Island.

Vanderbilt, Cornelius (1794–1877), a noted American merchant and railway speculator who accumulated a fortune of twenty millions sterling. His son William Henry Vanderbilt (1821–85) inherited and added to it.

Van Dyck (or **Vandyke**), **Sir Anthony** (1599–1641), was born at Antwerp, and after studying under Rubens went to Italy and there made a name as a portrait painter. In 1629 he came to England on the invitation of Charles I., but remained only a short time; in 1631 Charles prevailed upon him to return, made him a knight, granted him an annuity, and he became the Society painter of the day.

Vane, Sir Henry (1613–62), was a prominent statesman and diplomatist. At the Restoration he was arrested as an enemy of the State and ultimately beheaded on Tower Hill.

Van Gogh, Vincent (1853–1890), Dutch painter of some of the most colourful pictures ever created. With passionate intensity of feeling he painted without pause whatever he found around him—landscapes, still-lifes, portraits; his was a truly personal art. His life was one of pain, sorrow and often despair and in the end he committed suicide.

Van Loon, Hendrik Willem (1882–1944), Dutch-American historian, born in Rotterdam, who became famous in 1922 with the publication of *The Story of Mankind*, a picture history-book originally intended for children.

Vauban, Marshal Sebastien le Prestre de (1633–1707), a renowned French military engineer who introduced great improvements in methods of fortification, conducted fifty-three sieges, and took part in 140 battles.

Vaughan Williams, Ralph, O.M., M.A., D. Mus. (1872–1958), English composer. After Charterhouse and Cambridge he studied music in Berlin under Max Bruch and, later in Paris, under Ravel. He wrote nine symphonies besides a number of choral and orchestral works including *Sancta Civitas* and *Benedicite*, *Magnificat*, *Four Tudor Portraits*, *Dona Nobis Pacem*, operas including *Hugh the Drover*, *Riders to the Sea*, ballets, chamber music and songs. He showed great interest in folk tunes.

Velasquez, Diego (1465–1523), a Spanish soldier and companion of Columbus, sent to conquer Cuba. Velasquez founded Santiago and Havana.

Velazquez, Diego Rodriguez de Silvay (1599–1660), a famous Spanish painter, whose pictures rank among the finest in Spanish art.

Venizelos, Eleutherios (1864–1936), the Greek patriot and statesman, suffered many vicissitudes of fortune during his career. A Cretan by birth, he became Prime Minister of Greece for the first time in 1910, and again on several subsequent occasions, but died in exile. Best known probably for his activity during the Balkan wars, his finally successful attempts to bring his country into the first world war on the side of the Entente Powers, and his ambitions in Asia Minor. At the post-war conferences in 1919 he exercised more influence than anyone else outside the "Big Four."

Verdi, Giuseppe (1813–1901), Italian composer, foremost figure in 19th-century opera. Early works include *Nabucco*, *Ernani*, *I Due Foscani*, and *Macbeth*. A middle period is represented by *Rigoletto*, *Il Trovatore*, *La Traviata*, *Un Ballo in Maschera*, and *Don Carlo*. To the last and greatest period of his life belong *Aida*, *Otello*, and his last opera *Falstaff*, produced when he was 80. In his 85th year he composed his 'Ave Maria' and 'Stabat Mater.'

Verlaine, Paul (1844–1896), French poet, also well known for his memoirs and confessions; died in great poverty and degradation in Paris.

Vermeer, Jan (1632–75), Dutch painter and the greatest of all the "Little Masters." Jan Vermeer of Delft, as he was frequently referred to, was born in Delft, and obtained considerable recognition in his lifetime, but strangely his existence was entirely overlooked after his death, and until 1860 his paintings were attributed to other Dutch painters. *Lady at the Virginals* is in the National Gallery.

Verne, Jules (1828–1905), was one of the most popular authors of wonder-stories in Europe. The best-known of his numerous works are *Five Weeks in a Balloon*, *Twenty Thousand Leagues Under the Sea*, *Round the World in Eighty Days*.

Vernier, Pierre (1580–1637), inventor of the small sliding scale which enables readings on a graduated scale to be taken to a fraction of a division.

Veronese, Paul, or Paolo Cagliari (1528–88), a celebrated Italian painter of religious subjects His *Marriage Feast at Cana in Galilee*, *The Feast in the House of Simon*, and *The Presentation of the Family of Darius to Alexander*, are paintings of world-wide celebrity, while his *Adoration of the Magi*, in our National Gallery is a grand work.

Veronica, St., a legendary woman of Jerusalem who was said to have handed to Christ her kerchief on His way to Calvary. The old belief was that the Redeemer wiped His brow therewith leaving on the handkerchief a miraculous impression of His face, the so-called "Veronicon." The Saint is commemorated on February 4th.

Verwoerd, Dr. Hendrik Frensch (b. 1901), succeeded J. G. Strydom as Prime Minister of South Africa in 1958. Prof. of Psychology at Stellenbosch Univ., 1928–50.

Vespasian (Titus Flavius Vespasinus) (9–79 A.D.) was Roman Emperor during the last nine years of his life. At one time he commanded the Roman army of occupation in Britain.

Vespucci, Amerigo (1451–1512), Florentine merchant and navigator, who settled in Spain as commercial agent of the house of Medici. He made several voyages across the Atlantic and, according to his own accounts, which are disputed by many authorities, reached the American continent on June 16, 1497. A German geographer paid him the tribute of giving the name America to what is now known as South America in a map he published in 1507.

Victor Emmanuel II. (1820–78) was King of Sardinia from 1849 to 1861, became King of Italy, according the the Proclamation of the Sardinian Senate; but it was not until 1870, when the unification of Italy was fully secured, that the title came to have its true significance.

Victoria (1819–1901), Queen of Great Britain and Ireland and Empress of India, was daughter of the Duke of Kent, and came to the throne in 1837 on the death of her uncle, William IV. In 1840 she married Prince Albert of Saxe-Coburg-Gotha, who died in 1861. Lord Melbourne was Prime Minister at the date of the Queen's accession, and for a number of years the country lived through troublesome times, the Corn Law and Chartist agitations being at times very threatening, but a more settled condition of things supervened, and for the remainder of the long and illustrious Victorian reign there was no serious home unrest. The Jubilee of Queen Victoria's accession was celebrated in 1887, and the Diamond Jubilee 10 years later.

Villeneuvre, Pierre Charles Baptiste Silvestre (1763–1806), the French naval commander who was opposed to Nelson at Trafalgar and captured along with his ship, the *Bucentaure*.

Villon, François (1431–*c.* 1485), French poet who lived at a turbulent time in French history at the close of the Hundred Years War. His extant works consist of *Le Lais* (or *Petit Testament*) and *Grand Testament*, masterpieces of French mediæval verse.

Virgil (Publius Vergilius Maro) (70–19 B.C.), the great Roman epic poet, was born near Mantua, and cultivated a farm in the adjacent village of

Andes. He proceeded to Rome in his thirtieth year to obtain redress for the occupation of his lands by the military. Became known to Octavian and Mæcenas, and, having had his demand satisfied, began the writing of his *Eclogues*. *The Georgics* followed: his most famous work, the *Æneid*, comprised twelve books dealing with the story of the wanderings of Æneas after the destruction of Troy.

Vitus, St., Roman Catholic saint and martyr, who lived in the 4th century. It used to be the custom to dance before his shrine on this festival day, June 15th, in the belief that good health was thereby ensured for the next twelvemonth. The nervous ailment, St. Vitus' dance, derives its name from this practice.

Volta, Alessandro (1745–1827), Italian physicist, professor at Como and Pavia. Working on the results of Galvani, he found that the essential thing in producing an electric current was contact of dissimilar metals. He invented the voltaic pile, the first instrument for producing an electric current, and thereby laid the foundation of electrochemistry.

Voltaire, François-Marie Arouet de (1694–1778), one of the greatest of French philosophers and writers. His first essays offended the authorities, and he lived in London for a couple of years (1726–28), and there wrote some of his dramas. Returning to France he published his *Philosophical Letters*, which aroused the enmity of the priesthood. At this juncture, the Marquise du Châtelet offered him the asylum of her castle of Cirey, and for the next fifteen years he made this his home, writing there his *Discourses on Man*, *Essay on the Morals and Spirit of Nations*, *Age of Louis XIV.*, &c. From 1750–53 he lived in Berlin, on the invitation of Frederick the Great.

Vondel, Joost van den (1587–1679), the greatest of the Dutch poets. Most of his dramas are on biblical subjects, and the two most famous are *Jephtha* and *Lucifer*.

Voroshilov, Marshal of the Soviet Union Klimentiy Efremovich (b. 1881), President of the Supreme Soviet of the U.S.S.R. since Stalin's death in 1953; commander of the Leningrad defences in 1941.

Vyshinsky, Andrei Yanuarievich (1883–1954), Russian jurist and diplomat; conducted the prosecution of the Moscow treason trials, 1936–38; represented Russian interests abroad and at U.N.

W

Wade, George (1668–1748), military engineer who after the Jacobite rebellion of 1715 commanded the royal forces in Scotland and constructed the great military roads through the Highlands, some of which have continued to be the main lines of communication. Promoted to Field-Marshal in 1743 and in 1744 George II made him Commander-in-Chief in England. In the last Jacobite rising of 1745 his army was the first to be evaded by the Young Pretender, Charles Edward, on his famous march south.

Wagner, Richard (1813–83), German composer, born at Leipzig. He achieved a new type of musical expression in his operas by the complete union of music and drama, and his influence on later composers was immense. He made use of the *leitmotif* principle and was his own librettist. His originality and modernism aroused a good deal of opposition, and he was exiled for some years. But he was supported by many loyal friends, including Liszt, the young King Ludwig of Bavaria, and the philosopher Nietzsche. He began the music of the *Ring des Nibelungen* in 1853, finishing it a quarter of a century later. It was not until 1876 that the whole of this great drama (Rheingold, Valkyrie, Siegfried, Götterdämmerung) was performed at Bayreuth under the conductor Hans Richter. Other operas include *The Flying Dutchman*, *Rienzi*, *Tannhäuser*, *Lohengrin*, *Tristan und Isolde*, *Die Meistersinger von Nürnberg*, *Parsifal*, a religious drama. He married Liszt's daughter Cosima, formerly wife of his friend Hans von Bülow.

Waley, Arthur, C.H., C.B.E., M.A. (b. 1889), orientalist, well known for his translations of Chinese and Japanese poetry and prose, being the first to bring the literature of those countries to the western world.

Walker, George (1618–90), the hero of the siege of Londonderry, in 1688, who kept the besiegers at bay for 105 days.

Wallace, Alfred Russel, O.M., F.R.S., LL.D. (1823–1913), celebrated naturalist, a native of Usk, attracted much notice as far back as 1853 by his book *Travels on the Amazon*, detailing experiences in that region. In 1858, while down with illness in the Moluccas, the idea of the evolution theory occurred to him, and curious to say, he drafted his first notes upon it and sent them to Darwin in England while the latter was on the eve of publishing his own exposition of the theory, the result being the reading of a joint paper on the subject to the Linnean Society. The coincidence was fully acknowledged by Darwin. There are differences, however, between the points of view of the two thinkers.

Wallace, Edgar (1875–1932), English novelist and playwright, famous for his detective thrillers. A man of enormous and unflagging energy, he published some 150 crime novels (of which as many as five million were sold in a year) 14 plays, film scenarios, dramatic criticism and a daily racing article.

Wallace, Sir Richard, Bt. (1818–90), son of the Marquis of Hertford, and inheritor from him of a famous collection of pictures and other works of art to which he himself added largely. This was bequeathed to the nation by his widow along with Hertford House and now forms one of the most important exhibitions in London.

Wallace, Sir William (*circa* 1270–1305), the great Scottish patriot and chieftain who led the Scottish armies against Edward I., and for a time the English were kept completely in check. Later, Edward defeated him at Falkirk, and finally in 1304 he was captured, taken to London, condemned for treason, executed at Smithfield.

Wallenstein, Albrecht von (1583–1634), German soldier and statesman during the Thirty Years' War. An able administrator of his own estates, he sought the unity of Germany, but was distrusted and eventually assassinated.

Waller, Edmund (1606–87), was one of the most graceful of English poets, who tuned his lyre to suit both the Cromwellians when they were a power, and Charles II, when his turn came.

Walpole Horace, 4th Earl of Orford (1717–97), younger son of Sir Robert Walpole. He was a member of Parliament from 1741 to 1768, when he retired to his favourite house at Strawberry Hill (" a little Gothic castle ") and devoted himself to the writing of books and the accumulation of works of art. His letters give a graphic picture of Georgian England.

Walpole, Sir Hugh Seymour C.B.E., (1884—1941), a well-known British novelist, whose novels include *Fortitude*, *The Dark Forest*, *Jeremy*, and *Mr. Traill*.

Walpole, Sir Robert, K.G.(**1st Earl of Orford**) (1676-1745), great 18th-century Whig statesman. He sat in the House of Commons for over forty years, and was Prime Minister for the record period of twenty-one years. Although he enriched himself at the public expense, he was a great financial statesman, and his management of the national debt, encouragement of trade and industry, and his mercantilist colonial policy made England materially very prosperous.

Walter, Bruno (b. 1876), a noted conductor of German birth and American citizenship, associated especially with the opera in many different cities.

Walter, John (1776–1847), son of the founder of *The Times* and known as the second John Walter. Was the leading spirit of *The Times* from 1803 to 1847, and it was his efforts that made the journal the greatest newspaper in the world.

Walton, Izaak (1593–1683), one of the most lovable of English writers, the famous author of *The Compleat Angler, or the Contemplative Man's Recreation*. Also published lives of Donne, Hooker and George Herbert.

Walton, Sir William Turner (b. 1902), English composer, whose works include concertos for string instruments, a symphony, and coronation march, *Crown Imperial*, and an oratorio, *Belshazzar's Feast*.

Warbeck, Perkin (1474–99), a Pretender to the English Crown. The son of a Tournai Jew, he claimed to be Richard, Duke of York, supposed to have been murdered in the Tower, and therefore entitled to the throne of England in preference to its then occupant, Henry VII. The Duchess of Burgundy and Charles VIII. of France and James IV. of Scotland gave him their countenance. Warbeck was enabled in 1497 to appear in England at the head of a force of 7,000 men, but was easily defeated, tried for treason and hanged at Tyburn.

Warwick, Richard Neville, Earl of (*circa* 1428–71). "The King Maker," was the leader of the York party in the Wars of the Roses. At the battle of Northampton he made Henry VI. captive, and afterwards proclaimed Edward, Earl of March, king under the title of Edward IV. Then, when Edward showed a disposition to resent Warwick's protection, the latter drove Edward from the country and once more placed Henry VI. on the throne. He lost his life at the battle of Barnet.

Washington, Booker Taliaferro (1858–1915), a famous negro educationist who was Principal of Tuskegee Institute, Alabama, the first and greatest Institute for negro education, from 1881 until his death. He was a tireless worker for a better understanding between negroes and whites. Wrote several books, including his autobiography, *Up from Slavery*.

Washington, George (1732–99), was of English descent, and was living on his American estate at Mount Vernon when the dispute between the British home government and the colonists broke out. He became one of the leaders of the local opposition, and later was elected to the first Congress at Philadelphia. The following year, 1775, saw him Commander-in-Chief of the American army, and from that time to the end of the struggle in 1783 he was trusted and adored by the people, and on the founding of the Republic became its first President in 1789. He served a second term of office from 1793 onwards, and refused election for a third time.

Watson, John Broadus (b. 1878), American psychologist of international fame who formulated the theory known as Behavourism, of which he became the leading exponent. It substantiates the work of the late Professor Pavlov.

Watson-Watt, Sir Robert, F.R.S. (b. 1892), British physicist and engineer, chief of team of scientists engaged in radio location research which resulted in every aircraft and ship being equipped with radar aids enabling them to detect, locate, and shadow enemy craft with great accuracy during the Second World War.

Watt, James, F.R.S., F.R.S.E. (1736–1819). Born at Greenock, this genius was originally a mathematical instrument maker, and being brought into touch with mechanical problems, conceived the idea of the modern, that is, high-pressure steam-engine. Watt took out his first patent in 1769; the engine, however, was used only for mining operations until 1785, when it was applied to a cotton factory, Watt being greatly aided in his developments of the engine by the business ability of his partner, Matthew Boulton.

Watteau, Jean Antoine (1684–1721), a French landscape painter of transcendent ability, and especially great in *genre*. His shepherds and shepherdesses, rustic dance and fête scenes were wonderful for their harmonious brilliancy of coloration. His *chef-d'œuvre* is the *Embarkation for the Isle of Cytherus*, in the Louvre.

Watts, George Frederick, O.M., R.A. (1817–1904), occupied a unique place in English art. His works are numerous; among them may be mentioned *Love and Death*, *Hope* and *The Angel of Death*. He bequeathed to the nation a large number of his finest pictures. His portraits of Swinburne, Carlyle, Cardinal Manning, Browning, and Tennyson are especially fine.

Watts, Isaac (1674–1748), a great English hymn-writer; author of *O God, our help in ages past*.

Watts-Dunton, Walter Theodore (1836–1914), a prominent critic and close friend of Swinburne. Published *The Coming of Love* in 1897, and *Aylwin* in 1898.

Waugh, Evelyn Arthur St. John (b. 1903), English satirical writer, author of *Vile Bodies*, *Scott-King's Modern Europe*, *Brideshead Revisited* and *Life of Edmund Campion*, for which he was awarded the Hawthornden prize in 1936. His brother, **Alec Waugh** (b. 1898), is also a successful writer, the author of *The Loom of Youth*, *So Lovers Dream*, and *His Second War*.

Wavell, Field Marshal Earl, P.C., G.C.B., G.C.S.I., G.C.I.E., C.M.G., M.C. (1883–1950), Viceroy of India 1943–47; Com.-in-Chief India 1941–43; Com.-in-Chief British Forces in Middle East 1939–41; previously Southern Command 1938–39 and of troops in Palestine 1937–39. Described as one of the cleverest generals in the British Army, his strategy against the Italians in the winter campaign of 1940–41 was brilliantly successful.

Webb, Sir Aston, G.C.V.O., C.B., R.A. (1849–1930), President of the Royal Academy, 1919–24, one of our foremost architects, and the designer of the general scheme of the Victoria Memorial in front of Buckingham Palace, the new Birmingham University, the Britannia Naval College at Dartmouth and other fine structures.

Webb, Matthew (1848–83), in 1875 swam the English Channel in twenty-two hours, and was drowned eight years later in an attempt to swim through the Niagara rapids.

Webb, Rt. Hon. Sidney James, O.M. (1859–1947), eminent Socialist, one of the founders of the Fabian Society in 1884. Sec. of State for the Colonies 1929–31, and for the Dominions, 1929–30. Pres. of Board of Trade in first Labour Government, 1924. His wife Beatrice, equally with himself, was a great investigator and writer on political and economic affairs. Among their books were *History of Trade Unionism*, *English Local Government* and *Soviet Communism*. He founded (1913) and edited (till 1922) the *New Statesman*. Raised to the Peerage, 1929, as **Lord Passfield.**

Weber, Carl Maria Friedrich Ernst von (1786–1826), German composer, who is usually looked upon as the founder of the German national opera and of the German romantic movement, which found its complete musical expression in Wagner. His fame rests principally on his three great operas *Der Freischütz*, *Euryanthe*, and *Oberon*, the last being written for Covent Garden. He was an able pianist, conductor, and musical director as well as composer. He died in London after the performance of *Oberon*, and his body was taken back to Dresden in 1844.

Webster, Daniel (1782–1852), an American, who, as statesman, lawyer, and orator, exerted enormous influence on American constitutional ideas and practice. Served twice as Secretary of State and in 1842 negotiated the Ashburton Treaty which settled the Maine–Canada boundary.

Webster, Noah (1758–1843), the American lexicographer and grammarian. Author of the *Dictionary of the English Language*, and works on literary and political themes.

Wedgwood, Josiah, F.R.S. (1730–95), was the most famous of English potters. He was born at Burslem, served an apprenticeship that carried him through all the branches of the trade, and in 1759 was able to set up in business for himself with money he had saved. He persevered through failure after failure, and in a few years produced such an improved form of ware that it came into great demand. He engaged Flaxman to make classical designs for him, and his pottery became the fashion, and led to a great extension of the Staffordshire earthenware industry.

Weill, Kurt (1900–50), German composer of satirical, surrealist operas, including *Die Dreigroschenoper* (librettist Bert Brecht), and musical comedies, including *Lady in the Dark*, and *One Touch of Venus*. He left Germany in 1933 for France and went to the United States in 1935.

Weingartner, Paul Felix von (1863–1942), Austrian conductor and composer, studied at Leipzig and with Liszt. Established himself as a brilliant conductor, held several appointments in Germany, succeeded Mahler at the Vienna State Opera, and became head of the Conservatory of Music at Basle. His compositions include six symphonies, several operas, and some chamber music.

Weismann, August (1834–1914), a distinguished German biologist who was Prof. of Zoology at

Freiburg, 1866–1912. His great work was done in the field of evolution, especially on the question of individual variability. He is particularly remembered for his theory that heredity is a question of the continuity of the germ-plasm and that acquired characteristics cannot be transmitted to descendants.

Weizmann, Chaim, D.Sc., LL.D., Ph.D. (1874–1952), Zionist leader, became provisional President of Israel in May 1948, and was elected first President in 1949. Distinguished microbiologist and organic chemist.

Wellesley, Richard Colley Wellesley, Marquess, K.G., P.C., K.P. (1760–1842) was Pitt's famous governor general of India, the son of the Earl of Mornington, the first professor of music at Trinity College, Dublin, and elder brother of the Duke of Wellington.

Wellington, Arthur Wellesley, 1st Duke of, K.G., P.C., G.C.B. (1769–1852), was the most famous British general of the 19th century. He distinguished himself in India and conducted successfully the Peninsular War. In 1814 he was British Ambassador at Paris. Then came Napoleon's escape from Elba, the short and sharp campaign which terminated at Waterloo, and the final overthrow of Napoleon. Wellington became the most prominent man in the Empire. From 1828 to 1830 he was Prime Minister. From 1842 to his death he was Commander-in-Chief. His funeral at St. Paul's was one of the great pageants of last century.

Wells, Herbert George, D.Sc. London (1866–1946), distinguished English novelist whose work, whether romantic as in *Kipps* and *The History of Mr. Polly*, or scientific as in *The Outline of History*, gained him a world-wide reputation. Social, political and educational problems are treated with breadth of vision and are clearly analysed in his books. Among his later books are *A Short History of Mankind*, *Work, Wealth and Happiness of Mankind*, *The Shape of Things to Come*, *The Fate of Homo Sapiens*.

Wesley, Charles (1708–88), brother of John Wesley, and the poet of Methodism. Wrote a large number of hymns of enduring merit.

Wesley, John (1703–91), the founder of the great religious communion of the people called "Methodists," and the son of a clergyman of the Anglican church. Taking orders himself, in 1735, he went to Georgia as a missioner and allied himself with the Moravians, but later he abandoned all ecclesiastical traditions, and established, on a wonderfully well-devised basis, the connexion called by his name. His own open-air preaching was powerful in the extreme, his energy and depth of purpose inspiring, and his organising ability exceptional. He accomplished a great work of religious revivification, taking the world as his parish; and profound as was his conviction of his high calling as an Evangelist, John Wesley "builded better than he knew" in rearing the denominational edifice which is the monument of his faith and vigour.

West, Rebecca, D.B.E. (Mrs. Cicily I. Andrews) (b. 1892) novelist, critic and journalist. Her critical works include *Henry James*, 1916; *The Strange Necessity*, 1928; and *Particular Graces*, 1933. Among her novels are *The Return of the Soldier*, 1918, *The Judge*, 1922, *Harriet Hume*, 1924, and *The Fountain Overflows*, 1957; *Black Lamb and Grey Falcon* (a travel book and commentary on Yugoslavia) 1942.

Westermarck, Edward Alexander, Ph.D. (1862–1939), a distinguished Finnish scientist who was Professor of Sociology at the University of London, 1907–30. Born at Helsingfors, he made an international reputation with the monumental *History of Human Marriage*, written in English and published in 1891. His *Origin and Development of the Moral Ideas*, 1906–8, was followed by many other works, including *A Short History of Marriage*, 1926; *Ethical Relativity*, 1932; and *The Oedipus Complex* and other essays on sex.

Westinghouse, George (1846–1914), American engineer who built the dynamos for Niagara Falls, and in 1865 invented the compressed air brake known by his name and developed a compressed air system of railway signalling.

Westmacott, Sir Richard, R.A. (1775–1856), a great English sculptor who studied under Canova at Rome, and succeeded Flaxman as Professor at the Royal Academy. He executed many fine monuments in Westminster Abbey, at St. Paul's Cathedral, and elsewhere, including the statue of Achilles in Hyde Park and the pediment of the British Museum.

Wharton, Edith (Jones) (1862–1937), American novelist whose *House of Mirth* (1905) brought her fame as a social satirist. Her work was greatly influenced by her friend Henry James, and most of her fifty-four volumes were written after she was thirty-five.

Whately, Archbishop Richard (1787–1863), was for over thirty years Archbishop of Dublin, and achieved a high reputation as a writer on theology and philosophy. His treatises on *Rhetoric* and *Logic* are among the most notable books of their class.

Wheatstone, Sir Charles, F.R.S. (1802–75), was an eminent English electrician and scientist, whose experiments in association with Mr. W. F. Cooke resulted in the first application in this country of the principle of the electric telegraph. The stereoscope was also one of his inventions. He was Professor of Natural Philosophy to King's College, London, for many years.

Wheeler, Sir Charles, K.C.V.O., C.B.E., P.R.A., F.R.B.S. (b. 1892), British sculptor; P.R.A., 1956.

Whistler, James Abbott McNeill (1834–1903), was an original artist, writer, and wit, who first came to Europe from America in 1857, and made a name as an etcher both in Paris and in London. His studies of Thames scenery are especially fine. When he began to exhibit pictures in oils he greatly puzzled the critics, some of whom discovered in his "nocturnes" and other studies an impressionist of surpassing genius, while others, including Mr. Ruskin, who described one of the "nocturnes" at the Grosvenor Gallery as a "pot of paint flung in the public face," looked upon them as mere audacious eccentricities. The finest of his oil paintings are the portrait of his mother, and that of Carlyle. He brought an action against Ruskin for the criticism referred to, but only obtained a verdict of one farthing damages without costs.

White, Field-Marshal Sir George Stuart, V.C., G.C.B., O.M., G.C.M.G., G.C.I.E., G.C.V.O. (1835–1912), the heroic defender of Ladysmith in the South African War and a soldier who achieved renown at many points of a long military career.

Whitefield, George (1714–70), was for a time associated with John Wesley at Oxford in the propagation of Methodism and attracted great attention by his gifts as a preacher. He was Wesley's most powerful champion; but in 1741, differing from Wesley on a point of doctrine he left the Methodists, and thenceforward simply preached as an evangelist, allying himself with no sect, but expounding Calvinistic doctrines with fervour and eloquence.

Whitgift, John (1530–1604), a gifted Anglican prelate. Persecuted the Puritans, and was one of the authors of the famous *Lambeth Articles*. Was Archbishop of Canterbury 1583–1604.

Whitman, Walt (1819–92) was an original figure in the world of American authorship, and produced many works of striking poetic merit. He served in the Civil War, and his vigorous humanity, as expressed in his writings, made him a distinguished personality. His works include *Leaves of Grass*, *Drum Taps*, and *Democratic Views*.

Whittier, John Greenleaf (1807–92), America's Quaker poet, was the son of a New England farmer, and for a time followed the trade of a shoemaker. After some experience in journalism, he published his first book of poems, *Legends of New England* (1831). His best-known volumes are: *Lays of My Home* (1843), *Voices of Freedom* (1846), *Songs of Labour* (1850), and *National Lyrics* (1865).

Whittington, Richard (*circa* (1358–1423). The son of a Gloucestershire knight who was outlawed. Richard went up to be apprenticed in London and there found fortune and fame eventually as a merchant. Four times Mayor of London and representative of the City in Parliament he was a great man in his time, engaging in many profitable and honourable enterprises. Richard was well styled "the model merchant of the Middle Ages," and he did marry his

master's daughter, and no doubt drew some sort of inspiration from the bells of Bow.

Whittle, Air Commodore Sir Frank, K.B.E., C.B. (b. 1907), pioneer in the field of jet propulsion. The first flights of Gloster jet-propelled aeroplanes with Whittle engine took place in May 1941.

Whymper, Edward, F.R.S.E. (1840–1911), a wood-engraver and artist; also one of the best-known Alpine climbers, and the first to reach the summit of the Matterhorn. Author of books on mountaineering in various countries.

Wiggin, Kate Douglas (Mrs. George C. Riggs) (1856–1923), an American novelist of quaint charm and humour. Author of *Rebecca of Sunnybrook Farm*.

Wilberforce, William (1759–1833), was the son of a Hull merchant. He was educated at Cambridge, and entered Parliament in 1780. In 1789 made the first of his many proposals in the House of Commons for the abolition of the slave trade, but it was not until 1807 that the Act embodying these proposals was carried.

Wilcox, Mrs. Ella Wheeler, a popular American poetess (1855–1919). Writer of sentimental verse.

Wilde, Oscar Fingall O'Flahertie Wills (1856–1900), Irish author and dramatist. The son of Sir William Wilde, a well-known Dublin surgeon, was the leader of the cult of æstheticism, of art for art's sake. His works included poems, fairy-tales and short stories. He is best known, however, for his brilliantly witty comedies, *Lady Windermere's Fan*, *A Woman of No Importance*, *The Ideal Husband* and *The Importance of Being Earnest*.

Wilder, Thornton Niven (b. 1897), American author and playwright. Among his books are *The Bridge of San Luis Rey* and the *Ides of March*.

Wilkes, John (1727–97), was a forcible, daring, and original Whig politician, who championed the cause of the people with great vigour, and was for a time exceedingly popular. For a violent attack on the Government in his paper *The North Briton*, he was committed to the Tower, but obtained release on the ground that he was a member of Parliament. He was later expelled from the House and fled to France, returning in 1768, and elected M.P. for Middlesex. A fresh prosecution, however, and a fresh expulsion took place, and three times he was expelled and as often re-elected. A great agitation ensued, and so high was he in favour among the people, that he was made alderman, then sheriff, then Lord Mayor of London. In the end his opponents gave way, the orders against him were withdrawn, and from 1779 he was Chamberlain of the City of London.

Wilkie, Sir David, R.A. (1785–1841), was an eminent painter of popular subjects, mostly of rural life.

Willcocks, Sir William, K.C.M.G. (1852–1932), a British engineer, born in India, who in 1898 planned the great Aswan Dam, which he completed in 1902. In 1911 he undertook for Turkey a vast scheme for irrigating some 31 million acres in Mesopotamia.

Willett, William (1856–1915), an English builder, noted for his long and tireless advocacy of the Daylight Saving scheme, which, however, he did not live to see put into effect. It was adopted as a war-time measure in the year following his death. (*See* Summer Time, Gen. Inf.)

William I. (1027–87), the "Conqueror," Duke of Normandy, claimed the English throne as legally appointed successor to Edward the Confessor and, at the Battle of Hastings in 1066, defeated Harold II. who was killed. The new king crushed Saxon resistance in the North and West, transferred most of the land to his Norman followers, and drew England into closer relations with the Continent. Maintaining many old institutions such as the shire-court and the fyrd (a non-feudal army), William governed firmly, and was supported by the Church, especially by Lanfranc, Abp. of Canterbury. In 1085 he ordered the Domesday Survey (*q.v.*).

William I. of Prussia (1797–1888), the maker of modern Germany, succeeded to the throne of Prussia in 1861. It fell to him to have the control of his country during a period of mighty transition and development, with Bismarck as his chief minister. The war with Austria rendered him highly popular, and when in 1870 the war with France was entered upon the whole German people rallied round him, and after a series of brilliant achievements by his army he was proclaimed German Emperor on the 18th of January, 1871.

William II. (1056–1100), the Conqueror's son, surnamed "Rufus," King of England from 1087 to his death. Was in constant conflict with his barons, lived a life of wanton pleasure, was oppressive to his subjects, and was shot (by accident or design) while hunting in the New Forest.

William II., the Kaiser (1859–1941), King of Prussia and German Emperor 1888 until he abdicated Nov. 9, 1918, and fled to Holland, where he was subsequently interned in the castle of Doorn, living there in complete retirement until his death in June, 1941. Educated at Cassel and Bonn, afterwards entered the army and took a keen interest in military affairs. Succeeded his father, the Emperor Frederick, in 1888. His reign was marked by a strong militarism and an intense ambition to secure the dominance of Germany in the Councils of Europe —an ambition which by unscrupulous action and utter disregard of treaty obligations brought about the war of 1914–18. To him was due the introduction of a system of war savagery which greatly increased the horrors of warfare and must leave an indelible stain upon his name. Visited England in 1907, was present at King Edward VII's funeral in 1910, and in 1911 at the unveiling of the memorial to Queen Victoria.

William III. (1650–1702), King of England, Scotland, and Ireland (1689–1702), son of William II of Orange (1626–50) and Mary (1631–60), daughter of Charles I. He married Mary, eldest daughter of the Duke of York (later James II) while Stadtholder of Holland. As captain-general of the Dutch forces he was successful against the French, and in 1688, when James had abdicated and fled the country, William was invited to succeed him and he and Mary afterwards became joint King and Queen. Later he was at war with France, and suffered defeats, but ultimately effected an honourable peace by the Treaty of Ryswick in 1697.

William IV of England (1765–1837) was the third son of George III., and ascended the throne in 1830 in succession to his brother, George IV. He had seen some sea service, and was flatteringly styled the "Sailor King." He showed little of kingly capacity, he was genial and pleasure-loving, and placed no obstacles in the way of government, so was, after a sort, popular. In the early part of his reign (1832) the first great Reform Bill was passed.

William the Silent (1533–84), Prince of Orange, made many attempts to secure a peaceful settlement of Netherlands' disputes with Philip II, but became the leader of the ensuing Revolt and was assassinated. He established the independence and Protestant character of the Northern Netherlands, where literary, artistic, colonising, and commercial activity flourished in the following century.

Williams, Sir George (1821–1905), the founder of The Young Men's Christian Association.

Williams, (George) Emlyn (b. 1905), Welsh actor-playwright, and producer, who has had great success in numerous plays and films, and latterly in his readings from Dickens and Dylan Thomas. Author of *Night Must Fall*, *The Corn is Green*, and *The Light of Heart*.

Wilson, Richard, R.A. (1714–82), a landscape and portrait painter. Was the pioneer of modern landscape painting.

Wilson, (Thomas) Woodrow (1856–1924), President of the United States 1913–21. Was Governor of New Jersey, 1912–13. In 1916 secured from the Kaiser a promise to abandon the more inhuman forms of submarine warfare, and, on their resumption in 1917, broke off official relations with Germany and proclaimed a state of war. Entered into the conflict with the utmost vigour, bringing the full military and financial resources of the Republic into play against Germany. Was a great factor in the winning of victory and in the concluding of a just peace. Largely responsible for the setting up of the League of Nations, which was foreshadowed in his famous Fourteen Points.

Wingate, Major-Gen. Orde Charles, D.S.O. (1903–44), was the renowned and daring leader of the Chindit forces engaged behind the Japanese lines in Burma during the second world war. Killed in an air crash.

Winifred, St., the 7th-century patron saint of virgins, a Welsh maiden, who, importuned by Prince Caradoc, treated him with scorn, and he had her beheaded.

Wiseman, Nicholas Patrick Stephen, Cardinal (1802–65), the first R.C. Archbishop of Westminster, created Cardinal. Much of his life was spent in the reorganisation and development of the Roman Catholic Church in Great Britain. He was one of the three great R.C. prelates of the nineteenth century, the other two being Manning and Newman.

Wolf, Friedrich August (1759–1824), a great German scholar, regarded by some as the founder of scientific classical philology.

Wolf, Hugo (1860–1903), Austrian song-writer. In his settings of over 300 German lyrics, including many of Mörike and Goethe, he achieved complete union of poetry and music.

Wolfe, General James (1727–59), commanded the British forces in Canada at the siege of Quebec, where he won a brilliant victory, which cost him his own life.

Wolsey, Cardinal Thomas (1471–1530), was the son of an Ipswich butcher. Showing ability, he was sent to Oxford to be educated, later on entering the Church, where he gradually rose to a position of eminence, and was entrusted with several diplomatic missions. He was especially favoured by the King, Henry VIII., and secured rapid preferment under that monarch, being in turn Bishop of Lincoln, and Archbishop of York. He was subsequently made Cardinal and became Henry's Chancellor. For a number of years he was supreme, and by his diplomacy did much to strengthen the kingly power. But when Wolsey was unable, though willing enough, to obtain the papal sanction for Henry's divorce of Catherine, he fell into disfavour, and his decline was rapid indeed. From being a great personage, with a princely entourage, he was humbled, persecuted, and harried, and died at Leicester Abbey a broken, dejected man.

Wood, Sir Henry Joseph, C.H. (1869–1944), was the most popular English musical conductor of his day. He introduced many works and composers previously unknown to the British public and greatly stimulated and encouraged interest in classical music. His long association with the Promenade Concerts began in 1895 at the Queen's Hall, and after it was destroyed in an air raid in 1941 the concerts continued at the Albert Hall and are now named after him. He composed songs and cantatas, and his arrangement of sea shanties ends every series of Promenade Concerts.

Woodville, Elizabeth (1437–91), wife of Sir John Grey. After her first husband's death she made a secret marriage with Edward IV., and became the mother of Edward V., and his brother Prince, both of whom were put to death in the Tower by order of Richard III. She was also mother to Elizabeth, Queen of Henry VII.

Woolf, Mrs. (Adeline) Virginia (1882–1941), English novelist and essayist, daughter of Sir Leslie Stephen and wife of Leonard Woolf, writer and publisher. Together they formed the Hogarth Press. Among her best known works are *To the Lighthouse*, *Mrs. Dalloway*, *The Waves*, *The Years*, *A Room of One's Own*, *Orlando*.

Woolley, Richard van der Riet, Sc.D., F.R.S. (b. 1906), succeeded Sir Harold Spencer Jones as Astronomer Royal at the Royal Greenwich Observatory in 1956; formerly Commonwealth Astronomer and Director of the Commonwealth Observatory at Canberra.

Wootton, Barbara Frances, Baroness, M.A., L.H.D., J.P. (b. 1897). Prof. of Social Studies, Univ. of London, 1948–52. Her book *Social Science and Social Pathology* (1959) examines the state of our knowledge about social pathology, with particular emphasis on criminology and social work. Created a life peeress in 1958.

Wordsworth, William (1770–1850), the chief of the "Lake Poets," and one of the most inspired of all British bards, was a native of Cockermouth, and was educated at Hawkshead and St. John's College, Cambridge. In association with Coleridge he issued a volume of *Lyrical Ballads* in 1793. The following year saw him settled at Grasmere, and there and at Rydal Mount he passed the rest of his days. In 1802 he married Mary Hutchinson, his cousin, and the two, with the poet's sister Dorothy, formed an ideally poetic household. Here he carried out his creed of "plain living and high thinking," and produced at intervals some of the purest and noblest poetry in the language. As an interpreter of Nature in her many moods he stands unrivalled. Succeeded to the Poet Laureateship on the death of Southey in 1843.

Wotton, William (1666–1727), a scholar of marvellous precocity, who was entered at Cambridge University in his twelfth year, took his B.A. a year later, then knowing twelve languages, and was Fellow of St. John's at nineteen. Wotton became a clergyman of some distinction, and is best remembered as an author by his *Reflections upon Ancient and Modern Literature*.

Wren, Sir Christopher, F.R.S. (1632–1723), the most famous English architect of his time. He did not quite have all his own way with the tremendous thirty-five years' task he accepted in undertaking the reconstruction of St. Paul's after the Fire, but he produced a masterpiece of which Britain may well be proud. Chelsea and Greenwich Hospitals, and a number of London's finest churches were also his work.

Wright, Sir Almroth (Edward), K.C.B., C.B., M.D., F.R.S. (1861–1947), discovered the system of anti-typhoid inoculation, the method of therapeutic inoculation for bacterial infections (vaccinotherapy), and methods of measuring the protective substances in human blood.

Wright, Orville (1871–1948), American airman who, with his brother Wilbur (1867–1912), began gliding experiments on the sand dunes at Kitty Hawk, North Carolina. To the glider they built they added a petrol engine, and on 17th Dec., 1903, they made four flights, the longest being 852 ft. These flights were the first in which a man had been carried from the ground on flight by a power-driven aeroplane.

Wyatt, James, R.A. (1746–1813), a celebrated architect in his day. He built Fonthill Abbey for Beckford and the Royal Military Academy at Woolwich. Pres. of R.A. 1805–6.

Wyatt, Sir Thomas (1503–42), was the first writer of English sonnets, and a poet who did much to develop the earlier forms of verse. He was also a distinguished diplomatist.

Wyatt, Sir Thomas ("The Younger") (*c.* 1520–54); joined with the Duke of Suffolk in favour of Lady Jane Grey and against Queen Mary, son of the last-mentioned. Led the men of Kent in rebellion on London in 1554, but was captured and executed.

Wycherley, William (1640–1715), the Restoration dramatist, was for many years in high favour at Court. His genius for comedy writing was remarkable and readily adapted itself to the Restoration atmosphere; thus while he provided wit and intrigue and plot and characterisation in plenty and of great merit, the taint of the time was over it all. His plays include *The Country Wife*, *Love in a Wood*, and *The Plain Dealer*. He lived recklessly, was generally in pecuniary difficulties, and marrying the Dowager Countess of Drogheda late in life, placed himself in bondage to a highly jealous woman.

Wyclif, John (*c.* 1324–84), born in Yorkshire, educated at Oxford, and one of the most eminent ecclesiastics of his time. He adopted principles many of which became general at the Reformation, and brought down upon himself the bitter enmity of the Roman Catholic leaders, and would probably have been put to death but for the protection of John of Gaunt. While in comparative retirement as Rector of Lutterworth, in Leicestershire, he finished his translation of the Bible.

Wykeham, William of (1324–1404), was Bishop of Winchester from 1366 to his death, and from 1367 to 1371 Lord Chancellor. He was a man of great learning and an excellent preacher, and wielded great influence. He founded New College, Oxford, in 1379 and Winchester College in 1387.

Wyllie, William Lionel, R.A. (1851–1931), an English marine painter who excelled in the

draughtsmanship of seafaring craft of all kinds, and also won a high reputation as a water-colourist and etcher. His picture, *The Thames Below London Bridge*, was bought by the Chantrey Bequest. Among his other well-known works are *The Battle of Trafalgar*, and *The Port of London*.

Wyspianski, Stanislav (1869–1907), great Polish poet, dramatist and painter.

X

Xavier, St. Francis (1506–1552), the apostle of the Indies, was the follower of Ignatius de Loyola, and devoted his life to missionary work in the East. He was canonised in 1622.

Xenophon (444–359 B.C.), the Athenian general and follower of Socrates. His chief works are *Anabasis Hellenica*, and *Cyropœdia*.

Xerxes (*circa* 519–465 B.C.), King of Persia, was the son of the first Darius and a great commander. In 481 B.C. he started on his famous expedition against Greece when, according to Herodotus, he had a combined army and navy of over two and a half million men. He defeated the Spartans at Thermopylae, but his fleet was overcome at Salamis. He reigned from 485 to 465 B.C. and met his death by assassination.

Ximenes de Cismeros, Francisco (1436–1517), Spanish statesman and Cardinal who reformed the Franciscan Order to a great extent, and in 1502 began to direct the preparation of a polyglot bible, the *Complutensian*, which greatly influenced subsequent versions. In 1506 was made Regent for Queen Juana, and raised to the cardinalate in 1507. Personally conducted a military campaign in Africa in 1509, and afterwards became Inquisitor-General, and in 1516, Regent of Castile, but in the following year was dismissed by the Emperor Charles V.

Y

Yeats, William Butler (1865–1939), Irish lyric poet and dramatist and major figure in the Irish literary revival of the 20th century. With Lady Gregory and others founded the Abbey Theatre in Dublin, for which he wrote many plays. Interested in mysticism and the occult. Member of the Irish Senate, 1922–28; awarded Nobel Prize in Literature in 1923. Some of his best work was written in his later years in *The Tower* (1928) and *Last Poems* (1940). Plays include *Cathleen Ni Houlihan* (1902), *The Hour Glass* (1904), *Deidre* (1907).

Yonge, Charlotte Mary (1823–1901), author of over 120 novels, school books, and other works, including *The Heir of Redclyffe*, *The Daisy Chain*, *The Dove in the Eagle's Nest*, and *The History of Christian Names*.

Young, Brigham (1801–77), Mormon leader, and head of the Latter Day Saints of Salt Lake City. At his death he had seventeen wives.

Young, Francis Brett (1884–1954), British novelist. His books include *My Brother Jonathan* and *Doctor Bradley Remembers*.

Young, James, F.R.S. (1811–83), a Glasgow chemist who discovered the method of distilling oil from shale, and founded the mineral oil industry of Scotland, which led to the development of petroleum concerns.

Young, Thomas (1773–1829), one of the most versatile geniuses in history, descended from a Quaker family of Somerset. Studied languages, medicine, and held the Professorship of Physics at the Royal Institution. In 1804 elected Foreign Secretary of the Royal Society. He was very successful in deciphering Egyptian hieroglyphics and was the first to translate the inscription on the Rosetta Stone. Famous for his share in establishing the undulatory theory of light and for his work on physiological optics.

Younghusband, Lt.-Col. Sir Francis Edward, K.C.S.I., K.C.I.E. (1863–1942), soldier, explorer and writer. Wrote many works on the East. Headed the British Mission to Tibet, 1903–04. Was *Times* correspondent with the Chitral expedition. Pres. of Royal Geographical Soc., 1919–22.

Ypres, 1st Earl of, P.C., K.P., G.C.B., O.M., G.C.V.O., K.C.M.G. (1852–1925), entered Navy in 1866, afterwards passing into Army in 1874, making his mark as a Cavalry officer in the Egyptian campaign of 1884; served in South African War with brilliant success. C.-in-C. British Forces in France, 1914–15; C.-in-C. Home Forces, 1915–18; Lord Lieut. of Ireland, 1918–21.

Ysayë, Eugène (1858–1929), Belgian violinist and conductor, noted chiefly for his playing of the works of Bach and César Franck.

Yukawa, Hideki (b. 1907), Japanese physicist, who received the 1949 Nobel Prize for predicting the existence of the meson. Prof. of Physics at Kyoto Univ. since 1939.

Z

Zadkiel (the angel of Jupiter in Jewish rabbinical lore) was the name assumed by **Lilly** (1602–81) the astrologer, and also by **Richard James Morrison** (1794–1874), Hebrew scholar and amateur astronomer, in the almanack known as Zadkiel's Almanack and first issued in 1831.

Zaharoff, Sir Basil, G.C.B., G.B.E. (1849–1936), was an influential Greek banker and financier who became an armaments magnate, supplying the Allies in the first world war.

Zamenhof, Ludwig Lazarus (1859–1917), Polish linguist who was by profession an oculist, but gained fame as the inventor of Esperanto.

Zapotocky, Antonin (b. 1884), Pres. of Czechoslovakia since 1953; Prime Min., 1948–53; formerly trade union official.

Zeno of Citium (*c.* 340–264 B.C.) was a Greek philosopher who founded the Stoic system.

Zeppelin, Ferdinand, Count von (1838–1917), inventor of the huge dirigible airship bearing his name. His first ascent was in 1900. He organised a Zeppelin service for the German army in the war of 1914–18, but their extreme vulnerability militated severely against their usefulness.

Zeromski, Stefan (1864–1925), great Polish novelist, poet and playwright.

Zhukov, Marshal of the Soviet Union Grigory Konstantinovich (b. 1895), led the defence of Moscow and Leningrad during second world war; served on Allied Control Commission in Germany; C.-in-C. Land Forces and Deputy Minister of Armed Forces of Soviet Union, 1946–55; succeeded Marshal Bulganin as Defence Minister, 1955–57.

Zhukovsky, Vasily Andreyevich (1783–1852), Russian poet whose original work had very important influence on Russian literature.

Zola, Emile Edouard Charles Antoine (1840–1902), was the son of an Italian engineer, and came before the public as a novelist in 1867 with *Thérèse Raquin*. He then conceived the idea of a series of novels which should depict the history of a Second Empire family in various realistic phases, and began the series with *La Fortune des Rougons*, in 1871. In 1877 he made a higher success by *L'Assommoir*. From that time every novel he published had an immense sale.

Zorn, Anders Leonhard (1860–1920), was a noted Swedish painter, etcher and sculptor.

Zoroaster, the Greek form of the name of the Persian prophet, Zarathustra, who lived about the seventh century B.C. He was a monotheist, believing in a good and holy God whom he called Ahura Mazda. Many of his teachings were absorbed by the ancient Persian religion which survives today among the Parsees in India.

Zoshchenko, Mikhail (1895–1958), Russian writer whose humorous short stories, satirising the Soviet way of life, were wildly popular throughout Russia in the 1920s. Several have been translated and published in England.

Zosimus (fl. *c.* A.D. 300), the first known alchemist. He lived in Alexandria.

Zuccarelli, Francesco (1702–88), a very celebrated Italian artist, who came to England, succeeded, made a handsome fortune, and was one of the first members of the Royal Academy.

Zwingli, Ulrich (1484–1531), was one of the ablest of the Swiss Reformation leaders.

Zwirner, Ernst Friedrich (1802–61), an eminent Silesian architect. Restored Cologne Cathedral.

A Citizen's Guide

This Section explains how local and central government works and describes recent trends and problems. It tells the story of the British Commonwealth and of the United Nations, traces the growth of European Organisations, explains some of the recent changes in Africa and describes the American Constitution. Four controversial issues of the day have been selected for background study—the younger generation, the Wolfenden Report on homosexuality, capital punishment and world population. The Section concludes with a useful list of voluntary societies.

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A Citizen's Guide

A GUIDE TO LOCAL GOVERNMENT.

What is Local Government?—Local Government is concerned with the domestic duties of a community as distinct from national questions like defence or taxes which must be decided by Central Government. Beyond Central Government innumerable tasks remain for the elected Local Authorities.

The main subjects on which local authorities exercise powers are:—

Allotments.
Approved Schools and Remand Homes.
Art Galleries and Museums.
Baths and Washhouses.
Bridges.
Burial Grounds.
Car Parks.
Cemeteries and Cremation.
Child Care.
Civil Defence.
Community Centres.
Coroners.
Diseases of Animals.
Education.
Entertainment.
Fire Brigades.
Food and Drugs.
Footpaths.
Health Services and Mental Health.
Highways, including cleansing and lighting.
Housing.
Libraries.
Licensing Theatres, Cinemas, etc.
Local taxation—Road Fund and other licensing.
Markets, Abattoirs, and Cold Stores.
Milk and Dairies.
National Parks and Access to the Countryside.
Notification of Diseases.
Parks and Recreation Grounds.
Police.
Rate collection.
Refuse Collection and Disposal.
Registration of Births, Marriages, and Deaths.
Sewage and Sewage Disposal.
Shop Acts.
Small Dwellings Acquisition.
Smallholdings.
Town and Country Planning.
Water Supply.
Weights and Measures.
Welfare.

What Local Government is there in a Village?—Three bodies share the Local Government in a village:—

(1) A Parish Council of between five and fifteen members is elected in all rural parishes where the population is over 300. A Parish Meeting is an assembly of all the Local Government electors of the parish, and it meets every March. Where there are more than 200 electors they may set up a Parish Council; if there are more than 300, they must do so. Where there is no Parish Council the Parish Meeting assembles twice a year.

(2) Second, there is the *Rural District Council* taking in its area a group of adjacent parishes.

(3) Third, there is the *County Council*. The Parish Council deals with the purely local matters we have described. The Rural District Council takes the medium-sized problems like housing and housing conditions and sanitary services. The County Council takes the major services, like education, police, roads.

Value of the General Parish Meeting.—In the great majority of rural parishes little or no use has been made of the General Parish Meeting. But the meeting offers the electors of the parish an opportunity to review all those various matters which closely affect their general welfare. For adequate guidance on this subject enquiry should be made to the National Association of Parish Councils. 26 Bedford Square London. W.C.1. The Secretary, Mr. C. Arnold-Baker is the author of *Parish Administration* (Methuen: 42*s*.), which is a treatise on the administration of rural parishes. It contains a good deal of practical advice and information. It also contains all the relevant Acts of Parliament so that answers can be found to new questions. It is designed for use not only by professional experts but also by the laymen who form the vast majority of the 63,000 Parish Councillors and Parish Clerks.

The Local Government in a Small Town.—Here Local Government is shared by two authorities. the Urban District Council and the County Council, the major services going to the County authority.

The Local Government in a Medium-sized Town.—Here, too, we find only two authorities, the Borough Council and the County Council. The Borough Council is very similar to the urban District Council mentioned in the preceding paragraph, but the chairman of the Borough Council is a Mayor. Not all areas looked after by an Urban District Council are small. There are five with a population of over 100,000. On the other hand, not all areas with a Borough Council are medium sized, many of them having less than 5,000. A town becomes a borough by obtaining a Royal Charter, and the borough becomes a corporate body with a Mayor, Aldermen, and Burgesses (or Citizens).

The Local Government in a Large-sized Town.—In the largest towns there is only one body. The County Council plays no part, and the Local Authority is the County Borough Council. Thus Leicester is a County Borough independent of the Leicestershire County Council. Certain towns have retained their status because of their historic standing, examples being Oxford and Canterbury. There are eighty-three County Borough Councils in England and Wales. A County Borough may also be a City (which is a title of honour conferred upon a town by the Crown), but it may not be. It may have a Lord Mayor, but not necessarily.

The Administrative County.—In England and Wales sixty-two administrative counties, covered by County Councils, have been created. The number exceeds the number of geographical counties because the division for Local Government purposes has been made on grounds of convenience. For example, Sussex is split into the two Administrative Counties of East Sussex and West Sussex.

How Does London Run its Government?—Owing partly to its size and density of population London has its own special form of government. There are no County Borough Councils within the Administrative County of London, and responsibility is divided among the London County Council, the City Corporation, and the Metropolitan Boroughs. The county is divided into twenty-eight metropolitan boroughs, each having a Borough Council. The City of London Corporation is rich in tradition, and it has remained untouched by the general law relating to Local Government. Its functions are small compared to its prestige.

Local Authorities in Scotland.—These consist of County Councils, Burgh Councils, and District Councils. The County Councils have powers and duties similar to those in England and Wales. Burgh Councils are of three kinds (Royal, Parliamentary, and Police Burghs). The Royal Burghs (holding rights directly from the Crown) and Parliamentary Burghs (created by the Reform Act, 1882) correspond generally to County Boroughs in England and Wales, but they are not entirely independent of the County Councils. The Police Burghs correspond generally to the Urban

Districts and Non-county Boroughs in England. The town councils of Burghs consist of Provost, Bailies, and Councillors, corresponding to the Mayor, Aldermen, and Councillors of English Councils. The District Councils broadly correspond to English Rural District Councils. Central control of Scottish Local Authorities is exercised by the Secretary of State for Scotland, the Department of Health for Scotland, the Scottish Education Department, and other Scottish Departments.

Local Authorities in Northern Ireland.—These comprise six Administrative Counties (Antrim, Armagh, Down, Fermanagh, Londonderry, and Tyrone); two County Boroughs (Belfast and Londonderry); three Boroughs; and a number of Urban and Rural Districts.

Who Run Local Government?—We have seen that, excluding the area of the London County Council there are seven different types of local authority:—

Parish Meeting.
Parish Council.
Rural District.
Urban District.
Borough.
County Borough.
County.

Except for the first they consist of representatives elected by the citizens, who ultimately control them. The whole of the members of a Parish Council retire every third year. But in Rural and Urban District Councils and Borough Councils it is the normal practice for one-third of the councillors to retire each year and some continuity of experience is thus assured.

Besides Councillors there is another group of members called Aldermen in Borough Councils, County Borough Councils, and County Councils. They are elected, not by the public but by the Council itself, forming a fixed percentage of the total membership of the Council.

How does Local Government Get its Powers?—A Local Authority may do only those things which it has been empowered to do by Act of Parliament. There are three kinds of such Acts: General, Adoptive, and Local Acts. A General Act may require a Local Authority to do something, or it may permit it to do something if the authority so wishes. Thus Parliament having decided that the minimum school-leaving age is to be fifteen, Local Authorities must see that that rule is carried out: they cannot choose some other school-leaving age. Sometimes the Act lays a duty on the public and requires the Local Authority to see that it is carried out, examples being the Shop Acts fixing hours of shopkeepers.

An Adoptive Act is one which confers power to do something if the Local Authority wish to adopt the provisions of the Act, an example being the Public Libraries Act.

The third kind of Act, the Local Act, confers special powers upon a particular Local Authority to which the Act refers, *e.g.*, the widening of roads, or the establishment of a municipal theatre.

Where does the Money come from?—The services provided by Local Authorities in England and Wales cost about £1,100 million a year; and the main resources are rates and government grants. About £490 million of the money spent by Local Authorities comes from the rates, and nearly £600 million a year is paid by the Exchequer. It has been the practice for the larger part of the Government's share to be paid in the form of specific grants, most of which are calculated on a percentage basis. A percentage grant is one which is made as a fixed percentage of expenditure on some approved object. More than £250 million is paid out for education, as 60 per cent of the agreed cost of the work which is undertaken. Each authority is treated individually. The decision by the Government in 1958 to consolidate twelve of the percentage grants into a general or block grant is dealt with in a later paragraph dealing with the new Act.

How does Central Government Supervise Local Government?—Local Authorities, in providing services (for example, a Police Force) required by Act of Parliament, are in effect carrying out local administration of a national service. Therefore a Government Department is held responsible for seeing that the Local Authorities carry out their local duties. As regards police, the department is the Home Office; for education, the Ministry of Education; for town and country planning, the Ministry of Housing and Local Government. The Ministry of Housing and Local Government has a general concern for Local Government as a whole.

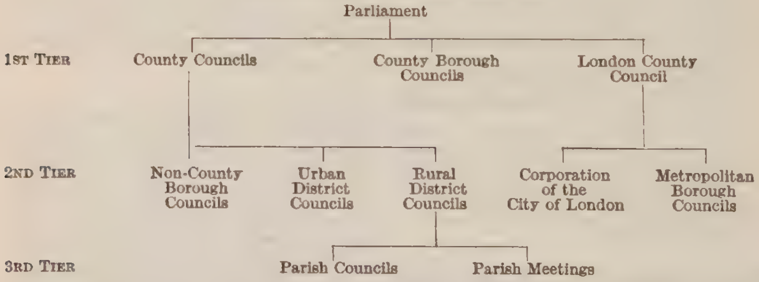
The tendency is for Central Government to lay down broad principles and advice to the Local Authorities, but it is the latter who know local circumstances.

The Trend towards Central Administration.—The country as a whole has taken repsonsibility for running certain services which have been administered locally, or has exercised closer control. Thus hospitals were transferred to Regional Boards under the National Health Service Act. Further examples are the removal of responsibility for trunk roads from local highway authorities and the ownership of civil airfields. Other services which have been transferred from Local Authorities are:—

Gas to Gas Boards.
Electricity to Electricity Boards.
Valuations for rating to Central Government.
River pollution to River Boards.
Outdoor relief of poor to National Assistance Boards.

The Roberts Committee on Public Libraries proposes legislation to ease the transfer of libraries from district to county councils.

Local Government in England and Wales



The Local Government Act 1958.—An attempt at reform was made by the establishment of a Boundary Commission under an Act of 1945. Another attempt at reform was opened in 1956 by the Government's proposal to set up two Local Government Commissions, one for England and one for Wales. Three White Papers were published, the first (1956) dealt with areas and status of Local Authorities, the second (May 1957) with functions of county and district councils, and the third (July 1957) with finance. These proposals were embodied in an Act, the three main objects of which were:—

(1) to increase the financial independence of local authorities by strengthening the rating system and reducing their dependence on percentage grants;
(2) to provide machinery and procedure for reviewing and improving the structure of local government to meet modern conditions;
(3) to give to the larger county district councils a greater share of responsibility for the health, welfare, and education services.

The Main Provisions of the New Act.—To carry out these objects the Act made the following provisions:—

1. Replacement by a general grant of a number of separate grants made for specific services. The largest to be absorbed are those for education, health, fire, and child care.
2. Rerating of industry from 25 per cent. of net annual value (the present level) to 50 per cent.
3. Creation of two Commissions, one for England and one for Wales, to review the areas of counties and county boroughs, and to consider claims for extensions and also claims by large non-county boroughs or urban districts that they ought to be county boroughs. (A population of 100,000 will be regarded as establishing a presumption of adequate size.)
4. Selection of five big provincial conurbations (in England) for special review by the Commission.
5. Reviews of districts and parishes, outside these five areas, by county councils.
6. Delegation of certain health, welfare, and education functions by county councils to the larger district councils.

Reviews of Local Government Areas.—In the White Paper on the Areas and Status of Local Authorities the Government stated that there was "no convincing case for radically reshaping the existing form of local government." What was needed was overhaul and improvements to bring it up to date. The Government considered in particular that—

(1) new or altered machinery was required for reviewing areas and status;
(2) there should be provision for creating county boroughs where appropriate;
(3) the pattern of local government in conurbations (densely populated areas each comprising a large number of authorities) should be examined for better handling of common problems; and
(4) the number of unduly small county districts should be reduced.

County Borough.—At present an essential qualification by a borough seeking promotion to county borough status is that the population of the borough must be at least 75,000. The new Act raised that minimum qualification to 100,000 with certain qualifications.

Special Review Area.—The five "special review areas" which under the 1958 Act are each to be examined as a unit are: West Midlands, Merseyside, West Yorkshire, Tyneside, and South-East Lancashire.

Greater London.—For the time being the Act is suspended as regards Greater London, which is being reviewed by a Royal Commission.

The First Areas to be Reviewed.—The first areas to be reviewed, commencing in March 1959 were the East and West Midlands, and this included the West Midlands Special Review Area. The Local Government Commission announced that their aim, as required by the new Act, was to make local government more effective and convenient. They had power, accordingly, to make far-reaching proposals. They can propose the creation of new county boroughs and the demotion of existing ones, the extension of county boroughs, the amalgamation of counties and alterations of their boundaries. Inside the special review areas they can also propose changes in districts and the creation of a new kind of local-government structure—a "continuous" county with a special distribution of functions. The Commission, later in 1959, announced that they would review next the Tyneside and West Yorkshire Special Review Areas and the south-west of England. At the third stage they would review the north-west of the country, and finally turn to Lincolnshire and East Anglia, the south-eastern and the southern counties.

Royal Commission on the Government of London.—Among those who gave evidence was a group from the London School of Economics. It considered that a more extensive area should have been taken, including the green belt and much of the territory beyond it which was covered by Sir Patrick Abercrombie's Greater London plan. Their main conclusion was that there is an overwhelmingly strong case for a directly elected Greater London Council to perform certain essential functions which demand comprehensive treatment. They also thought that second-tier authorities, within the area of the Greater London Council must be large enough to provide a wide range of services efficiently and economically, and that authorities with populations of less than 300,000 in Inner London and 200,000 in Outer London would be too small. At this point two alternative schemes were proposed.

Second-tier Organisations for Greater London.—Under one proposed scheme the Greater London area would be divided into twenty-five Greater London boroughs with populations of the order of a quarter to half a million. Under the other scheme Greater London would be divided radially into six "London Counties" with populations of the order of a million to a million and three-quarters, with a small Central London authority. Each London county would be subdivided into parishes with populations of 10,000–50,000, whose councils would provide amenities and air grievances.

The Block or General Grant.—The Act of 1958 provided that from April 1959 county and county borough councils should receive a new general grant in place of a number of existing specific grants, including those payable for education, health, fire services, and child care. The level of the grants absorbed was about £300 million, and the grant will be distributed on a formula which takes into account population, number of schoolchildren, old people, density of population, and other factors. About 87½ per cent. of the grants is made up by the old education grant.

The Controversy about the Block Grant and Education.—The principal argument put forward by the Government in favour of the Block Grant was that local councillors would regain initiative which they have lost, since percentage grants mean interference. On the other hand, it was argued that block grants have an inherent tendency to make authorities spend less and that if they do spend less it will inevitably mean less on education. For the Government, Ministers of Education have declared their intention to see to it that education does not suffer. The change was, however,

opposed by the National Union of Teachers, the Association of Education Committees, the education committee of the W.E.A., the T.U.C., and other bodies.

Recent Changes.—At the end of 1959 county district councils with a population of 60,000 or more were entitled to claim delegation from county councils of important planning functions; and in special cases the Minister of Housing and Local Government can require similar delegation to a district council with less than 60,000 population. The principal functions subject to delegation concern applications for planning permission, orders for preserving trees, and the control of outdoor advertising.

The Organisation of the Police Force.—In 1959, after two or three cases which had disturbed public opinion, the Home Secretary ordered an inquiry into the recruitment and organisation of the police force and the relations between the police and Government, and between police and public. The existing organisation of police forces is complicated. The 126 police forces in England and Wales are:—

1. County forces, under a Joint Standing Committee (half the members from the county council and half Justices of the Peace).
2. Borough forces, under Watch Committees, elected by the borough councils.
3. Combined forces covering more than one county or borough, under a body representing the constituent areas.
4. The Metropolitan Police Force, covering a 15-mile radius from Charing Cross, under the control of the Home Secretary.
5. The City of London force, under a committee of the Common Council.

Entertainments and Museums.—It is not widely known that since 1948 certain Local Authorities are empowered to take steps for the provision of a theatre, concert hall, dance hall, and other premises suitable for giving entertainment. Outside London the Local Authorities so empowered are County Boroughs and County Districts. Their expenditure for the provision of entertainment, which includes maintaining a band or orchestra, is limited to the product of a sixpenny rate, plus receipts from charge for admission, etc. Much better use needs to be made of this power if the low cultural quality of life in provincial cities is to be raised. Another element in cultural life which needs encouragement is the provision of museums. The value of a museum as a stimulus to general interest and education is only being slowly realised, and a large number of towns are devoid of anything in the nature of a museum. But both urban and rural authorities are free to establish museums and maintain them. Although museums add the name of the county to their title, scarcely any County Council supports a museum.

County Archive Offices.—Up to a fairly recent date county archives were neglected save for the care devoted to them by private societies or individuals. Counties have now been invited to institute a County Archives Institute. Where this has been done, invaluable historical records, which were rapidly disappearing, have received the care which they deserve to have in any good community.

New Towns.—A change in the government of the new towns was made by the New Towns Act, 1959. Under that Act when the New Towns Development Corporations are wound up their assets and liabilities will be transferred to a new body, to be known as the Commission of the New Towns, instead of to the Local Authorities as stipulated in an Act of 1946. The Local Authorities will remain responsible for schools, roads, lighting, and refuse disposal, but the Commission may assist in providing amenities, water supply, and sewerage. The Commission's houses will be exempt from rent control.

The Professions in Local Government.—A new trend in local government is that the work of the professional person is becoming more important, in some people's eyes, than that of the politician or councillor. The work of local government is largely planned and operated by doctors, engineers, lawyers, teachers, and so on. Another trend is the introduction into local government of the managerial methods of business (known as O. & M., Organisation and Method) already introduced into Government Departments and public corporations. Will these methods tend, by their emphasis on financial efficiency, to lead to the creation of bigger authorities?

A Vision of Community.—What, if anything, is likely to infuse new life into local government, which has played so important a part in English life? Will local bodies be able to play a new, imaginative rôle as community builders, providing finer opportunities of life in the community—making the arts accessible to larger ranges of people, and housing them handsomely? In modern society human relations within the family have been stimulated by the building society, the motor-car, the television, and domestic machinery. The Press, the radio, and television deal with national and world events. In this pattern, local public life is neglected. But the decay in local initiative and in a sense of community is extremely serious.

The International Municipal Exchange Scheme.—The Council of Europe had devised a scheme to promote exchanges between county and borough councillors and local-government officers throughout Europe. It enables those responsible for local government to broaden their knowledge of the institutions and administrative methods of other countries. A Yearbook on the subject is issued by the Council of Europe, Strasbourg, France. The councillor or local-government official desirous of visiting a given municipality writes to the Mayor and receives the name and address of his host. The opposite number in the foreign country undertakes to explain to his guests the local administrative methods and to make their stay profitable. The Council also hold, from time to time, a European Conference of Local Authorities, at which delegates attend representing, not Parliaments, but municipal authorities.

OUTLINE OF CENTRAL GOVERNMENT.

What is Democracy?—Democracy is a form of Government in which the supreme powers of Government are vested in the whole body of citizens. It thus differs from an autocracy, in which these powers are vested in one person, from an oligarchy (powers vested in a few people), and from an aristocracy (powers vested in a privileged class). This country, the United States, the Scandinavian countries, and most of the Dominions are among the examples of a democracy. The classification of Governments into monarchy (a form of government with a King or Queen at the head) and republic (which has no King or Queen but a President) cuts across the division of Governments into those which are democratic and those which are not. For example, the United States is a democracy, but not a monarchy. In this Guide we try to explain how democracy works in Great Britain; the essential methods whereby the people control the Government; and the way Government itself works (including Parliament, the Civil Service, Local Government, and the Judiciary).

Essentials of Democracy.—The fundamental way in which the mass of citizens control the Government is a combination of methods, namely universal suffrage, the rule of the majority, and the right to oppose the Government. Under the first of these three principles all citizens, male or female, over the age of twenty-one have the right to elect their own member of Parliament and to vote in local elections. Although we may sometimes take universal suffrage for granted, it came

only in 1928, and is the culmination of slow growth. Under the second principle the majority has the right to rule, subject to the safeguards we shall describe later and subject especially—and this is the third principle—to the right of the minority to oppose. This consideration is vital to a democracy and opposition is so essentially a part of the British Constitution that the Leader of the Opposition is paid a salary by the Government. The idea of opposition entails the existence of parties, dealt with later.

What is the British Constitution?—The statement that our Constitution is an unwritten one means that there is no single document called a Constitution. In this respect this country is unique. Democracy is preserved by the ordinary law, by the political organisation of the people, by custom, and by rights which depend upon the capacity of the people to preserve them.

Government of the People.—The supreme law-making body is Parliament (a word which originally meant a talk). Parliament has grown from the original principle that in important matters such as making the laws the monarch ought not to act without counsel and consent, and it now consists of two Houses, the House of Lords, composed of lords spiritual and temporal, and the House of Commons representing the commoners.

House of Commons.—The principal share of parliamentary business is conducted in the Commons. Its business is divided into three branches: legislative, financial, and critical.

Composition of the House of Commons.—Its members consist of 630 citizens of the United Kingdom and Northern Ireland, who receive a salary. Women are eligible for membership. Adult citizens of both sexes have the right to vote at general elections subject to certain qualifications. The Speaker or chairman is elected by a free vote of the House from among the members. As Speaker he presides over debates with impartiality and safeguards the rights of members. He is the link between the House and the Crown. The life of a Parliament is limited to five years, although, on the advice of the Prime Minister, the Queen may dissolve Parliament and issue a proclamation calling for election of a new Parliament. Parliament is adjourned from day to day while in session. At the end of the session it is prorogued. At the expiry of its life it is dissolved.

Legislation.—Legislation is the work of making laws. The law of this country consists of common law, statute law, and equity. One may describe the common law as that based on custom and usage as declared and expounded by judges. Statute law is the law made by Parliament, enshrined in Acts of Parliament or statutes of the realm. Parliament is thus concerned with the making of statute law. The classification of law is explained in another part of this section and in the Section **The Law of England.**

How Laws are Made.—Any member of the House of Commons may present a Bill after giving formal notice, but the principal Bills are those introduced by the Government based upon its programme as outlined in the Queen's Speech. The Bill has to pass three Readings before it is agreed by the Commons. The First Reading is a formality. The House gets down to discussion at the Second Reading, when general principles as distinct from details are discussed. If these principles are approved, the Bill passes its Second Reading and is then referred to a Committee. This Committee is a Committee of the whole House, with the Chairman of Committees presiding in place of the Speaker (a proceeding adopted for the more important Bills) or it may be a Committee composed of a lesser number of members divided between the parties on relative strength in the House itself. Finance Bills and other money Bills go to a committee of the whole House. In Committee the Bill is examined clause by clause. After the committee stage follows the report stage. The House (with the Speaker) considers the Bill as reported to it by the Committee and considers whether further changes should be made. Where the House reports to itself this stage is a formality. The final stage in the Commons is the Third Reading (when only verbal alterations are allowed) and the House considers the Bill as a whole and whether it should or should not become law. The Bill, having passed through all its stages in the House of Commons, is sent to the Lords, who may reject or amend it. The Lords cannot require the Commons to agree to amendments; nor can they delay a Bill indefinitely. They have no power in respect of money bills or bills dealing with the duration of Parliament; and since the passing of the Parliament Act, 1949, any other Bill which has been passed by the House of Commons in two successive sessions may be presented for Royal Assent without the consent of the Lords, provided that a year has elapsed between the date of the Second Reading of the Bill in the Commons and the date on which it is finally passed in that House.

Money Functions of the Commons.—We return to the Commons and its second function (and one of its earliest in history) to provide the State with money. The Government cannot raise money by taxation (or in any other way) or spend money without the authority of Parliament; and this power of authority belongs exclusively to the Commons. The House can vote money only on the demand and on the responsibility of a minister of the Crown.

Critical Functions of the Commons.—Parliament itself does not govern. The Queen's ministers are responsible for government and parliamentary government means that Parliament ensures that those ministers represent and have the confidence of the party which possesses a majority in the House; and further, that it controls the action of ministers by questions and criticisms. Any member may propose a motion of condemnation of any member or department of the Government, and such a motion would become a vote of want of confidence if it were made by the leader of the opposition.

The House of Lords is the oldest second chamber in the world and the most hereditary in its character. The Lord High Chancellor presides. The House of Lords has two sets of functions, legislative and judicial. It is a party to legislation within the limits imposed by the Parliament Acts of 1911 and 1949, and these limits are explained above. They are based on the fundamental principle that the function of the Lords, which is a non-representative assembly, is not to thwart the will of the people, but to ensure that that will is precisely and reasonably interpreted. The judicial functions of the House of Lords sprang from the fact that it is the highest Court of Appeal for the United Kingdom. Only the nine Law Lords and those peers who have held judicial appointments hear these appeals, which are presided over by the Lord Chancellor. These decisions are final and become part of Common Law. Proposals for reform of the House of Lords are discussed in a later paragraph.

A Separate House of Lords for Scotland.—In 1960 the independent Bow Group of the Conservative Party suggested a separate House of Lords for Scotland to give that country an Assembly where Scottish views could be aired. Five years earlier the Royal Commission on Scottish Affairs had considered—but rejected—the idea that the Scottish Standing Committee of the House of Commons should sit in Edinburgh instead of London. The Committee, however, can scarcely be regarded as a vigorous one.

The Queen.—We have seen that the Central Government is vested in the High Court of Parliament or The Queen in Parliament, consist-

ing of the Queen and the two Houses. The Queen's tenure of the Crown holds for life (unless she abdicates), it is hereditary, and it is held by statutory right. The Queen is a constitutional monarch; she takes an oath at her Coronation to rule according to the laws and customs of the people. She is the link binding the United Kingdom with the independent countries of the Commonwealth (where she is represented by a resident Governor-General). The Queen is the fount of honour and justice in the realm. She is head of the Forces, which are governed by "Queen's Regulations." She is also head of the Executive, that is all the work of the State is enacted in the name and under the authority of the Crown. Her assent is necessary before a Bill becomes an Act of Parliament.

The Parties.—We have said that the right of a minority to oppose is an essential of democracy, and this idea means that political parties are allowed to function. The party system implies a government party (which has the largest number of candidates) and an opposition known as Her Majesty's Opposition (the leader of which receives a salary). The party system emerged in the latter half of the seventeenth century as Parliament gained the right to be the law-making body. The original division was between Tories and Whigs, the former representing broadly country interests and emerging from the Cavaliers and the latter broadly representing new interests and having their origin in the Roundheads. Thus of the three main political parties today, we may say that the Conservative Party's line of growth is from Cavalier to Tory, to Unionist and to Conservative; the Liberal Party's growth is from Roundhead to Whig and now Liberal; while the Labour Party is the youngest of the three. The Conservative Party advocates private ownership of land and the means of life and is inclined to take a cautious attitude to reform. The Liberal Party strongly advocates free trade and also supports private enterprise, but initiates and supports reform. The Labour Party distrusts exclusive reliance upon private enterprise and looks to State action or nationalisation to bring about a better distribution of wealth.

The Executive.—We must now turn from law-making by Parliament to the carrying out of the law. The work of applying the law and securing obedience is called the executive work of the Government. The Executive comprises five bodies; the Queen, the Privy Council, the Cabinet, the Government Departments or Departments of State and the Civil Service. The Queen as the Head of the State is the nominal head of the executive.

The Privy Council is the Queen's own Council, consisting of over 300 distinguished men drawn from all walks of life. Its function is to give private advice to the Queen. From it have sprung many organs of the constitution. For example, the Judiciary or courts of justice have grown from the Queen's Council sitting as a Court of Justice, and today the Judicial Committee of the Privy Council is a body of distinguished lawyers acting as a Court of Appeal from courts of the Commonwealth. Many of our Government Departments have grown from Committees of the Privy Council.

The Cabinet was originally a committee of the Privy Council. It consists of the principal Ministers of the Crown, and is responsible for deciding the policy of the Government on all matters affecting the country, whether on foreign or home affairs. It has also complete control of the Government Departments. It is thus the central link in the whole machine of government. The Cabinet is responsible for the individual actions of its members. This follows from the requirement that a Minister's policy must be in agreement with Cabinet policy. Thus the Government have a common policy and act as one man. This is the meaning of the phrase "Ministerial responsibility."

The Prime Minister.—The office of Prime Minister, like the existence of the Cabinet, was not formally mentioned in law until recent times. He is the link between Cabinet and Queen. It is he who decides when to advise the Queen to dissolve Parliament. He is leader of the Government party in the House of Commons and gives a lead on policy. A recent writer has pointed out how he Constitution has, after long evolution, divided the functions of leadership and vested them in two personages—a Prime Minister who is temporary and removable by the will of the electorate, and the Queen, who, by contrast, embodies the principle of continuity. In recent years the office of Prime Minister has steadily increased in importance, and the holder bears a growing resemblance to the President of the United States.

The Government Departments.—The Departments are divided into six groups; the Defence Services, the Taxing Departments, the Social Services, the Post Office, Productive Departments, and others.

Defence Services and their Supply.—These consist of the *Admiralty*, the *War Office*, the *Air Ministry*, the *Ministry of Defence*, and the *Ministry of Aviation*.

The Taxing Departments consists of the *Inland Revenue*, which assesses and collects Income Tax, and the *Customs and Excise*, which collects taxes on certain goods when imported into this country and certain commodities produced in this country (*e.g.*, beer, liquors), and taxes certain transactions (*e.g.*, purchase tax) or activities (entertainment tax).

The Social Services.—Into this important group we may put the following:—

National Assistance Board conducts the administration of national assistance and non-contributory old-age pensions.

Ministry of Pensions and National Insurance operates pensions for death or disablement in war (including civilians) and the care of disabled and war orphans; and it also operates the National Insurance Acts and Family Allowances.

Ministry of Labour and National Service operates the Employment Exchange, the Appointments Department, Unemployment Insurance, Resettlement, Training of the Disabled, Factory Inspection, and Training Centres.

Ministry of Education.

Ministry of Housing and Local Government deals with housing and new towns, planning and control of the use of land.

Ministry of Health administers the National Health Service.

The Post Office employs more staff than any other department, and works the posts, telegraphs, telephones, and the Savings Bank. Through its 20,000 Post Offices it does a large number of tasks, such as paying out pensions and family allowances, and issuing wireless and television licences.

Productive Departments.—A number of other Departments produce essential and useful products, for example the *Ministry of Works*, which supplies building material.

Other Departments.—There still remains some forty or more other Departments. The most important offices are:—

Treasury controls national finance and manages the Civil Service.

Foreign Office.

Ministry of Agriculture, Fisheries and Food.

Colonial Office manages relations with Colonies, protectorates, protected states, and trusted territories.

Commonwealth Relations Office deals with

affairs relating to self-governing member countries of the Commonwealth and with the Central African Federation.

Ministry of Power.

Home Office, responsible for Police, Prisons, Aliens, Children, National Fire Service, etc.

Board of Trade.

Ministry of Transport.

Ministry of Aviation.—Aviation was given its own Ministry by the new Conservative Government in 1959. It took most of the functions of the Ministry of Supply (which was abolished), and these functions included guided-missile research. The civil-aviation functions were taken from the Ministry of Transport, which was thus left to concentrate on a roads programme.

A Minister of Science and Technology.—One of the changes introduced by the Conservative Government in the autumn of 1959 was the assignment of responsibility for science to the Lord Privy Seal. That Minister became in fact, though not formally in name, Minister of Science and Technology. This responsibility includes atomic energy. Hitherto civil science had been run by two offices—one under the Lord President of the Council and the other, the Atomic Energy Office, under the Prime Minister and deputed to the Paymaster General. The two offices were combined under the Lord Privy Seal, and an Atomic Energy Office ceased to exist as such.

Possible Amalgamation of Colonial Office and Commonwealth Relations Office.—These two offices were formed out of the Colonial Office in 1925. But the field of the Colonial Office is rapidly shrinking and that of the C.R.O. correspondingly grows as countries in the Commonwealth emerge into self-government. It is seen, however, that countries do not change their natures and needs so rapidly as their formal status, and continue for some time to look to Whitehall for many services they previously enjoyed as Colonies. It is, therefore, being urged that it might soon be time to reunite the two Departments with a three-fold function; a diplomatic one (now the C.R.O.'s) for full Commonwealth members; an administrative one (now the Colonial Office's) for the dependencies; and a technical and advisory service available to countries of any standing.

The Civil Service consists of all employees in the Government Departments. They are employed by "The Crown," and their salaries are authorised annually by Parliament. The employees of Public Corporations (like the National Coal Board) are not Civil Servants, nor are those employed by Local Authorities. The Civil Service (leaving out the postal workers) is divided broadly into five classes: the Administrative; the Executive; the Professional, Scientific, and Technical; the Clerical; and the Messengers, Cleaners, etc.

Changes in the Scope of Government.—During the present century the field in which the Government operates has widened considerably. Fifty years ago the Government was concerned mainly with the maintenance of order, external defence, and foreign relations. Now it is directly concerned in economic affairs, participating in industry and commerce, organising development and investment, and promoting scientific research. A good deal of the State's activities is conducted through public corporations. The increasing impact of science has been reflected in the organisation and promotion of research by the Government. The much wider sphere of Government activity has resulted in there being six times more non-industrial Civil Servants than in 1914, and three times more than in 1935. These figures exclude the Post Office.

The Grievance Man: a Novel Scandinavian Device.—A method of dealing with miscarriage of justice as between private individuals and Government Departments has been in practice in Sweden for a long time. A Parliamentary Commissioner watches over both military and civil affairs. More recently the system has been adopted by Finland and Denmark and it is due to be incorporated in the Norwegian Constitution. The Danish "Grievance Man" is elected by Parliament to investigate complaints; and in so doing he has access to hospitals, mental homes, barracks, and prisons. Every person in Government service (including Ministers) is obliged to supply him with any documents or information for which he asks. He cannot, of course, reverse a Government Department order, but he can recommend to Parliament that a minister should be called to account. In 1958 the all-party organisation of lawyers, known as "Justice," began an examination as to how far the Scandinavian experience can be applied in this country.

Election Results from 1900 to 1959 have been:—

	Cons. & supporters.	Lib.	Lab.	Irish	Others
1900	402	184	2	82	—
1906	157	379	51	83	—
1910 (Jan.)	273	275	40	82	—
1910 (Dec.)	272	272	42	84	—
1918	526	28	63	73	17
1922	347	118	142	—	8
1923	261	155	191	—	8
1924	413	40	151	—	11
1929	260	59	287	—	9
1931	521	37	52	—	5
1935	431	21	158	—	5
1945	212	12	398	—	18
1950	298	9	315	—	3
1951	321	6	295	—	3
1955	344	6	277	—	3
1959	365	6	258	—	1

Some Anomalies of the 1959 General Election Results.—The Conservatives polled more votes than in 1955, but fewer in relation to the increased total of votes cast. In 1955 the Government got the support of 49·8 per cent. of the voters, and it had a majority of 60 seats in the House of Commons; in 1959 they received 49·4 per cent. of the votes, but the majority rose to 100 seats. Allowing for that portion of Liberals, Nationalists, etc., who would prefer Conservative to Labour, the Government's support cannot amount to substantially more than half the nation. Yet, under our electoral system, it has a majority so large as to enable it to disregard the wishes of the other half. To elect one Member of Parliament it took 37,693 Conservative votes, or 47,349 Labour votes, or 271,627 Liberal votes. In other words, the average Conservative vote at the 1959 election was worth more than a Labour vote and nearly eight times as much as a Liberal vote. There were 80 members elected with fewer votes than were cast for their two or more opponents (47 Conservatives, 31 Labour, and 2 Liberal). Thus 80 constituencies are represented by someone who the majority may have wished to keep out.

An Analysis of Three Groups of Seats.—It is worth examining what happened in certain groups of constituencies. The result in Bedfordshire County, where there are four separate constituencies, was:—

Conservatives	97,000 votes	4 seats
Labour 76,091 votes	98,068 "	0 seats
Liberal 21,977 votes		0 seats

A still more curious result occurred in Cardiff:—

Conservative	77,042 votes	1 seat
Labour	70,359 votes	2 seats
Others	2,961 votes	0 seats

At Leicester City four Conservative candidates polled 80,774 votes, but only one got in, whereas

three out of the four Labour candidates were successful on total votes of 72,091. There were, of course, similar anomalies elsewhere.

The Case for Electoral Reform.—Of the nearly 28 million votes cast, nearly 12 million were cast for losing candidates. All those 12 million voters had no influence on the composition of the House of Commons. The object of the proposed system called Proportional Representation is to make votes count.

Proportional Representation.—So long as only one member of Parliament is elected at a time, only one body of opinion in each constituency can be represented. Suppose, however, several Members of Parliament were elected together, say the four members for Bedfordshire or the three for a city like Cardiff, the elector could vote by numbering the candidates—1 for the man or woman he thinks the best, 2 for the next best, and so on as far as he pleases. Your vote is thus made to count by being passed on from a candidate it cannot elect to one whom it can elect—exactly as, in a shop, if the thing you want is out of stock, you spend your money instead on the next best thing. If the candidate you have marked "1" has so many votes that he does not need yours, or if he has so few votes that he has no chance of election the Returning Officer passes your vote on to the candidate you have marked "2" and further, if necessary, till it reaches a candidate whom it can help to elect. As, in this way, nearly all the votes are made effective, it follows that the Parliament thus elected must reflect the wishes of nearly all the voters. This is the system of Proportional Representation by the Single Transferable Vote. The Proportional Representation Society, 82 Victoria Street, London, S.W.1, publish explanatory pamphlets on the subject, including details of a model P.R. election, illustrating, exactly, how the single transferable vote works.

Proportional Representation in Other Countries.—Eire, Switzerland, Sweden, and some other countries have used Proportional Representation for more than a generation. They all have stable Governments. P.R. does not necessarily produce coalitions, but it does make them easier to form and to work, if circumstances require. An objection to coalitions under the present British voting system disappears, because there is no need for pacts between the parties in the constituencies. After the election, a coalition can be entered into freely, on the basis of whatever common ground exists between the parties, with public support for the various parties and policies accurately known and represented.

Reform of the House of Lords.—A controversy between the two Houses arose during 1947–48 when it was agreed, on the initiative of the Conservative Opposition, to set up an inter-party Conference to consider whether agreement could not be reached on the future of the House of Lords. The party leaders did agree provisionally on certain proposals. They agreed that the existing constitution of the House of Lords should be modified to ensure that the Second Chamber was complementary to and not a rival of the House of Commons and that there should be no permanent majority for any one political party. On the composition of the new House it was agreed that:—

1. The present hereditary peers would not automatically be qualified to attend and vote.
2. Instead new "Lords of Parliament" would be appointed on grounds of personal distinction or public service. They would be drawn either from the hereditary Peers or commoners who would be created Life Peers. They would be paid and would be disqualified if they neglected or became unable or unfitted to perform their duties.
3. Women should be eligible to take their place in the Lords.
4. Peers who were not Lords of Parliament would be able to vote at elections and be candidates for the House of Commons.

But the Conference broke down on a point on which agreement could not be reached. It concerned the powers which should be vested in any reformed Upper House, and in particular the length of time that would be reasonable for the performance of its functions. A proposal for another informal Conference on the subject was made in 1953, but came to nothing.

The Life Peerages Act, 1958 was the first attempt to fulfil the promise of reform contained in the preamble of the Parliament Act, 1911. The Act provided for the creation of life peers and the introduction of women into the Lords. The first list of life peers in July 1958 comprised four baronesses—the first women members of the House of Lords—and ten barons.

The Privy Council as Second Chamber.—A proposal that the functions of the House of Lords should be taken over by the Privy Council was made by Mr. Anthony Wedgwood Benn in 1957. He thought there was a strong case for a Second Chamber to help the House of Commons, which would otherwise be burdened with work; but he rejected the possibility that a reformed House of Lords might serve this purpose. He advocated that a Second Chamber should be by appointment in preference to any form of direct or indirect election and he argued that the Privy Council fulfils all the conditions required of the Second Chamber.

The Reform of the Commons.—As a result of the 1959 Election it was realised that the old idea of British politics whereby there was a fairly regular swing of the pendulum might be replaced by another—long periods of one-party Government during which a Ministry (backed by the power which the Constitution gives the Executive and by an efficient Civil Service) might rule unchallenged and scarcely criticised. It became vital therefore to revitalise Parliament for its proper rôle as a check to the Executive. Such a process would also give opportunities to Members to give their best abilities to serving the public.

The Proposal for Specialised Standing Committees.—Small committees on special subjects, such as colonial affairs, which would do much of the work now done by committees of the whole House, would enable back benchers to become acknowledged authorities with real influence. This system is a feature of the United States Congress, and is said to be foreign to our system and likely to weaken the power of the Executive. But it is more powerfully urged that such a reform would make the Commons a much more informed and effective critic of Government policy and administration, and that it would encourage a Member of ability to feel that he could serve the country even if he never became a Minister. A number of standing committees sitting simultaneously would enable Parliament to get through business more quickly and thus find more time to debate great issues of defence, foreign affairs, and economics.

Proposals for a More Efficient Commons.—Among further proposals made were:—

1. M.P.s should be given individual offices, secretaries, free travel anywhere on public business, and a salary and pension scheme tied to a Civil Service grade.
2. M.P.s should have good research facilities, thus having sources of information independent of Whitehall.
3. M.P.s with these facilities should put their public duties before all other concerns and be more available to investigate complaints against the Executive and other public authorities.
4. A strong case can be made out for secret voting so that members might vote without fear or risk of expulsion from party and thus from Parliament.
5. Voting to take place only upon important issues; on other matters the dissent of minorities could be recorded.

The Vote at Eighteen?—There appears to have been no inquiry into the general question of the age at which men and women ought for general purposes to be regarded as adult. At what age ought they have the right to vote? At 18 they are liable to compulsory military service. At 18 they pay adult rates of National Insurance, they may bet and drink intoxicants in public-houses, they may drive a car or be in sole control of an aircraft. They are liable to taxation as soon as work begins; and they are treated by the Courts as an adult from 16 years and upwards. They can marry at 16. The question has therefore been asked whether the State, having imposed so many obligations and rights upon young people at the age of eighteen, should not give them the right to vote at that age and not withhold it for another three years. If they are fit to fight for their country are they not also fit to vote? This question is strengthened by the further reflection that if young people were enfranchised the needs of youth would receive more attention and the community would be enriched by their vigour.

LAW AND THE COURTS.

The subject of English law and its sources (comprising Common Law, Case Law, Equity, and Statute Law) is dealt with in the section **The Law of England.**

The System of English Courts.

I. Criminal Courts.—1. *Courts of Petty Sessions.*—At the bottom of the ladder are the Courts of Petty Sessions, which can try minor offences punishable either by fine or imprisonment, with a maximum of six months' imprisonment for one offence and twelve months for two or more. These courts are presided over by not fewer than two local Magistrates, called Justices of the Peace, whose office is honorary, and who are appointed by the Lord Chancellor on the recommendation of the Lord Lieutenant of the County. Some officials, *e.g.*, Mayors during their term of office, are J.P.s *ex officio*. Most J.P.s are laymen, but all Petty-Sessional Courts are assisted by a trained magistrate's clerk, who is usually a solicitor.

These courts also act as courts of preliminary inquiry to determine whether there is a *prima facie* case (*i.e.*, a case that requires to be answered) against an accused which will require his being "indicted" for trial by jury. This they do by taking depositions from witnesses. If they decide that there is no *prima facie* case, the accused is discharged; if that there is such a case, he is committed for trial either to the Quarter Sessions or the Assizes. In many of the bigger towns a barrister known as a "Stipendiary Magistrate" is appointed to act as sole and permanent magistrate, and in London there are a number of such magistrates known as Metropolitan Police Magistrates.

2. *Quarter Sessions.*—These courts have a wide jurisdiction, but cannot try the most serious crimes, *e.g.*, murder, treason, or bigamy. Trial is by jury. The courts are of two kinds. Those which sit for the county are presided over by magistrates for the county; those for boroughs by experienced barristers known as "Recorders." Courts of Quarter Sessions also hear appeals from Petty Sessions.

3. *Courts of Assize.*—England and Wales are divided into a number of circuits of very ancient origin, each comprising a number of Assize towns. One or more judges of the High Court go on each circuit at least three times a year. Their criminal jurisdiction is unlimited, and they also deal with such civil cases as can be conveniently dealt with locally rather than at the High Court of Justice in London. A great many divorce cases are thus disposed of.

The Central Criminal Court, or Old Bailey, as it is popularly known, is the seat of the Assizes for the City and County of London and certain parts of the home counties. Because of the immense population of this area, the Sessions are held once a month, and four courts are held at a time.

4. *The Court of Criminal Appeal.*—This court is situated in the Royal Courts of Justice Building in London and usually consists of two judges of the Queen's Bench and the Lord Chief Justice. Appeals from Quarter Sessions and the Assizes lie to this court, which has powers to quash, reduce, or augment sentences on appeal.

5. *House of Lords.*—An appeal from the Court of Criminal Appeal lies to the House of Lords. This appeal is not, however, of right, and the "fiat" or permission of the Attorney-General must be obtained.

The constitution of the House of Lords as a judicial body is discussed on another page.

II. The Civil Courts.—1. *The County Court.*—There are about 500 County Courts in England and Wales which are grouped into circuits (not the same as the Assize Circuits). A County Court Judge visits each court at least once a month. Broadly speaking, his function is to try civil actions when the amount involved is not over £200, or in some cases £500.

2. *High Court of Justice.*—The High Court of Justice is one of the two branches of the Supreme Court of Judicature, the other being the Court of Appeal, described below. The High Court deals with all civil cases, except those dealt with by the County Courts or by the civil side of the Assizes. Since 1873 it has been divided into three divisions:—

(1) the Queen's Bench Division, which is principally concerned with Common Law cases (*e.g.*, defamation, breach of promise, damages for injuries, or breach of contract);

(2) the Chancery Division, whose functions have already been outlined; and

(3) the Probate, Divorce, and Admiralty Division, whose title is self explanatory.

3. *The Court of Appeal.*—Appeal lies as of right from decisions of the County Court and from the High Court of Justice to this court. Appeals are heard by courts consisting of three appeal judges, at the head of whom is the Master of the Rolls. The court can dismiss an appeal, allow it or make a fresh order as to damages or costs, or order a new trial.

4. *The House of Lords.*—Appeal lies from the Court of Appeal to the House of Lords. In some cases an appeal may be made without leave, in others leave of the Court of Appeal must be obtained. Only the "Law Lords" (or "Lords of Appeal in Ordinary"), who are eminent lawyers and life peers, and certain other high judicial appointees assist when the House of Lords is constituted as a judicial body to hear either civil or criminal appeals. They are presided over by the Lord Chancellor, who is the head of the English Judiciary. While other judges are appointed for life, his appointment is a political one, and he retains office only during the tenure of power of his party. He is, of course, always an eminent lawyer.

Judicial Committee of the Privy Council.—This is a committee of lawyers, drawn from the Privy Councillors, who hear appeals from decisions of colonial and ecclesiastical courts.

Juvenile Courts.—This is a special kind of Magistrates' Court to deal with accused persons under the age of eighteen. The magistrates chosen are specially qualified for the work, and where possible a woman is appointed as one of the three Magistrates who constitute the Court. The Court is held in private away from the ordinary court room. The object of the Juvenile Court is to introduce into the trial a plan to reform the offender by providing for the care and protection which he may need, by removal from undesirable surroundings, and by subsequent education or training. In these objectives the Court has the co-operation of social workers, including Probation Officers.

Probationary Officers are attached to particular Courts, sometimes a Magistrates' or a higher court. Sometimes an offender is not sentenced to punishment, but is released "on probation," that is on

the condition that he behaves well and follows directions given by the Court or by a probation officer. Such an officer is a trained man (or woman) who advises, assists, and befriends people who have been committed to his care by a court of law. The probation officer, by his assessment of the social background of the offender, can advise the court upon the wisdom of putting the offender on probation. The probation officer by his understanding can so befriend an offender as to provide a basis for his rehabilitation. He undertakes the "after care" of those released from prison or Borstal or approved schools, to which juveniles are sent.

Legal Aid.—If your means are small and you have reasonable grounds for taking proceedings in the High Court of Justice or Court of Appeal or (since 1956) in the County Court you can have the free services of a solicitor and, where necessary, of a barrister. A pamphlet explaining in broadest outline the main feature of the scheme for legal aid (under the Legal Aid and Advice Act, 1949) is issued by the Law Society. The Society has set up Area Committees and Local Committees on the subject. You can obtain the address from any County Court, any office of the National Assistance Board or any Citizens' Advice Bureau. Your Local Authority may also be able to give you the address. Full information is contained in a book published by H.M. Stationery Office entitled "Legal Aid under the Legal Aid and Advice Act, 1949." No one should act on the assumption that he is eligible for legal aid until a decision is reached.

Legal Advice.—The Act referred to in the preceding paragraph provided for a system of free legal advice. In 1958 the Government announced its support for a scheme proposed by the Law Society. This scheme would relieve much of the work done by Citizens' Advice Bureaux and Poor Men's Lawyer Centres.

Legal Aid in Criminal Cases.—The system of granting Legal Aid to persons charged with criminal offences is different from that applying to civil cases. Legal Aid in criminal cases originates from the Poor Persons Prisoners Act, 1903, now repealed; and Part II of the Legal Aid and Advice Act, 1949, augments the various Acts which were passed to replace the original 1903 Act and which is the foundation of the present system. In criminal cases a Certificate that a person should have free legal aid is granted at the discretion of the magistrate or Judge of the court where the case is to be held.

Proposed new Legislation.—At the time of going to press (February 1960) a Bill is before Parliament to extend the scope of legal aid to enable many people who cannot now qualify for legal aid and advice under the 1949 Act to do so. Under the new Bill the upper limit of the applicant's disposable income would be raised from £420 to £700 a year.

OUTLINE of the BRITISH COMMONWEALTH.

The Commonwealth is a free association of sovereign, independent States—the United Kingdom, Canada, Australia, New Zealand, South Africa, India, Pakistan, Ceylon, Ghana, and Malaya—together with the Federation of Rhodesia and Nyasaland. Nigeria was due to become the eleventh member upon gaining independence in October 1960. The United Kingdom, Australia, New Zealand, and the Union of South Africa have dependencies for which they are independently responsible. So vast and complex an association has not been easy to define with precision. For a long time the term "British Empire" was used, and the self-governing countries (other than the United Kingdom) were called "Dominions." These terms have now given place to "Commonwealth" or "Commonwealth of Nations" and "Members of the Commonwealth." The last term describes the ten sovereign countries named in the opening of this paragraph. Other parts of the Commonwealth, such as Colonies, while they may be described as "Commonwealth countries" are not *Members* of the Commonwealth.

The Nature of the Commonwealth.—The Commonwealth is not a federation, for there is no central government, defence force, or judiciary, and there are no rigid obligations or commitments between them. Nor is it a contractual association as the United Nations is. Like the United Kingdom itself the Commonwealth of Nations has no written constitution. But all its members have a broad community of interests, and they are bound together by a common sense of ideals and by a common interest in the maintenance of peace, freedom, and security. Although the Commonwealth includes about a quarter of the total population of the world about three-quarters of the Commonwealth's people live in India. The white population of the Commonwealth is only a small fraction of the whole. The diversity is further illustrated in religion, for the Commonwealth includes over 200 million Hindus, 100 million Moslems, and 80 million Christians. The same variety appears in climate and natural resources. But in spite of diversities of race, religion, language, and tradition, members share a common political heritage which has given rise to a broadly common pattern of institutions.

The Common Heritage.—All members have certain important constitutional features in common. They are parliamentary democracies, their laws being made with the consent of a freely elected parliament after discussion there. The government holds office because it has the support of a majority in that parliament. Ministers who must be members of parliament, are collectively responsible for the actions of the executive and must answer in parliament for all governmental administration. These salient constitutional features are similar to those described above in the Outline of Central Government. Lower houses are elected by secret ballot on a basis of adult suffrage, and they have the power of the purse, since they alone can originate or amend financial legislation.

The Sovereign and the Commonwealth.—At the head of each of the parliaments of the Commonwealth—except those of the republics of India and Pakistan—is the Queen, in whose name the administration is carried on. The Queen's legislative power is a formality—she reigns, though she does not rule; but she provides the element of continuity in the administration. The Queen is, therefore, Queen of the United Kingdom, Canada, Australia, New Zealand, South Africa, Ceylon, Ghana, and Malaya, and she is the symbol of their free association in the Commonwealth. India and Pakistan being republics with a President as Head of State, do not owe allegiance to the Queen, but accept her as the symbol of the free association of the member nations of the Commonwealth and as such the Head of the Commonwealth. The Queen has, therefore, in the seven countries named above, a relationship with the individuals comprising each country and also a relationship with the nation as a collective entity. In the case of India and Pakistan, she has only the latter relationship.

The Commonwealth in the World.—The Commonwealth as a whole, including the dependent territories, covers roughly speaking a quarter of the world's land surface and contains about a quarter of its population. The nations vary widely as has been explained, not only in size, background, geographical position, race, religion, language, but also in composition of population, industrial growth, and world importance. It is natural, therefore, that the approach of the different countries to international questions should vary, and on particular occasions they have voted on opposite sides in the United Nations.

Status of Member Nations.—The subordination of the Dominions, as they were then called, to

the United Kingdom had ceased for all practical purposes many years before that fact was embodied in the Statute of Westminster, 1931. The recognition of a situation already existing was made in the following words:—

> It is in accord with the established constitutional position that no law hereafter made by the Parliament of the United Kingdom shall extend to any of the said Dominions as part of the law of that Dominion otherwise than at the request and with the consent of that Dominion.

The United Kingdom Government cannot declare war or make peace for another Member of the Commonwealth of Nations or determine its foreign or fiscal policy. And that is true, of course, of every Member of the Commonwealth of Nations with regard to every other Member. They make their own laws and they decide their own policies. Now that the independence of Members of the Commonwealth is no longer in question there is a growing consciousness of interdependence—the added security and prestige and wider opportunities which flows from association in the Commonwealth.

The Right to Secede.—" The essence of the Commonwealth relation is that it is a free association of nations, with a common purpose, who belong together because they have decided of their own volition to give and to take their fair share in a world-wide partnership." These words were used when the Burma Independence Bill 1947 was being discussed in the House of Lords by Lord Listowel, then Secretary of State for Burma. " We do not regard membership of the Commonwealth," he said " as something to be thrust by force upon a reluctant people, but as a priceless privilege granted only to those who deeply desire it and are conscious of its obligations as well as of its advantages." But the Member states of the Commonwealth do not for the most part think in terms of the right to secede. It is a basic assumption that the Commonwealth is not only a voluntary and friendly but also a lasting friendship, providing the basis for long-term planning. In 1948 Eire declared its separation from the Commonwealth, and Parliament next year passed the Ireland Act 1949, recognising that Eire (to be known henceforward as the Republic of Ireland) had ceased to be a part of the King's dominions, while providing that the Irish Republic should not be regarded as a foreign country.

Defence.—Each Commonwealth nation is responsible for the organisation and training of its own defence force, and its military action is in no way bound by any decision of the United Kingdom. There is, of course, discussion between the Governments on important questions of policy, and considerable practical co-operation by such means as the exchange of training facilities, standardisation of equipment, and combined exercises.

The Colonies.—As stated in the opening passage of this outline, the United Kingdom, in common with other members of the Commonwealth, has certain dependencies which are described as " The Colonies." But this is a loose term, for " the Colonies " are not really all Colonies in the strict sense. What are loosely spoken of as Colonies are properly divided into Colonies, Protectorates, Protected States, Trust Territories etc.

Definitions.—*Colony.*—A territory belonging by settlement, conquest, or annexation to the British Crown.

Protectorate.—A territory not formally annexed, but in respect of which, by treaty, grant, usage, sufferance, and other lawful means Her Majesty has power and jurisdiction.

Protected State.—A territory under a ruler which enjoys Her Majesty's protection, over whose foreign affairs she exercises control, but in respect of whose internal affairs she does not exercise jurisdiction.

Trust Territory.—A territory administered by the United Kingdom Government under the trusteeship system of the United Nations.

Condominium.—A territory over which responsibility is shared by two administering powers.

Leased Territories.—This term applies only to that part of the mainland of China which was in 1898 leased to Great Britain for ninety-nine years and is administered by the Government of Hong Kong.

Responsibility of the British Government.—The British Government is responsible for the affairs of Colonies (properly called Crown Colonies) both internal and external, and for their defence, and their peoples are British subjects. Protectorates are governed in the same way as Colonies, but have not been annexed. The peoples of Protectorates are not British subjects but British-protected persons.

The Countries of the Commonwealth.—At the end of the Gazetteer is a list of all the countries of the Commonwealth showing their land area and recent estimates of population. The list distinguishes between the sovereign members and the British dependent territories, and classifies the latter according to the kind of dependency. Not all the British dependencies come exactly within the definition either of Colony of Protectorate, since, for historical reasons, many come partly under one heading, partly under another.

The Road to Independence.—During 1960 attention was focused on four British African dependencies. First and in the lead for independence was Nigeria, already self-governing and due to achieve independence in October. Next was Tanganyika, where self-government was granted as a step to complete independence at a later date. The other two dependencies, Uganda and Kenya, presented difficulties. Background notes on these four countries, as well as upon the Central African Federation, are offered in the following section " Changes in Africa."

Cyprus.—A settlement was dramatically reached in London in February, 1959, of the problem of Cyprus. Greece, Turkey, and Britain guaranteed the independence of Cyprus and undertook to prohibit, as far as lies within their power, all activity having the object of union of the new Republic of Cyprus with any other state, or the partition of the island. The three Powers made a Treaty of Alliance, to be embodied in a " tripartite headquarters " in Cyprus, the Greeks contributing a contingent of 950 and the Turks one of 650 soldiers. Britain undertook to transfer sovereignty over the island to the new republic on conditions and with the exception of two bases.

The Government of Cyprus.—The agreement also provided for a President (Greek) and a Vice-President (Turkish), a Council of Ministers, a House of Representatives and a Civil Service composed of Greeks and Turks in the ratio of seven to three. The Cypriot Army is to be composed of members of the two communities in the ratio of six to four. There are to be communal chambers for the management of purely communal affairs. The treaties and the new Constitution were due to be brought into effect during 1960.

Malta.—A Round-table Conference on the future of Malta recommended that Malta, if it chooses, should be given representation at Westminster. It suggested that there should be three Maltese representatives and that they should be elected in the same way and under the same laws governing representation as are members of the United Kingdom. A referendum was held in Malta in February 1956. The result was in favour of integration by a large majority, but only just over 60 per cent. voted in the referendum. Thus of the total votes cast approximately 75 per cent. were in favour of integration, although the pro-integration vote was only 45 per cent. of the electorate as a whole. Talks with Malta pro-

ceeded in 1957 on the constitutional and economic principles involved in the closer association recommended by the Round Table Conference. Unfortunately relations deteriorated and in 1958, upon the resignation of the Mintoff Government, the Governor assumed direct responsibility for the administration of the island. At the end of 1958 talks were resumed in London on the constitution. The Nationalist Party claimed Malta's rights to self government and the Malta Labour Party claimed independence. But the discussions led to no agreement on the future constitution of Malta. In 1959 the Government announced that Malta would be ruled through the Governor assisted by a council of about ten members, including Maltese.

The West Indies Federation.—In 1960 the Government of Jamaica said that that country might have to "contract out" and seek independence within the Commonwealth on its own, if agreement on the degree of central control in the West Indies Federation could not be reached with other member territories. In the autumn of 1959, there had been a constitutional conference to work out revisions of the present West Indian federal structure in preparation for the achievement of Dominion status; but strong differences of opinion had developed between Trinidad and Jamaica on the degree of economic control at the federal centre. If, as must be hoped, there were a successful outcome of further talks West Indians might be ready to ask Britain for sovereign status within the Commonwealth in 1961.

The Ever-changing Commonwealth.—There have been three major changes in the evolution of the Commonwealth. First, a multi-racial character was introduced in the conception of the Commonwealth when the Union of South Africa became a self-governing dominion. For the first time an area with a majority of non-British population became a Dominion. The second change was the Statute of Westminster, which recognised the independent sovereign and equal status of the members of the Commonwealth. But the essential European character of the Commonwealth still remained. It was in 1947, when India, Pakistan, and Ceylon elected to remain in the Commonwealth, that it changed its character from a political association of peoples of European stock into a world-wide community without any restrictions of colour or race.

Recent Changes in the Commonwealth.—There have been an increasing number of anomalies. One important change has been the adoption of a policy of neutrality by India. The SEATO arrangements are supported by Pakistan but not by India. Thus defence has already ceased to have an all-over Commonwealth character and is coming to be regional in character. Similar considerations apply to trade. It may not therefor be possible to produce a single joint conclusion on matters of internal policy.

The Defence of Human Rights in the Colonies.—To defend human rights in Britain and the Colonies, a council of British lawyers was established in 1957 under the chairmanship of Sir Hartley Shawcross and consisting of an equal number of members from all three British political parties. The Council is called "Justice," and it announced that it will be primarily concerned with abuses of justice, the substitution of bureaucratic for judicial processes, and the encroachment on the liberties of the individual in those territories for which the British Parliament is responsible.

Commonwealth Scholarships.—A start was made in 1960 under a scheme for creating 500 Commonwealth scholarships and visiting fellowships. The United Kingdom had agreed at the Commonwealth trade and economic conference in Montreal in 1958 to provide the money for half the thousand scholarships proposed. The Commonwealth Scholarship Commission will be responsible for selecting scholars and placing them in British universities and colleges of technology. The scholarships will be open to men and women under thirty-five who have already got their degree or equivalent qualification, and preference will be given to those between twenty-two and twenty-eight years of age. Awards will include the payment of fares, tuition fees, a grant for books and apparatus, a clothing allowance, travelling expenses, a personal maintenance allowance, and a marriage allowance where necessary.

Commonwealth Conference, May 1960.—It was announced that the Prime Minister of the Central African Federation would be present at this Conference but not the Prime Minister of the Federation of the West Indies or the Nigerian Federation.

CHANGES IN AFRICA.

At the end of the Second World War there were only four independent States in Africa. At the beginning of 1960 there were eleven:—

Egypt	Ghana
Sudan	Guinea
Libya	Liberia
Tunisia	Ethiopia
Morocco	Union of South Africa
Cameroon Republic	

By the end of 1960 there may be seventeen independent states in all, when nearly two-thirds of Africa's population of 230 millions will be independent. The further six countries achieving or seeking independence in 1960 are:—

Mali (Federation of Senegal and Fr. Sudan)
Nigeria
Togoland Republic
Somalia
Madagascar

Of the estimated population of 230 millions, 175 millions are Africans with widely different cultures and speaking some thousand different languages. There are about 5½ million Whites and about 50 million in the Arabic North who are Muslims.

Nigeria was due to become an independent sovereign State within the Commonwealth on October 1, 1960, being the eleventh State to win independence within the Commonwealth: the first was Canada in 1867. In December 1959 a general election was held for the House of Representatives which will rule in the first few years of independence. The Northern People's Congress did not have an overall majority, but won most of the seats because it was the party of the Northern Region, which is twice the size of the two other regions of the Federation put together. The National Council of Nigeria and the Cameroons, the party of the Eastern Region (led by Dr. Azikiwe, the East's Prime Minister), came second. The Action Party, led by the Prime Minister of the Western Region, came third. A coalition Government was formed from the two leading parties, but the Cabinet did not contain Dr. Azikiwe, the architect for twenty years or more of Nigerian independence.

Tanganyika was a United Nations trusteeship territory, for which Britain was responsible. The African population is under 9 millions, with 25,000 Europeans and less than four times that number of Asians. In December 1959 the British Government announced constitutional changes which would provide Tanganyika with an African majority in the Legislature and in the Ministerial Council. New elections on a much wider franchise were due to be held in September 1960. The new Legislature will consist of seventy-one elected members, with a few nominated members. Fifty of the seventy-one seats will represent "open" seats, that is to say, the electorate will be predominantly African. Eleven seats will be reserved for the Asian community and ten for the Europeans. This is the first time that power has been transferred in a country having large

minority communities of Asians and Europeans. It is in this respect that the grant of self-government to Tanganyika differs from that to Nigeria, Sierra Leone, and to Ghana (when still the Gold Coast), the three previous African territories to achieve self-government. Mr. Julius Nyerere, who seemed certain of becoming the head of the territory's first African administration, has proved the most successful of the Nationalist leaders in East and Central Africa. The problem before Tanganyika is to overcome the shortage of African professional and technical men, in a country which is economically far more backward than Kenya or even Uganda.

Uganda.—There are only about 4,000 white inhabitants in Uganda, and the quarrel is between Ugandans. In December 1959 the Buganda Lukiiko (or Assembly) announced that while they were not seeking complete independence for Uganda they were asking for as much independence as was possible consistent with a Federal Government for the whole country of Uganda. The smaller kingdoms of Ankole, Bunyoro, and Toro are also concerned about their autonomy.

Kenya.—A constitutional conference met in London in January 1960. The leaders, including Mr. Tom Mboya, of the all-African Kenya Independence Movement made plain their objective—universal suffrage at once, responsible government in 1960, no nominated members, and an African as Chief Minister. It was naturally asked by Kenya's Africans why they should lag behind Tanganyika, who would secure responsible government in 1960. One reason was that Kenya has a larger European element than Tanganyika. An end to the seven years of emergency rule in the Colony was announced just before the London Conference, by which time thousands of prisoners had been released. But there would be a Public Security Act to cover the "twilight" transition period giving the Government powers to control public meetings and to sanction political parties. Africans said they would not consider the emergency over until Jomo Kenyatta, who was to remain under restriction, was freed.

The Central African Federation.—The Federation was formed in October 1953, and comprises the self-governing colony of Southern Rhodesia and the protectorates of Northern Rhodesia and Nyasaland. The formation of the Federation was the object of much controversy in Great Britain. The constitution provided for the continuation of the protectorate status of the two northern territories, Northern Rhodesia and Nyasaland. Within the Federation the three territories retain the same constitutional status as before, except in respect of those matters which have been specially designated as Federal subjects. The ratio of black to white is thirteen to one in Southern Rhodesia, forty-two to one in Northern Rhodesia, and 588 to one in Nyasaland.

The Government of the Federation.—At first the Assembly of the Federation consisted of 35 members (17 from Southern Rhodesia, 11 from Northern Rhodesia, and 7 from Nyasaland). Of these 6 were specially elected Africans (2 from each territory) and there were 3 Europeans (1 from each territory) charged with special responsibility for African interests. This basis was altered in 1957 so that there are 59 members of Assembly, of whom 12 are specially elected Africans and 3 are European members for African interests. This change was declared by the African Affairs Board to be discriminatory against Africans. One of their reasons for this view was that Africans would still control the election of only 4 members in a house enlarged to 59. The African Affairs Board is a Standing Committee of the Federal Assembly and one of its functions is to draw attention to any Bill which discriminates against Africans. But the British Government did not uphold the appeal of the Board, and the change was made. The change was the basis on which an election was held in November 1958.

Review of the Central African Federation Constitution.—The constitution provides that some time between 1960 and 1963 there shall be a conference to review the constitution. The United Federal Party (of which Sir Roy Welensky is the leader) advocates that the Federal Government should then take over the responsibilities now exercised by the Colonial Office in Northern Rhodesia and Nyasaland and that safeguards for African welfare should be the subject of a treaty between the Federation and the United Kingdom. The Dominion Party advocates the declaration of independence after 1960 in defiance of Westminster, excepting the protectorates of Nyasaland and Barotseland (which is the south-western part of Northern Rhodesia), which it would leave under the joint authority of Colonial Office and the Federal Government. The common characteristic of both parties is their attitude to race and the call for white supremacy. The United Federal Party won the general election in November 1958. The African National Congress of Northern Rhodesia and of Nyasaland call for the complete dismemberment of the Federation.

The Monckton Commission was set up by the British Government in 1959 to make a preliminary survey of the constitutional problems of the Federation of Rhodesia and Nyasaland. The Opposition were invited to join it but declined, partly because the terms of reference had not, in their view, been clearly defined to allow it to consider other forms of association as an alternative to federation. They also urged that detainees in Nyasaland, and particularly Dr. Banda, should be released (or brought to trial) in an effort to win the trust of the Africans.

Community of Independent African States.—In November 1958 ex-British Ghana and ex-French Guinea announced that they were to constitute "the nucleus of a Union of West African States," despite the fact that the two countries are geographically separate (as Egypt and Syria are). Before Ghana achieved independence Dr. Nkrumah had envisaged a West African Federation which would include Nigeria, Sierra Leone, and Gambia and several other possible member states. In 1959 Dr. Nkrumah, the Prime Minister of Ghana, and his Guinea counterpart proposed a Constitution for a Union of African States. Their declaration was due to be submitted to the Parliaments of Ghana and Guinea and to all African States which have gained or are in the process of gaining independence It was superseded in July 1959 by an Agreement between Ghana, Guinea, and Liberia to form a Community of Independent African States.

Conference of Independent African States.—A biennial conference of heads of all independent African States, except South Africa, was initiated by Dr. Nkrumah at Accra in 1958. At the same time he launched the All-African People's Organisation, a non-governmental movement of nationalist parties meeting annually. This is not to be confused with the Afro-Asian Solidarity Movement, a non-governmental movement of nationalist parties in Africa, Asia, and the Middle East launched by Nasser in Cairo in 1957.

The Policies Advocated by the White Populations.—To solve the problem of multi-racial societies—in territories with a substantial minority of immigrant communities, mainly whites and Asians—different policies have been put forward by the white population. Four differing policies are apartheid, partnership, non-racialism, and integration. Apartheid, the official policy of the South African Government, keeps races apart in all ways, and is based on white supremacy. Partnership, advocated by the Prime Minister of the Central African Federation, while accepting the principle of political and economic integration, upholds residential segregation and does not contemplate African majority rule at any future time. Non-racialism strongly emphasises the importance of white leadership in Africa but accepts the principle of African majority rule, not in the immediate

but in the distant future. It calls for equal rights for all civilised people and is the policy of the New Kenya Party and liberal groups in Central Africa and South Africa. Continuing further on this liberal path, we reach the policy of Integration, which opposes all forms of racial discrimination. It accepts a common electoral roll with a majority of African voters, although it may not envisage social integration as an immediate objective. It is the policy of South African Liberals.

OUTLINE OF THE UNITED NATIONS.

The Origin of the United Nations.—Great Britain, U.S.A., Russia, and China made the first draft of a new World Peace Organisation in 1944 at Dumbarton Oaks, near Washington. There was a strong resemblance in the Charter to the Covenant of the League of Nations, which had been the international organisation between the two World Wars. But an Economic and Social Council was added to help the Assembly on a wide range of subjects. The right to take action to keep the peace was centralised in a Security Council of eleven.

San Francisco Conference, 1945.—The Dumbarton Oaks plan and the Yalta interpretation on voting in the Security Council thus formed the basis of discussion at the San Francisco meeting of fifty States.

Charter of the United Nations.—The Charter of the United Nations was signed on June 26, 1945. The purposes of the United Nations can be divided into four groups (security, justice, welfare, and human rights) and the nations undertook to carry out four main duties (to settle disputes peacefully, to refrain from treating or using force, to assist in carrying out the Charter, and not to assist an aggressor). The UN affirms faith in the human rights of all without distinction of race, language, sex, or religion.

Membership of the United Nations.—The UN had eighty-two member countries at January 1960. They were:—

Afghanistan
Albania
Argentina
Australia
Austria
Belgium
Bolivia
Brazil
Bulgaria
Burma
Byelorussian S.S.R.
Cambodia
Canada
Ceylon
Chile
China (Taiwan)
Colombia
Costa Rica
Cuba
Czechoslovakia
Denmark
Dominican Republic
Ecuador
Egypt and Syria
El Salvador
Ethiopia
Finland
France
Ghana
Greece
Guatemala
Guinea
Haiti
Honduras
Hungary
Iceland
India
Indonesia
Iran
Iraq
Ireland
Israel
Italy
Japan
Jordan
Laos
Lebanon
Liberia
Libya
Luxembourg
Malaya
Mexico
Morocco
Nepal
Netherlands
New Zealand
Nicaragua
Norway
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Roumania
Saudi Arabia
Spain
Sudan
Sweden
Thailand
Tunisia
Turkey
Ukrainian S.S.R.
Union of South Africa
U.S.S.R.
United Kingdom
United States
Uruguay
Venezuela
Yemen
Yugoslavia

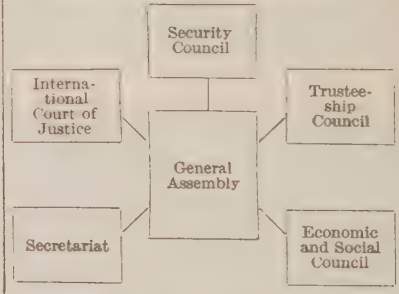
Present and Original Membership.—The classification of the present eighty-two members and of the original fifty-one members is as follows:—

	1945.	1959.
Americas	22	22
Western Europe	8	16
Soviet bloc	6	9
Asian	9	} 30
African	3	
Others	3	5
Total	51	82

Major Organs of the United Nations.—The UN have six major organs: (1) a General Assembly, (2) a Security Council, (3) an Economic and Social Council, (4) a Trusteeship Council, (5) an International Court of Justice, and (6) a Secretariat. It is especially the inclusion of the third body on this list (with all the Commissions and specialised agencies which stem from it) which makes the UN more broad and balanced than the League of Nations.

General Assembly.—The General Assembly occupies a central position in the structure of the UN. But its business is quite distinct from the Security Council. It meets once a year. The Assembly can consider the general principles of co-operation for peace and security and disarmament and regulation of armaments. It can discuss any question concerning peace and security brought before it. It makes recommendations, but any question upon which action is necessary must be referred to the Security Council. The carrying out of its humanitarian work is the function of the new Economic and Social Council (dealt with below) which it elects and supervises. Further, the Assembly controls the purse.

Principal Organs of the United Nations.



The Security Council.—The aims of the UN are wide—from feeding starving peoples to encouraging self-government in backward areas—but it cannot advance towards the noble objectives set out in the Preamble unless peace is maintained. The principal organ to preserve peace and security is the Security Council. It has eleven seats, of which five are permanently occupied by Great Britain, the U.S.A., the U.S.S.R., China, and France. The China which is represented in the UN and on the Security Council is not, however, the Republic of China (or Communist China). It is the régime of Chiang-kai-Shek, who occupies Formosa. The other six are elected for two years by the General Assembly. These six are (1960), Argentina, Italy, Tunisia, Ecuador, and Ceylon; the sixth seat being shared by Poland and Turkey (one year each). The Security Council sits continuously. It has two functions: (1) to promote the peaceful settlement of disputes and (2) to stop aggression. Under the Charter, parties to a dispute have already promised not to use force, and to settle their quarrels peaceably and to refer their dispute to the Security Council if they really cannot reach a peaceful settlement. On its side the Council can call on the parties to settle disputes peacefully, it can investi-

gate any situation likely to cause a breach of the peace, and at any stage it can recommend a solution.

The Veto.—At this point we must deal with the veto, which applies to substantive questions. A decision needs only seven out of eleven votes. Five of the seven votes must be those of the permanent members, namely the United Kingdom, the U.S.A., U.S.S.R., China, and France. In other words if any one of them says " No " to the use of force, even after a full investigation, the Council cannot use force to settle the dispute. Thus when it comes to imposing sanctions for a breach of the peace the assent is required of the Great Powers, and one of them may of course be a party to the dispute. If the Great Powers imposed sanctions on each other it would mean a major war in which the present UN would disappear. Partly in order to overcome the difficulty of the veto the Assembly has set up a Committee to remain in permanent session consisting of one representative of each member. It is known as the Little Assembly, its formal title being the Interim Committee.

The Uniting for Peace Resolution, 1950.—The General Assembly had always been able to discuss matters of peace and security, although it could not make recommendations about them if they were being considered by the Security Council. But in 1950, after the Korean crisis, a new decision was taken by the General Assembly whereby if there were some threat or breach of the peace on which the Security Council was in deadlock, the Assembly, on a vote of seven members of the Security Council, could consider it immediately and make a recommendation about it. This decision, to which Russia and four other countries were opposed, was called the " Uniting for Peace " resolution. By this resolution, too, the Assembly could be called together within twenty-four hours. It was the standing Interim Assembly which considered the Israeli–Egyptian dispute in November 1956.

The Economic and Social Council.—The UN pledged themselves to a broad humanitarian policy of which the following are salient points: to promote higher standards of living; full employment; the conditions of economic and social progress; solutions of international economic, social, health, and other related problems; educational co-operation; universal respect for human rights; and the fundamental freedoms for all. The main business of the Economic and Social Council is to carry out this broad policy. To tackle these huge problems the Council established a number of important commissions and bodies, which fall mainly into the following categories.

Regional Economic Commissions

- Economic Commission for Europe (ECE)
- Economic Commission for Asia and the Far East (ECAFE)
- Economic Commission for Latin America (ECLA)
- Economic Commission for Africa (ECA)

Functional Commissions

- Technical Assistance Board (TAB)
- Transport and Communications
- Fiscal
- Statistics
- Population
- Social
- Human Rights
- Status of Women
- Narcotic Drugs

Special Bodies

- UN Children's Fund (UNICEF)
- Commissioner for Refugees

Intergovernment Agencies (previously called Specialised Agencies).—The agencies are organisations established by intergovernmental agreements, and their activities as a rule are co-ordinated by the Economic and Social Council. The list of the thirteen Agencies are given below.

- International Atomic Energy Agency (IAEA)
- International Labour Organisation (ILO)
- Food and Agriculture Organisation (FAO)
- UN Educational, Scientific and Cultural Organisation (UNESCO)
- World Health Organisation (WHO)
- International Bank for Reconstruction and Development (Bank)
- International Finance Corporation (IFC)
- International Monetary Fund (Fund)
- International Civil Aviation Organisation (ICAO)
- Universal Postal Union (UPU)
- International Telecommunication Union (ITU)
- World Meteorological Organisation (WMO)
- Inter-Governmental Maritime Consultative Committee (IMCO)

Several of these organisations were at work before the UN was set up. One such body is the ILO.

Economic Commissions.—ECE was the first of the great Regional Commissions to be set up under the auspices of the Economic and Social Council, and it was established in 1947 to facilitate concerted action for the reconstruction of Europe. The success of ECE has led to the establishment by the UN of similar Economic Commissions for Asia, for Latin America, the Far East, and Africa. ECE is described further in the section devoted to European Organisations.

Technical Assistance to Under-developed Countries.—One of the most important developments of the last decade has been the creation of a world-wide scheme for the sharing of skills and knowledge between nations. At least half of humanity is ill-fed and illiterate. Only one-quarter of the world's people can expect, on the average, to live beyond the age of thirty-eight. Two-thirds of mankind live in the world's less-developed areas, where hunger, disease, and poverty are a daily lot; and of the eighty-two members of the UN sixty can still be regarded as under-developed. But there is no longer the fatalistic resignation of past ages to such human misery. The achievements and promises of modern technology have stimulated demands the world over for a better life. " It is the first age since the dawn of history," wrote Arnold Toynbee, " in which mankind has dared to believe it practicable to make the benefits of civilisation available to the whole human race." This assistance has been organised by the UN under three schemes, Technical Assistance, the Expanded Programme of Technical Assistance, and the Special United Fund (called SUNFED). These are described below.

Technical Assistance Scheme.—Help is given only at the request of a government, and the skill-sharing operations of the UN are aimed at helping countries to help themselves. Requests cover a vast range of development problems, from fish-breeding to fiscal reform, from handicrafts to housing, from timber-cutting to traffic control. There is hardly a country which has not obtained technical assistance. Nearly every country, regardless of its stage of development, can provide some special knowledge or skill to help some other country improve its living standards. Those who receive aid often provide aid to others. There is therefore not a one-way flow of skills from the more to the less developed countries; but rather a cross-fertilisation of skills on a world-wide scale.

The Expanded Programme (EPTA).—A sign of the value which governments put on the international skill-sharing programmes was the fact that they offered voluntary contributions to pay for an Expanded Programme of Technical Assistance. Hitherto the basic programmes had been met by regular membership dues. In the last nine years eighty-five governments have paid about 250

million dollars. Seven of the intergovernmental agencies (such as the ILO, FAO, and UNESCO) work together under the Technical Assistance Administration to provide the technical help, whether it be paid out of the regular budgets or out of the voluntary contributions of governments in cash or services.

The Special Fund (SUNFED).—In December 1957 the Assembly decided on the establishment of a Special Fund with a special purpose, namely to create more favourable conditions for investment—private and public, national and international—in the less-developed countries. It concentrates on relatively large projects and urgent needs which cannot at present be met by one of the existing UN methods. Up to 1959 thirteen projects had been approved with a budget of nearly 8 million dollars. During the next ten years the net increase in national income in the under-developed countries—allowing for population growth—should be at least 2 per cent., instead of an average of 1 per cent. But even this rate would be too slow—dangerously too slow. The growth of the Expanded Programme is limited by the inadequacy of funds.

Food and Agricultural Organisation.—We can here deal with only some of the specialised agencies. It has been a major concern of FAO to improve the world's food supply and to devise ways of preventing both shortages and surpluses of agricultural commodities. It has taken measures to control pests, infestation of stored grains and animal diseases. Rinderpest, the most serious of livestock diseases, kills over 2 million cattle annually in Africa, Asia, and the Far East. The organisation gives technical assistance to countries wherever such assistance can bring new land under cultivation, improve the yield of land already cultivated, raise levels of consumption, or provide better living conditions in rural areas.

The United Nations Educational, Scientific, and Cultural Organisation hopes to build peace and security by assisting in collaboration between nations through education, science, and culture in order to further universal respect for justice, for the rule of law, and for fundamental human rights. It is trying to wipe out illiteracy and to raise educational standards everywhere. UNESCO, because of its special concern for international understanding, has made suggestions for the teaching of geography and for improving text-books and teaching materials. The organisation has devised projects into, *inter alia*, the methods of political science and the methods which have developed in education, psychology, and in philosophy for changing mental attitudes. A UNESCO Report published in 1957 stated that more than two-fifths of the world's population aged fifteen or over still cannot read or write.

The International Bank and the International Monetary Fund.—These two agencies of UNO became better known to newspaper readers during the autumn of 1957, when steps were being taken to defend the pound sterling from devaluation. Bank and Fund, as they are called, grew out of the Bretton Woods Conference in 1944, when forty-four nations laid plans for a new method of economic and financial co-operation in the post-war years. The Bank was designed to promote the international flow of capital for productive purposes. It has made development loans to numerous countries. The Fund was created to assist in stabilising international exchange; to provide member nations with short-term foreign-exchange assistance; and to hasten the removal of artificial barriers to international payments.

The World Health Organisation essays to eliminate three of the world's major diseases—malaria, tuberculosis, and venereal diseases. It has effectively controlled malaria in Italy and Greece, and greatly increased the production of DDT, which is effective in eradicating the carrier of malaria. The disease still kills about 3 million annually throughout the world out of the 300 million whom it strikes. In the field of tuberculosis the organisation has undertaken mass immunisation. *See also* P72.

The United Nations Children's Fund (UNICEF) is the world's largest international effort to improve the health and welfare of children and the mothers who bear them. Its first mission is to protect children against disease, principally the child cripplers: malaria, tuberculosis, and yaws. Millions of babies die annually because of ignorance, and the Fund's second mission is therefore to teach and train mothers in hygiene and child care. The Fund provides equipment, insecticides, vaccines, and drugs for campaigns against disease. It ships powdered milk to combat hunger sickness; and helps to build up local milk supplies for children. UNICEF was set up as an integral part of the UN in 1946. It was called into being to grapple with an emergency, as its original name "the United Nations International Children's Emergency Fund" denoted.

World Refugee Year.—Upon British initiative the UN called for a World Refugee Year, which began in June 1959 in an attempt to harness public opinion everywhere in a concerted effort towards the solution of some of the world's worst refugee problems. The United Kingdom Committee decided on four objectives. In Europe the aim was to close the refugee camps and to find homes or livelihoods for the 24,000 people who live in them; training, grants, and skilled guidance for the refugees of the Middle East; emergency relief for the million Chinese refugees in Hong Kong; and resettlement for the 8,000 European refugees from China in the Far East. The aim was to secure £2 million voluntarily for these purposes; and the Government contributed £200,000.

The International Court of Justice.—The Court is the principal judicial organ of the UN and consists of fifteen judges elected by the General Assembly and the Security Council. No two of the judges may be nationals of the same State. The judges must be independent of national interests, and they declare solemnly in open court that they will exercise their powers impartially and conscientiously. Countries which are parties to the Statute of the Court can refer to it any case they wish. The Court meets at The Hague.

Acceptance of Compulsory Jurisdiction.—Unfortunately only thirty-nine states, out of the eighty-four parties to the Statute of the Court, now accept compulsory jurisdiction. Furthermore, certain states have replaced or renewed their acceptance by declarations containing new and far-reaching reservations. There is natural concern lest the decline in the acceptance of compulsory jurisdiction, if not soon halted, may render the whole system of compulsory jurisdiction, as contemplated by the founders of UNO, virtually illusory.

Reservations by the United Kingdom.—In 1957 the British Government announced that they would no longer accept the jurisdiction of the International Court of Justice in disputes relating to any questions which by international law fall within the jurisdiction of the United Kingdom. They also excepted from the Court's jurisdiction disputes in respect of which any other party to the dispute has accepted the jurisdiction of the International Court only in relation to or for the purposes of the dispute; or where acceptance of the Court's compulsory jurisdiction on behalf of any other party to the dispute was deposited or ratified less than twelve months prior to the filing of the application bringing the dispute before the Court. The latter reservation was meant to exclude the possibility of another government accepting the Court's jurisdiction *ad hoc* when it thought it had a good case against the British Government and then refusing to accept it when the British Government themselves had a good case.

New American Attitude to International Court of Justice.—In 1959 it was announced that Congress would be asked to remove the most restrictive reservation it places on its acceptance of the jurisdiction of the International Court. In 1946 the U.S.A. had excluded from the Court any disputes "which are essentially within the domestic jurisdiction of the U.S.A. as determined by the U.S.A." It was proposed to withdraw this reservation in order to "advance the rule of law in the international field." Events in Hungary and Tibet seemed to provide the reason for trying to establish greater hopes of determining such international disputes. There were some hopes that Soviet countries might be brought into the international judicial field. Only Bulgaria of the Eastern European countries has acceded to the Statute of the Court. Twelve other countries had appended restrictive reservations identical to that made by the U.S.A. in 1946 at the inspiration of that Government; and it remained to be seen whether they would withdraw it when the U.S.A. withdrew the restriction.

The New Russian Disarmament Proposals, 1959.—The Soviet Premier Nikita Khrushchev visited UN Headquarters in New York in September 1959 during his tour of the U.S.A. He addressed the General Assembly three days after the opening of the 14th session on September 15. The essence of the Soviet proposals was complete disarmament over a period of four years. Armies, navies, and air forces would cease to exist, and general staffs and war ministries would be abolished. Military bases in foreign territories would be abolished. All atomic and hydrogen bombs at the disposal of states would be destroyed and their further production terminated. States should have at their disposal only strictly limited contingents of police or militia, agreed upon for each country. He also proposed an international control body.

A Three-stage Plan.—It was intended that the four-year programme of disarmament would be carried out in three stages. During the first stage the armed forces of the U.S.S.R., the U.S.A., and the Chinese People's Republic would be reduced to a level of 1·7 millions each, and those of the United Kingdom and France to a level of 650,000 each. The armed forces of other countries would be specially agreed by the General Assembly. During the second stage, the disbanding of all armed forces would be completed and military bases on foreign soil would be eliminated. During the third stage, the destruction would take place of all nuclear weapons, missiles and stockpiles of chemical and bacteriological weapons. The funds made available by disarmament would be used "to subsidise national economies and to furnish extensive economic and technical assistance to under-developed countries."

The United Kingdom Proposals for Disarmament, 1959.—Shortly after the Russian proposals had been made, Mr. Selwyn Lloyd outlined a comprehensive three-stage plan by which, he said, the United Kingdom felt progress might be made in disarmament, "if there is a will." Development of the plan "would of course, depend upon the development of the techniques of international control." The plan included:—

(1) a first stage, in which agreement would be reached on a number of major issues, such as the discontinuance of nuclear tests and the limitation of armed forces, and a study would be undertaken of the problems involved in the use of outer space;

(2) a second or "intermediate stage," in which a beginning would be made at putting some of the agreements reached into preliminary or progressive effect; and finally,

(3) a third stage embodying "the ultimate objective . . . comprehensive disarmament by all powers, under effective international control."

Mr. Lloyd stressed that the control organ "will not only have to control disarmament measures, but will also have increasing responsibilities within the framework of the United Nations to preserve world peace as purely national armaments diminish."

Assembly Transmits Disarmament Proposals to Geneva Committee.—The General Assembly in November 1959 unanimously agreed to transmit all the proposals on disarmament which had been made at the current session to the new ten-nation Disarmament Committee "for thorough consideration." The ten-nation Committee was expected to meet in Geneva early in 1960. It was made up of representatives from:—

Bulgaria	Poland
Canada	Roumania
Czechoslovakia	U.S.S.R.
France	United Kingdom
Italy	U.S.A.

The proposals include the Soviet Union's programme for general and complete disarmament over a four-year period, the United Kingdom's plan for disarmament in three stages, and all other proposals and suggestions advanced. The Soviet delegation spoke with appreciation of the "business-like co-operation" which had taken place between itself and the U.S.A. in working out the joint text of the resolution on the subject.

Three Consequential Questions.—During the debate at the UN the U.S. representative, who pledged his country to participate fully and constructively in the work of the ten-nation Committee, said that "if all nations lay down their arms, there must be institutions to preserve international peace and security, and to promote the rule of law." He therefore offered three questions for the Committee:—

1. What type of international police force should be established to preserve international peace and security?
2. What principles of international law should govern the use of such a force?
3. What internal security forces, in precise terms, would be required by the nations of the world if existing armaments are to be abolished?

The Arms Race.—The best account of the disarmament discussions carried on by the Great Powers is contained in a book published in 1958 entitled *The Arms Race*, by Mr. Philip Noel-Baker (Stevens and Sons Ltd., 25*s*.). The author has campaigned for more than thirty years for world disarmament and has attended many conferences in an official capacity. There can be few people with a greater grasp of all the technical and legal problems involved and with a better knowledge of the history of the subject. In no sense, therefore, can Mr. Philip Noel-Baker be regarded as a "starry-eyed" idealist. For that reason his final convictions, stated at the end of his authoritative analysis, are all the more remarkable and valuable. He does not believe that the technical difficulties are so great that they could not be readily overcome if there was a will to overcome them. He thinks that the romanticists are those who still believe that modern armaments can make a nation safe. "There is no military defence today for any nation," he writes, "except in drastic measures of disarmament . . . to which all governments subscribe. From the first day that this treaty enters into force and the UN inspectors take up their posts in the countries which they will control, the security of every nation will at once, and notably, be increased . . . it will do much to end the 'nightmare fear' of sudden and unprovoked attack." He thinks facile pessimism a graver fault than facile optimism and that defeatism about the feasibility of plans for disarmament has been "the most calamitous of all the errors made by democratic governments in modern times."

The 1959 Nobel Lecture.—Mr. Philip Noel-Baker received the Nobel Peace Prize for 1959, and in his Nobel Lecture said that in 1914 the nations were spending about £500 millions a year on preparing for war; today they were spending £40,000

millions. "It is the strangest paradox in history," he said. "Every new weapon is produced for national defence; but all experts are agreed that the modern, mass-destruction, instantaneous-delivery weapons have destroyed defence." "What is left," he asked, "of the morality on which our Western civilisation has been built?"

The Campaign for Nuclear Disarmament has, as its purpose, to press for a British initiative to reduce the nuclear peril and to stop the armaments race. It is argued that the possession of a few hydrogen bombs and Britain's part in the nuclear arms race is both morally wrong and rationally indefensible. Whatever agreements might or might not be reached, it is urged that Britain, with as many nations with her as possible, but if necessary on her own, should renounce unconditionally the use and production of nuclear weapons, by herself or in her own defence. The Campaign puts forward four immediate proposals:

1. That the British Government should halt patrol flights of aeroplanes equipped with nuclear weapons, in view of the danger, if the plane crashes, from plutonium; and the graver danger that such accidents may be mistaken for enemy action and trigger off a nuclear war.
2. The stopping of testing of nuclear weapons.
3. That the Government should not proceed with the establishment of missile bases in Britain. They would make Britain the first target if a nuclear war breaks out.
4. That Britain should refuse to supply other powers with nuclear weapons. Three nuclear powers are bad enough. Ten or twenty would be disastrous.

In the view of the sponsors of the Campaign the so-called "Great Deterrent" is a myth. The risks we run now, the argument continues, are far greater than any involved in renunciation. Civilisation cannot survive a nuclear war. Bertrand Russell said, "At present it seems an even chance whether any human beings exist forty years hence. If man is to survive, the trend must be reversed."

The Rapacki or Disengagement Plan.—This plan for disengagement in Europe was put forward in February 1958, and was later amended by him to take account of some of the Western objections. As revised, the plan provided for a zone free of nuclear weapons to be created in Central Europe and to consist of East and West Germany, Czechoslovakia, and Poland. There would be two stages of advance:—

1. The Governments of these countries would undertake not to produce nuclear weapons. Armies in the zone, except the British, American, and Russian, would undertake not to acquire them.
2. In the second stage all the Powers concerned would discuss reduction of conventional forces; and if agreement were reached the reduction would then be made simultaneously with the complete removal of all nuclear weapons.

Merits of the Rapacki Plan.—An opportunity to reduce armaments is more likely to be taken if it is applicable to a limited area. The plan would need a control system, and this would be supervised by both the Western and the Eastern countries, that is to say, by representatives of NATO and Warsaw Treaty Powers. There would thus be a very valuable experiment and experience in joint control. There are some classic examples of neutral or demilitarised zones and frontiers. One is the frontier between the U.S.A. and Canada; and another the frontier between Sweden and Norway. Demilitarised zones diminish dangers arising in those zones; and by their very success such zones tend to be forgotten.

Objections to the Rapacki Plan.—One objection offered was that the plan made no provision for the reunification of Germany. Another was that there would still be preponderant Russian conventional forces on the Polish–Soviet frontier, and within easier striking distance of the centre of the zone than the withdrawn Western forces. General Norstad, the NATO Supreme Commander, said in 1959, "The withdrawal of United States forces from Germany, even with the corresponding withdrawal on the Eastern side, would spell added weakness for the West . . ."

The Geneva Conference on Berlin, 1959.—The Foreign Ministers of Russia, Britain, France, and the U.S.A. conferred for three months at Geneva in 1959 on the subject of Berlin. The Soviet Government had proposed to bring the four-Power occupation of Berlin to an end by transferring all its remaining rights in East Berlin to the East German Government. They had proposed, further, that West Berlin should be made an independent political entity or free city with its own Government. They had thought, originally, that West Berlin should be demilitarised and all troops withdrawn; but they later conceded retention of token forces. No agreement on all this was reached at the Geneva Conference. But the Conference seems to have confirmed the British view that Berlin's ultimate freedom depends on negotiating a wider and more lasting settlement with Russia, and not simply on Western strength.

The Summit Meeting, 1960.—These notes were written before the Meeting in Paris, in May 1960, of the heads of Government of the Western Powers—Britain, France, and the U.S.A.—with Russia. At the end of 1959 the three Western Powers who would attend the Summit Conference and West Germany held a preliminary meeting in Paris in an attempt to co-ordinate their policies. Britain and the U.S.A. wanted a short summit conference which might be the first of several, with the modest aim of making progress on one or two points, such as an interim settlement on Berlin, an agreement to stop nuclear tests, and, perhaps, a talk on general disarmament. France had wished for one big conference to deal with a whole range of problems, taking in problems of Africa, the Middle East, and the Far East. Germany—not entitled to be present—was not in favour of a summit meeting, unless its discussion of the Berlin problem were linked to the wider question of Germany and in turn to general disarmament.

Both France and Germany believed that at present there was no basis for negotiating on Berlin and that to do so would result in weakening concessions being made. They seemed to think that delay was necessary so that certain strengthening factors could come into play, namely, German rearmament, the development of French nuclear power, the end of the Algerian war, and the development of the Common Market.

Nuclear Tests.—The first real sign of progress towards an agreement to stop nuclear tests was reported at the end of 1958, when Britain, the U.S.A., and Russia announced their acceptance of the first four draft articles of a treaty. But these articles indicated what should be done and not how it should be done. The three Powers agreed on the composition of the organisation which would control the ban on nuclear-weapon tests. The four component parts would be: a control commission (acting as the governing body), the detection system, the executive head of the control organisation, and the conference of parties to a test prohibition treaty. The crucial questions of control and veto remained to be settled. By the beginning of 1960 the Geneva Test Conference had agreed on seventeen out of twenty-three articles in the draft treaty. Underground tests remained the one major problem left unresolved. American scientists claimed that an explosion five times as great as the Hiroshima blast could be virtually undetectable; and this was held to reinforce the case that underground tests should be excluded, at present, from any treaty. But no inspection system can be foolproof. The West had always insisted on the importance of inspection; and the principle and virtually all details of inspection had been accepted by the Russians. It would therefore be a grave set-back if the West

were to declare that, after all, inspection is unworkable. The U.S.A. announced at the opening of 1960 that they reserved the right to hold more nuclear tests.

Atomic Radiation.—In January 1960 the UN Scientific Committee examined "food chain" problems, that is to say the passage of radioactive isotopes from soil to plants, and hence to animals and into human diets. Another UN Scientific Agency—the World Meteorological Organisation—sent specialists to join the Committee in discussions on ways in which radioactive debris from nuclear tests is transported in the atmosphere, especially at high levels.

The Treaty of Antarctica.—Twelve nations agreed in December 1959 that Antarctica should be used only for peaceful purposes and that scientific investigation should continue there freely. Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the U.S.A., Great Britain, and Russia renounced no territorial claims (Argentina and Chile had stressed this particularly), but agreed to the freezing of them for thirty years with no new claims. Nuclear explosions were prohibited pending an international agreement, and an inspection system would prevent military activities. Russian acceptance was particularly encouraging, as was her acknowledgement of the authority of the International Court of Justice to deal with legal disputes in Antarctica.

What can the United Nations Do?—The UN sends investigating bodies to study on-the-spot situations in troubled areas, so that it may have first-hand information when recommending the steps to be taken. The UN itself takes measures to end disputes; for example, by appointing a group or a person to help opposing sides to agree (as in the cases of Palestine, Indonesia, and Kashmir). The UN may take collective measures to maintain or restore peace, if peace is threatened or broken or some country has committed an act of aggression, as it did in Korea. Work by the UN to prevent the use of atomic weapons in war has been accompanied since 1946 by efforts to harness atomic energy for peace; and the Statute for an International Atomic Energy Agency has been described. The UN tries to secure agreement to reduce armaments, and the work of its Disarmament Commission is described below.

The UN Technical Assistance Administration, with seven specialised agencies, assists the under-developed countries. The UN has proclaimed a Universal Declaration of Human Rights as a common universal standard; and it agreed upon a convention to prevent genocide (the killing of groups of people belonging to a particular race, nationality, or religion).

United Nations Emergency Force.—This force was created for temporary duty in the Middle East in 1956. UNEF has had more than two years of successful service. It still safeguards peace along the armistice line between Egypt and Israel, and it has given to the world the first successful pattern for an international police force. Of the twenty-three countries which had offered to send troops, contingents were accepted from ten nations. The total strength of UNEF was nearly 6,000, of which the largest detachments came from Canada and India, the smallest from the four Scandinavian countries, and the others from Colombia, Yugoslavia, and Indonesia. The men are distinguished by their blue berets.

World Government: the First Five Steps.—In a manifesto published in 1958 the British Parliamentary Group for World Government, to which 135 members of all parties from both Houses belong, set out what it considers must be the first five steps towards federal world government. These are:—

1. The Government should declare that the creation of a world authority will be the aim of its foreign policy and invite other Governments to do likewise.
2. The existing UN Truce Supervision Commission should be expanded or transformed to become a permanent peace force.
3. Explore how UN Charter might be transformed into a world federal government.
4. Alongside the existing advisory wing of the United Nations there should be created a new wing with real powers over limited fields such as the jurisdiction and control of the high seas outside territorial waters, of major international waterways, and Antarctica.
5. A world economic development authority should be created to which all member states would subscribe annually a percentage of their total national product.

New Trends and Leadership at UNO.—The most important new fact about the UN is its increasing influence. It can now be left out of no country's calculations. It has been called the fifth Great Power, and it represents the influence of a massive public opinion. For one thing there has been a flow of new nations into the organisation—thirty-two new nations were admitted to membership between 1946 and 1958—and the Assembly is now predominantly composed of small nations. Although many of these nations are poor and under-developed, they want to assert their independence of the Great Powers and their conviction that economic development is first priority and that disarmament can release energy to help them. The Assembly, in which these nations are making their influence felt, is replacing the Security Council (dominated by the Great Powers) as the mainspring of the UN. Another important trend is that assistance to the poorer two-thirds of the world may eventually be carried out mainly through UN agencies, America being desirous of giving a greater share of responsibility to UN bodies. There is, however, growing need for better leadership of the smaller nations or what might be called the back-bench nations of the world. At one time India provided this leadership and later Canada, and at the last sessions of the Assembly Ireland gave a strong lead. How the smaller powers will develop their influence in world councils and who will emerge as their leader is one of the aspects of UNO which will be worth watching.

OUTLINE OF EUROPEAN ORGANISATIONS.

1. Introduction.

This outline is an attempt to explain the various organisations through which European countries are trying to co-operate. It is hoped that the reader, with the help of the chart, will find the pattern less bewildering than at first appears; and that he will be in a better position to understand the proposals which have been made, and which are also explained, for simplification of the whole design. The destruction in Europe in the Second World War emphasised the need for greater union, both for recovery and for defence. A bewildering array of organisations has sprung up. They differ in form, in function, and in membership. Some overlap in function. Some are much less effective than others. The edifice is not, moreover, built on a single harmonious plan. Beneath the edifice are two different kinds of foundations, that is to say, two rival theories. These two theories (the federalist and the functionalist) are explained as the story unfolds. The story traces three main streams—the military, the political, and economic developments—and describes the bodies which evolved in each stream. The account concludes with an explanation of some suggestions which have been made to make the organisations more effective by better co-ordination.

Historic Origin of European Unity.—Sully, the famous Minister of Henry IV, King of France, outlined, in 1638, a proposal for achieving European unity and putting an end to war in Europe. He called it the "Grand Design." It was revived in modern dress by Monsieur Briand, the French Prime Minister, in 1929. During the War (1943)

the concept of a United Europe which should be created after victory was won was outlined by Sir Winston Churchill: and he returned to the subject in his famous speech at Zurich University in 1946.

Two Starting Points: ERP and the Brussels Treaty.—There were two main sources of the present numerous European bodies. The first was the European Recovery Programme in 1947 (ERP), and the second was the Brussels Treaty of 1948.

The European Recovery Plan was popularly known as the Marshall Plan, as it was the result of the invitation made in 1947 by Mr. Marshall (then U.S. Secretary of State) to the European countries to draft a programme to put Europe on her feet economically. The U.S.A. was ready to give this aid if the countries concerned would agree on co-operation and plan their needs. In March 1948 the countries concerned created the Organisation for European Economic Co-operation (OEEC) to administer the programme of aid, and this body is described below.

The Brussels Treaty, 1948, was the other main source of the West European organisations. In March 1948 Britain, France, and the Benelux countries (Belgium, Holland, and Luxembourg), agreed at Brussels to pursue a common policy on economic, political, and military collaboration, and to promote a better understanding of the principles which form the basis of the common civilisation of Western Europe. It also provided for the creation of a Consultative Council. This Council, when formed, was the Council of Europe, and it is described below, together with an account of all the organisations which stemmed from the Treaty. Italy and the German Federal Republic joined the Brussels Treaty Organisation in May 1955, which then became the Western European Union.

2. Military Organisations.

The Brussels Treaty and the Western Union Defence Organisation.—As we have seen, under the Brussels Treaty, so far back as 1948, the five Western Powers concerned pledged themselves to military collaboration; and in the same year they formed the Western Union Defence Organisation. At that time policy was being framed by a fear of a revival of German aggression. But in time this fear was replaced by distrust of the Soviet Union. There were two developments. In the course of seven years the Western Union Defence Organisation was transformed by the inclusion of the German Federal Republic itself and of Italy into a larger body called the Western European Union. How this change came about is described in the following paragraphs, which tell the story of the creation of the new Federal Republic of Germany, the proposal for a European Defence Community (which did not materialise), and the eventual emergence of Western European Union (in 1955). The second sequel of a military character of the Brussels Treaty was the creation of the North Atlantic Treaty Organisation (NATO). Whereas WEU is a regional organisation, NATO has an even larger range, as its members include Canada and the U.S.A. An account of NATO follows the story, to which we now turn, of the emergence of the new German Republic and its eventual incoporation in WEU.

Government of Germany after the War.—As a result of Germany's unconditional surrender on June 5, 1945, all power in Germany was transferred to the Governments of the four principal Allies. By decisions at Potsdam in 1945 that power was exercised by the Commanders-in-Chief of the U.S.A., the United Kingdom, the Soviet Union, and France, each being responsible in his own zone of occupation. On matters affecting Germany as a whole, the four would be jointly responsible as members of the Control Council. Berlin was divided into four sectors of occupation.

The London Conference 1947 of the four Foreign Ministers concerned failed to agree on a joint German settlement. Unfortunately, the effect was to set in motion political and economic developments which were speedily to make Germany the battleground of the conflict of ideas between Soviet Russia and the Western Powers. The Allied Control Council could no longer function efficiently; and by the end of 1948 four-Power rule had virtually collapsed and the partition of Germany was complete. A federal Parliament and Government were formed in Western Germany. The Soviet zone prepared a rival form of Government for East Germany.

Western Germany's New Status.—In May 1952 the German problem acquired a new complexion, when the so-called "Contractual Agreements" were signed by the three Allied Powers and Western Germany at Bonn. These Agreements did not form a Peace Treaty, but they attempted to define how W. Germany and the three Allied Governments should work together. Sovereignty was to be restored to Germany and she was to enter a military alliance with France. Indeed, a Treaty called the European Defence Treaty was drawn up between the four Powers, with Italy and the Benelux countries, which was to fit German Armed Forces into a Western European system. But this system, called the European Defence Community, never came to fruition as such, owing to the refusal of France to ratify the Treaty in 1954.

Collapse of EDC.—With the collapse of EDC there was a halt to the idea of a Political Community designed to embrace both the proposed EDC and the existing European Coal and Steel Community. It was logical that these two Communities formed by the same countries should not have separate institutions but should take their place within a single political community.

The London Nine Power Conference and the Paris Agreements, 1954.—Nine Powers met in London to devise a substitute for EDC. They were Belgium, Canada, France the German Federal Republic, Italy, Luxembourg, Netherlands, United Kingdom, and the U.S.A. The Conference considered how to assure full association of the German Federal Republic with the West and the German defence contribution. All the decisions which were reached formed part of one general settlement and these were embodied in agreements signed shortly afterwards in Paris. These decisions included the following:—

1. The occupation of W. Germany by Great Britain, the U.S.A., and France should end.
2. The German Federal Republic and Italy should join the Brussels Treaty Organisation.
3. The W. German Republic was admitted to the North Atlantic Treaty Organisation (NATO).

Western European Union.—These agreements took effect on May 5, 1955, when the occupation régime in Western Germany ended and the Republic attained full sovereignty and independence. At the same time the Republic became a member of the Western European Union (the expanded Brussels Treaty Organisation), which came into formal being on May 5, 1955, and also of NATO, to which we now turn.

The North Atlantic Treaty, 1949.—The founder members of this Pact (which widened the scope of the Brussels Treaty) were Great Britain, the U.S.A., Canada, France, Holland, Belgium, and Luxembourg. The parties agreed that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agreed that if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognised by the Charter of the UN, will assist the party so attacked.

3. Political Organisations.

Federal Union.—The development of greater political unity among the European countries

may be best introduced by a word about the federalists. The Federal Union had, before the War, urged a federation of Europe as a first step in a progression towards a world federation. The Federalists advocated the surrender of absolute national sovereignty, a part of that sovereignty being vested in a federal authority. This authority, it was urged, should possess a government responsible to peoples and not to the States. It should have a Supreme Court to settle disputes between States which are members of the federation; and have an armed police force to uphold its decisions.

The Hague Congress, 1948.—Several schools of thought were represented at the Congress, one main difference being between the federalists, who want to create a real federation in Europe, and those, like the United Europe Movement, who were not committed to a federation in so far-reaching a sense. The Congress declared that the European nations must transfer some part of their sovereign rights so as to secure common action, and it demanded an early convening of a European Assembly chosen by the Parliaments of the participating nations.

The Creation of a Council of Europe.—In May 1949 the Foreign Ministers of the ten countries consisting of the five Brussels Treaty Powers and Denmark, Eire, Italy, Norway, and Sweden, concluded a formal Agreement called "The Statute of the Council of Europe." It set up a Committee of Ministers and a Consultative Assembly, forming together a Council of Europe. The Council was established twelve months after the Hague Congress, almost to a day. The Committee of Ministers provides for the development of co-operation between governments, while the Consultative Assembly provides a means through which the aspirations of the European peoples may be expressed. The seat of the Council was fixed at Strasbourg.

Council of Europe.—The Council came into existence in August 1949, and the Assembly opened at Strasbourg when M. Spaak was elected President. Mr. Churchill (as he then was) sat as an ordinary member. Procedure is a combination of British and Continental systems, but the design of the chamber follows the Continental pattern, delegates sitting at tables arranged to form a semi-circle. In November 1949 the Council of Ministers agreed to meet the wishes of the Assembly that it would not in practice exercise its right of control to fix the agenda of the Assembly.

The Consultative Assembly.—This, the deliberative organ of the Council, is empowered to debate and make recommendations upon any matter which: (i) is referred to it by the Committee of Ministers with a request for its opinion, or (ii) has been approved by the Committee. The Assembly consists of representatives of each member state appointed in such a manner as the government of the member shall decide. All resolutions of the Assembly require a two-thirds majority of the representatives casting a vote. The Assembly meets annually.

Limitation of the Assembly's Powers.—One group of representatives wished a complete change of the Assembly's powers in order to transform the present consultative and deliberative organisation into a legislative body. During the second session of the Assembly (in August 1950) a British delegate submitted a plan, which was not accepted, for a basic revision of the statute so as to give the Assembly a political authority endowed with limited functions but real powers.

Towards a European Parliament.—This is the title of a book of great interest published by the Council of Europe in 1958 and written by Mr. Kenneth Lindsay, who has worked for the cause of European Unity for many years. (The book is obtainable from H.M. Stationery Office.) Reference is made in later paragraphs to some of Mr. Lindsay's general comments on the British attitude to European organisations; but we deal here with some of Mr. Lindsay's views on the Council of Europe. He raises three separate issues:—

(1) the responsibility of Ministers to respect the feelings of the Assembly and to present Reports in person;
(2) whether members speak for themselves in an individual capacity or for a national delegation or a party; and
(3) the relations between the Assembly and national parliaments.

The Responsibility of Ministers.—The writer thinks that the Council of Europe would undergo a much-needed blood transfusion if there were a better attendance of Ministers at Assembly debates and if the Assembly could count on the presence of leading statesmen from Opposition parties. Unfortunately there is a ceaseless cold war between the Assembly and Ministers. Scores of recommendations and resolutions by the Assembly are made with no tangible result. It is true that some attempt has been made to smooth relations between the two sides of the Council by means of a Joint Committee. But Mr. Lindsay thinks it should be possible for the rotating chairman of the Committee of Ministers or a substitute to attend Assembly debates at least twice a year. Mr. Lindsay claims that the Assembly debate on the Rapacki "disengagement" plan, which proved to be a fair summary of European opinion, would have gained in public notice and in significance if a Minister had been present.

The Responsibility of Members of Assembly.—The Assembly comprises over two hundred individual members of Parliament from fifteen different countries. As already explained, these members are appointed by Governments in such a manner as each Government chooses. Although they are entitled to group themselves on any particular issue if they choose, a member is in particular relationship to his country and his party or even to his constituency. There is therefore a position of some confusion and subtlety. Meanwhile the success of the Council depends upon those who can rise above party and country and express a European outlook.

Relations with National Parliaments.—The attempt made by the Joint Committee between Ministers and the Assembly to act as an organ of co-ordination between the two sides of the Council has not satisfied the Assembly. It has therefore set up a Working Party to analyse the relations between the Assembly and national parliaments. This Party tries to see what steps can be taken in each national parliament to secure consideration of recommendations and ratification of Conventions which have been approved at Strasbourg. They have gone so far as to appoint a spokesman for each country.

What Has the Council of Europe Achieved?—The Council plays an important part in law-making. It has itself framed and launched important Conventions like that on Human Rights, and it also frames general principles and gives opinions on texts of laws. On the diplomatic side it prepared the way for a solution of the Saar problem, which had divided France and Germany since the War. It is working on the simplification of frontier formalities, and it is concerned (in common with several other international bodies) with refugees. Among other actions, it has encouraged the growth in reciprocity between countries of their social services, and established a European Court of Human Rights.

4. Economic Organisations.

The Organisation for European Economic Co-operation (OEEC).—We now turn to the third stream, the economic. We have seen that OEEC was created to administer American (Marshall) aid. But it needed also to re-create a sound European economy. The allocation of aid continued until

1952; but the practice of mutual consultation on economic matters has continued in order to carry out long-term programmes. OEEC is situated in Paris, and is an intergovernmental organisation, being a conference of sovereign states in permanent session. Owing to the nature of its original task of distributing Marshall Aid, the U.S.A. and Canada became associate members of the Organisation.

European Coal and Steel Community.—A further economic development came in 1950 with the proposal for the co-ordination of coal and steel production in Germany, Belgium, France, Italy, Luxembourg, and the Netherlands. The High Authority of the Community which began its work in 1952 includes a consultative Committee of representatives of management, labour, and consumers, an Assembly of Parliamentary delegates, a council of Ministers as a link to the governments, and a Court of Justice to settle disputes. The organisation of the Community is an example of co-operation on a supra-national basis, since the governing authority is not responsible to the individual governments of member countries but only to the Community. The High Authority has the right to deal directly with the coal and steel enterprises of the Community without passing through national governments. The plan caused great discussion between the two opposing points of view within the European Movement: the Federalists and the Functionalists. The latter advocate integration by specific conventions, and the former aim at a European parliament and government. Great Britain declined to join an association which went beyond intergovernmental co-operation; but in 1954 she formed a Standing Council of Association with the High Authority for consultations on coal and steel and for co-ordination where necessary.

What ECSC Has Achieved.—The Community has achieved a common market for coal, iron ore, steel, and scrap within the six countries and has eliminated tariffs, quotas, and other restrictions. It has also promoted the interests of coal and steel workers and has provided for the free movement of labour. But the Community's success in economic integration is only a part of its importance. Its further importance is in the surrender of national sovereignty in certain spheres and the creation of an authority which, as explained, is not responsible to the governments of the six countries which belong to it.

The European Economic Community (EEC), or Euromarket.—In 1955 "the Six" (namely the countries in ECSC) decided to drive towards further economic integration. This decision was taken at Messina, and the six are sometimes referred to as the Messina Powers. The EEC was established by a Treaty of Rome in 1957 and is an extension to the whole economic field of the institutional method of co-operation already adopted in the European Coal and Steel Community of the Six. The principal institutions are the Parliamentary Assembly (which is common to EEC, ECSC, and Euratom), a Council of Ministers, and an executive Commission of nine members. The common Parliamentary Assembly is now called the European Parliament. The Community is merging the Six into a single economic unit by harmonising economic, social, and investment policies and establishing a common market in trade.

What is a Common Market?—A common market is a trading area with no internal tariffs (import duties) or quotas (which are quantitative restrictions on imports) and a single external tariff and quota structure. The first tariff reductions inside the Six (10 per cent.) took place on January 1, 1959, and a further 10 per cent. reduction was due on July 1, 1960. The whole process will take from twelve to fifteen years. The common external tariff is being worked out. The levelling which will begin in 1962 will mean reductions by France and Italy in their high tariffs while the rest raise theirs.

A European Free Trade Area.—When the Six were discussing the Common Market the British Government declared (1956) that they would consider joining a free-trade area in Europe. Although she would not join the Common Market scheme itself, she would consider sharing in the stage-by-stage reduction of inter-European tariffs on all non-agricultural goods. They would not attempt (unlike the Six) to standardise their own tariff walls in relation to the world outside the European free-trade area. Such a free-trade area would be independently controlled with permanent co-ordination with EEC.

Rejection of Free-trade Area.—In November 1958 France rejected the British proposals for linking the six European common-market nations with the eleven other OEEC countries in a free-trade area. Under the proposal the EEC would have been linked, as a single entity, with an area which would cover all eleven OEEC countries. It was said that the principal obstacles were wide differences of social-service charges and the lack of equality of customs tariffs applied by the countries concerned. It appeared to the French impossible to establish a free-trade area between the six treaty powers and the other eleven OEEC countries without a single customs tariff between all of them and the outside world and without measures of harmonisation in the economic and social sphere.

The European Free Trade Association.—Thereupon seven countries outside the area of the Six formed a European Free Trade Association. They were Great Britain, Austria, Denmark, Norway, Portugal, Sweden, and Switzerland, and they agreed upon a plan at Stockholm in November 1959. Inside the free-trade area comprising these seven countries it is contemplated that there will eventually be no internal tariffs or quotas, but member states will retain separate external systems. The Association will function by intergovernmental co-operation, with a minimum of special institutions. It is intended to align internal tariff reductions with those of EEC. Thus it was decided to make a first reduction of 20 per cent. on July 1, 1960, when the Six was due to make its second 10 per cent. reduction. This reduction will be followed by periodical cuts, the transitional period ending in 1970. The difficulty of working the scheme with differing external tariffs is being surmounted by requiring certificates of origin for imports. This prevents imports flooding the whole area through the country with the lowest external tariffs for a given commodity.

Effects of the Free Trade Association.—The Stockholm agreement offers some safeguard to the nations concerned against being left economically isolated on the fringe of the common market. It might conceivably hasten the day when all of Western Europe is brought together in a single economic system. It created a single market of 88 million people; but there are 160 millions inside the European Community of the Six. There would be 250 millions inside a Europe-wide free-trade area. Britain stands to gain comparatively little by the removal of the low tariffs in Scandinavian countries compared with the benefits following freer entry in to France and Italy. All seven countries do more trade with the Six than with each other; all have an equal interest in ending the division of Europe into two rival trade groups.

Sixes and Sevens.—The Seven, upon the foundation of their Association, immediately offered friendly co-operation to the existing Common Market. But the problem of finding a political link—called by the diplomatists the problem of the three half-crowns (seven and six)—remained a difficult one. It was thought that the Outer Seven, by showing that a loosely-knit free trade could be made to work smoothly, might dispel some of the scepticism behind the French rejection of the original OEEC plan, as described above. On the other hand, of course, Europe is now split into two opposed trading groups. Although France was the stiffest

opponent of a wider agreement, she does a relatively small trade with the Outer Seven. The effect on Germany will be more serious.

The Remaining Five.—What about the other five members of the eighteen-nation organisation for European Economic Co-operation? They are Greece, Iceland, Ireland, Turkey, and Spain. They are "developing countries," not having highly industrialised, diversified economies, and the state of their economies did not permit them to join either EEC or EFTA unless special arrangements (*e.g.*, a longer time-limit for the reduction of customs duties and quota restrictions) were made. Greece and Turkey were seeking, in 1959, associate membership of EEC; and Finland sought affiliation with EFTA.

A New Global Grouping of Industrial Nations.—A conference held in Paris in January 1960 was expected to lead to the eventual replacement of OEEC by a much larger grouping. Certain Commonwealth countries, Japan, the U.S.A., and certain European countries would be members. The object would be two-fold: to enable the "have" countries to prevent trade wars between each other and also to co-operate closely in helping the "have-not" countries. As explained above, OEEC was originally set up to handle Marshall Aid, and Great Britain was the chief architect of it. Great Britain had also looked to OEEC as the appropriate framework to contain an eventual merger of the Six and the Seven into a wider European Free Trade Association. It was hoped that if a new Council were formed it would be given the task of co-ordinating the aid by Western countries to under-developed countries, and it would thus be realised that aid and trade policies could not be kept in watertight compartments. Under-developed countries need our markets as well as our money; and this realisation would lead to a lowering of European tariffs towards the rest of the world.

Economic Commission of Europe.—As explained in the preceding outline of the UN, ECE was the first of the great regional commissions to be set up by UNO. It was created in 1947 to concert action for the economic reconstruction of Europe, and it was hoped to strengthen economic co-operation between all European members of UNO. Russia and some of the Communist Eastern European countries are members of ECE, and it is the only European organisation where the Western bloc and Soviet powers can meet for discussion and action.

Euratom.—The six countries which proposed the Common Market also discussed the creation of a European organisation for the peaceful uses of atomic energy. Euratom, as it is called, has prior claim on any uranium, plutonium, or thorium in member countries and would distribute it to atomic-energy establishments without discrimination. In the event of deficiency materials are allocated on needs. The institution of Euratom is dealt with in the Treaty of Rome establishing the European Economic Community.

5. Proposals for Simplification.

There are now in Europe almost as many "Unifying" bodies as there are countries to unite. Six major organisations, still more minor ones, and three parliamentary assemblies are all engaged on aspects of the task of building a United Europe. At least four cities, each housing one of the major organisations, can aspire (should they desire this honour) to become the "capital of Europe." There is inevitably some overlapping. Thus Western European Union and the Council of Europe are both competent for social and cultural questions. OEEC and the Council are both interested in economic questions. At the moment there is not "one Europe" but the Europe of the Six (coal and steel community, common market, Euratom), another Seven in EFTA, the Seven in WEU, the Fifteen (the Council of Europe) and the Eighteen (OEEC).

Britain's "Grand Design."—In 1956 Great Britain suggested a single European Assembly where all aspects of Western co-operation could be reviewed. This would have the merit of concentrating in a single place organisations whose centres are at present in various capitals. This European Assembly would have five Commissions, political, economic, social and cultural, legal, and administrative. The "Grand Design" suggests more effective political consultation in NATO and WEU; and it further suggests the better linking of European unity in an Atlantic community. But the Assembly would need to cover in some way organisations of differing concepts and differing membership. This central difficulty has been faced by a proposal for two Assemblies to take, respectively, the intergovernmental and the supranational institutions—the Council of Europe, WEU and OEEC being in the former category and the institutions of the Six in the other. Another difficulty is that some countries are ready to join other countries in economic matters but not in military.

Other Proposals.—Another proposal is to link OEEC (which has no Assembly) with the Council of Europe (which is primarily an Assembly). Members of the Assembly of the Six might also be the members of the Assembly of OEEC which would become the Economic Assembly of Western Europe. In a similar way a fusion has been suggested of NATO and WEU to form a general defence assembly. This proposal was advocated in an excellent pamphlet published by PEP (Political and Economic Planning) in 1957.

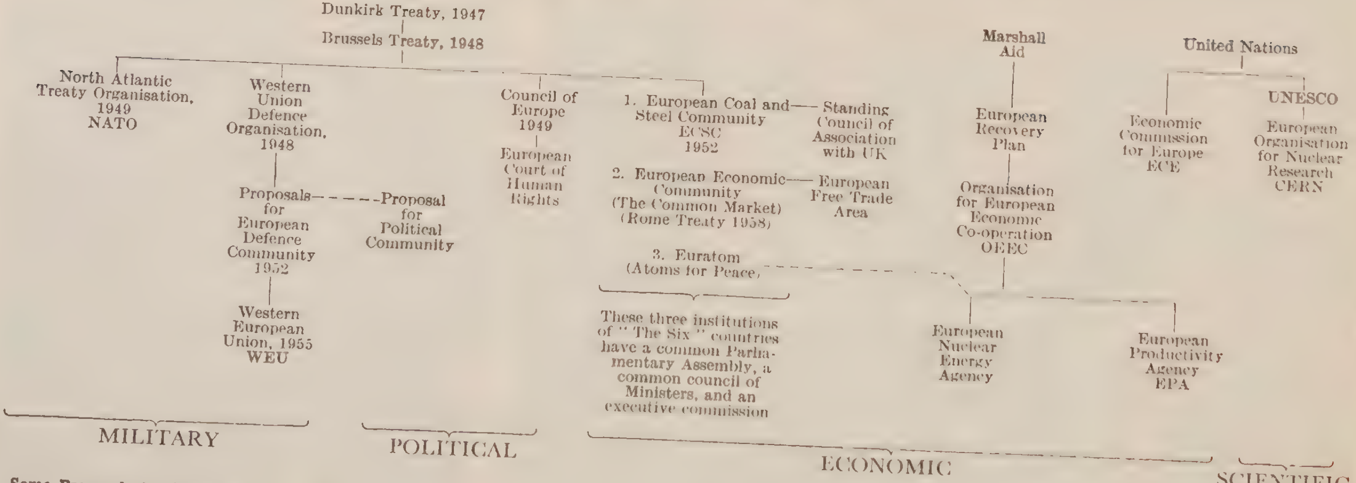
First Attempts at a Solution.—No real attempt to get to the root of the problem was made before 1959 when the Committee of Ministers (Council of Europe) set up an *ad hoc* Committee on Rationalisation. On a first report the Ministers took their first decisions: to propose to the Governments that the exercise of the competence in the social and cultural fields of WEU be transferred to the Council of Europe. But the Assembly of the Council did not think this was going very far. They urged, in addition, that the process of merging the Council with OEEC should begin immediately. The admission of Spain to OEEC posed a problem which it was thought could be met. The debate, however, revealed that the universal agreement on the necessity of rationalisation fades when it comes to discussing the concrete measures required to put the idea into practice. The subject was due to be discussed again in January 1960.

The Special Position of Great Britain.—This country, although a European country, is in a special position, being already in two other orbits. She belongs to the British Commonwealth, and half her trade is with the Commonwealth, a quarter being with Europe. She also has strong links with the U.S.A. For these reasons this country has been unwilling to join in supranational organisations. An exception in practice has been the transfer of the command of Britain's national forces to the NATO supreme commander.

6. Can European Union be Effective?

The Comparative Failure to Establish an Effective Form of European Union.—This failure was discussed in Mr. Kenneth Lindsay's book *Towards a European Parliament* already referred to. He regards as the two main causes of this failure the inadequacy of British leadership at every stage in the growth of European organisations and, secondly, the proliferation of organisations. Britain, he says, could have become the architect of a united Europe without in any way injuring Commonwealth trade or her special relationship with the U.S.A. "At each successive step forward," he writes, "whether in the case of the Coal and Steel Community, EDC, the still-born Political Community, the Common Market or Euratom, the British have done two things. They have welcomed the steps taken and then put forward a succession of proposals to counterbalance them.

GROWTH OF WESTERN EUROPEAN ORGANISATIONS



Some Proposals for Simplification.

1. Proposal for a single European Assembly with five Commissions, in a "Grand Design." Proposal made by United Kingdom.
2. Proposal for two Assemblies to take respectively the intergovernmental and the supranational institutions. The Council of Europe, WEU and OEEC are in the former class; and ECSC and other institutions of the six countries concerned are in the latter class.
3. Proposal to link OEEC (which has no Assembly) with the Council of Europe (which is primarily an Assembly); to make OEEC the Economic Assembly of Western Europe (the members of the Assembly of the Six being also members of an Assembly of OEEC); and to fuse NATO and WEU in a general Defence Assembly.
4. Proposal to merge the defence functions of WEU with NATO and its other functions with the Council of Europe; then to merge the Council of Europe with OEEC to create a "European Union" for Greater Europe (Mr. Kenneth Lindsay).

MEMBERSHIP OF EUROPEAN ORGANISATIONS
(M is full membership, AM associate membership)

	Military		Economic				
	NATO.	WEU.	Council of Europe.	OEEC.	ECSC. Euratom, and EEC.	EFTA.	ECE.
Belgium (Benelux)	M	M	M	M	M		M
Netherlands (Benelux)	M	M	M	M	M		M
Luxembourg (Benelux)	M	M	M	M	M		M
Norway (Northern Council)	M		M	M		M	M
Denmark (Northern Council)	M		M	M		M	M
Sweden (Northern Council)			M	M		M	M
Iceland (Northern Council)	M		M	M			M
Greece (Balkan Pact)	M		M	M			M
Turkey (Balkan Pact)	M		M	M			M
Austria			M	M		M	AM
Finland							AM
France	M	M	M	M	M		M
Western Germany	M	M	M	M	M		AM
Ireland			M	M			AM
Italy	M	M	M	M	M		AM
Portugal	M			M		M	AM
Spain				M			
Switzerland				M		M	AM
United Kingdom	M	M	M	M	*	M	M
Yugoslavia							M
Canada	M			AM			
United States	M			AM			M

Notes: All the countries are members of UNO except Western Germany and Switzerland. The U.S.S.R. and other Eastern European countries are also members of ECE.

* The United Kingdom is associated with ECSC through a Standing Council of Association.

HOW THE AMERICAN CONSTITUTION WORKS.

The following outline describes how the American democratic system works and how it differs from our own.

A Written Constitution.—The Government of the U.S.A., unlike Great Britain, works upon a written Constitution. It was framed when the U.S.A. came into existence as a sovereign body, when the Constitution built a republic out of a federation of thirteen states, based on representative government. The constitution was adopted in 1789, and its strength has been tested by the fact that, substantially unchanged, it is now the groundwork for a federation which now comprises forty-nine states (Alaska having been admitted in 1958 as the Forty-ninth State) and with a population forty times greater than in the original federation. Only twenty-two amendments to the constitution have been approved over the years, and none touch basic principles. The main design of the constitution is the division of power into three branches—the legislature, the executive, and the judiciary—each branch limited so that none could rise above the other and the three co-ordinated and balanced. This division is known as the separation of powers; and an explanation of it is offered towards an understanding of American politics. Let us look at the three branches.

National Congress.—All legislative powers are vested in Congress, which consists of a Senate and a House of Representatives. In the Senate each of the forty-nine states has two representatives, and in the House of Representatives there are 436 members based upon the population in each state. Senators hold office for six years (one-third of them being elected in elections in every even-numbered year), and members of the House of Representatives for two years. Bills may be introduced in either House or Senate except revenue measures, which must originate in the House of Representatives. The two Houses have almost the same authority in the making of laws, and the Constitution lists eighteen subjects (including the declaration of war), on which Congress may make laws, all other law-making power being left to the States. Congress is forbidden to do six things, and these include the suspension of *habeas corpus*. Differences between the two Houses are referred to specially appointed conferees, and when agreement is reached the measure is sent to the President for approval or disapproval. If he approves and signs, the measure becomes law. And it becomes law, even without the President's signature, if he should take no action on it within ten days, while Congress is in session. If the President should veto the measure and send it back, Congress may enact it into law over the President's objections by a two-thirds vote of members present, each chamber of Congress voting separately. So Congress has both the first and last word on all legislation. President Truman is said to have made more frequent use of the veto than any of his predecessors in office. A number of them were overridden by Congress. As a result of the Congressional elections of November 1958 the House of Representatives comprised 283 Democrats and 153 Republicans and the Senate 64 Democrats and 34 Republicans. Let us turn now to the President, in whom executive power is vested.

The President.—Despite the example before them of the danger of the excessive power of a British king, the framers of the Constitution decided to give all executive power to a single official to be known as President of the United States. It does not give any executive power to the Vice-President (who presides over the Senate) or to other officials. The President is thus his own Prime Minister, an actual ruler who nominates the Cabinet Ministers who are responsible only to him. The President lives in the White House at Washington, and heads the Executive Departments, each under a Cabinet member, and also many independent agencies. He is elected for four years through indirect election (as described below) by the people.

How Presidents are Chosen.—Candidates are chosen at conventions held by the principal political parties in the summer of election year. After every State delegation has had an opportunity to offer the name of its candidate, the delegates vote for their choice. A candidate having been thus selected by each party, the Presidential election takes place in the following November by an "indirect method." By this method the voters of each state select Presidential electors equal in number to the Representatives and Senators which that State has in the Congress. These electors are nominated by the political parties for the sole purpose of voting for their party's candidates for President and Vice-President. The electors from all forty-nine states are known as the Electoral College. The Federal Electoral College does not actually meet, the electors of the college meeting each in their own state. All the state's delegates vote for the candidates (for President and Vice-President) of the political party which has a majority, however small, in the state.

Congress and Foreign Policy.—The President shares with Congress responsibility for foreign policy. The initiative in the conduct of foreign relations rests with the President, who acts also as the nation's principal spokesman on foreign policy. He points the path to be followed. Notwithstanding this Presidential prerogative treaties can be made only with the approval of the Senate; and to the extent that foreign policy requires money and possibly laws, Congress as a whole has the final voice in determining what foreign policy should be adopted. When President Truman sent U.S. troops to Korea in 1950 he had to assume that Congress would support him, which it did. President and Congress work well together and serious conflicts seldom arise. Perhaps the most dramatic and important instance of the Senate saying "No" to a Presidential policy was its refusal to approve the Treaty of Versailles after the First World War. Put briefly, the President is the country's principal spokesman on foreign affairs, but Congress can assert its final authority in this field as in domestic legislation.

"Checks and Balances."—We have thus seen that both in legislation and in foreign policy Congress can profoundly influence and, if sufficiently determined, can dictate the course of national policy. De Tocqueville, who wrote a classic study of *Democracy in America*, 1835, said: ". . . the struggle between the President and the legislature must always be an unequal one, since the latter is certain of bearing down all resistance by persevering in its plans." The British Ambassador, James Bryce, said that although the Constitution gave the President substantial powers of his own there is scarcely one of these that the long arm of legislation cannot reach. To sum up, the "checks and balances" between President and Congress work both ways. Congress can check the Executive in foreign affairs. The President can veto the legislation of Congress. Congress can then countercheck and over-ride the President. So the President leads but does not rule. Most Presidents of the past fifty years—from Theodore Roosevelt to Eisenhower—have acted on the assumption that the President carries a mandate from the country, with a responsibility for leadership. The relationship between President and Congress gains added interest by the anomaly that, from November 1958 to the Presidential Election in 1960, both Houses of Congress had Democratic majorities, whereas President Eisenhower was of course, a Republican.

The Third Branch of Government: the Judiciary.—The courts act as a check on the other two branches—Legislature and Executive—by deciding whether one or the other has tried to use more authority than it has been given; and it decides whether, as between the national or the state governments, one side or the other have gone beyond their powers. The Supreme Court is the highest court, and could not be abolished without amending the constitution which created it.

The Bill of Rights specifically guarantees certain freedoms which the first Congress did not think adequately covered by the articles of the Constitution itself. These freedoms include that of religious worship, of speech, the Press, and peaceable assembly, and guarantees against unreasonable search of persons and houses.

The State Governments.—In the governmental pattern the State units occupy a special position. After all, the first thirteen of them had been operating for some years under written constitutions before the Federal constitution had been created. The constitutions of the states differ in some detail, but have a similar pattern; and they all provide that the final authority in the State belongs to the people. The line of demarcation between the respective powers of federal and state governments is drawn in the federal constitution. One of the requirements imposed on states is that their governments must be republican in form, and they may adopt no laws conflicting with the constitution, laws, or treaties of the federal government.

Changes in the Constitution.—The authors of the constitution were aware that changes would be needed from time to time to keep pace with the growth of the nation. But they wanted to ensure that such a change would not take place without mature consideration; and, at the same time wanted to prevent a minority being able to block a desirable change. So they devised a variety of ways by which the constitution could be amended. There have been twenty-two amendments to 1960. The first ten amendments are called the Bill of Rights, which is the subject of the next paragraph. The 18th amendment prohibited the sale of intoxicating beverages and was repealed by the 21st amendment. The 19th amendment gave women the right to vote.

The Committees of Investigation.—The accusations brought by Senator McCarthy in 1950 against a large number of government employees brought the Senate Committees, which investigated the charges, into great prominence. There is no provision in the Constitution for congressional committees, but precedents go back earlier than the constitution itself. Congressional committees have inquired into many matters over the years and the authority to investigate has been upheld when it could be shown that investigation was in the public interest and related to the power to legislate. Legislative investigators receive special prominence because they can be broadcast and televised, whereas the formal proceedings of House and Senate are not. Of course, this kind of committee is only one of the many kinds who prepare and "pre-consider" federal legislation. There are standing committees of each house and joint committees.

The Republican Party was born by the fusion in 1854 of the group who called themselves National Republicans, having split from the Democrats over tariffs in 1825, and the northern Democrats, both of them being opposed to slavery. It came to power on Abraham Lincoln becoming President in 1861 and remained in power (with the exception of four Administrations) until 1912. On coming to power in 1920 the Republicans withheld the U.S. ratification of the Treaty of Versailles, which had been negotiated by Woodrow Wilson. It was defeated in 1932 largely as a result of the economic depression. Once isolationist in foreign policy, the Party now advocates an active policy, especially in Asia. The symbol of the party is an elephant.

The Democratic Party, one of the two great parties, originated about 1787, advocating restrictions on the federal governments and in opposition to the federalists. It was in 1825 that a group who were in favour of high tariffs seceded, and this group was to become the Republican Party. The Democratic Party was split again over slavery before the Civil War (1861–65), and in the main

the southern states have been supporters of the Democrats. There was a Democratic President for twenty years, ending in 1953, when Eisenhower, the Republican Party candidate, became President. Eisenhower succeeded at both the 1952 and 1956 elections. The Democrats included in their last election programme a federal development of hydro-electricity and measures to prevent unemployment.

ISSUES OF THE DAY.

The following paragraphs contain background information on four selected controversial issues:—

The Younger Generation.

Capital Punishment.

The Wolfenden Committee and Homosexuality.

The Expansion in World Population.

THE YOUNGER GENERATION.

Is the Gap between the Generations Widening?—There always exists a gap between the generations. But is the gap at the present time wider than it has been? Is it wider than it ought to be? Do adults fail to understand the young? Do the young reject the standards of adults? What is the truth about the increase in delinquency? What are the difficulties and the aspirations of the young? Is it the young who are changing, or is it the world, or is it both? What can adults do? These are very important questions, because the burden of decisions tomorrow will fall on today's young.

Who Are the Young?—They are the young men and women between the ages of fifteen and twenty, and there are 4 million of them. They were born in and between 1939 and 1944, war years which were specially difficult for the rearing of children, and many of the young people were educated in overcrowded classrooms. In two to four years time the position will have changed. There will then be a million more between fifteen and twenty owing to the bulge in the post-war birth-rate. There will be shortly, therefore, more teenagers than at any time since the First World War.

What is New about the Present Younger Generation?—First, it is comparatively well-off. The average weekly wage packet of the male teenager in 1959 was £5 14*s*. and for girls under 18, £4 7*s*. 4*d*. The young have not only shared in the general advance of wages but have done relatively better. Further, the teenager today hands over a smaller proportion of his earnings than the teenager of twenty years ago, partly because parents are now more prosperous. Something like £500 million annual purchasing power are in the hands of the young. Another new fact is that the young are now more mature than heretofore. Better food and medical care have made them healthier, and they reach physical and sexual maturity earlier. A century ago girls reached puberty at 17; it is now generally at 13; in twenty years it may be as early as 12. Taken together, these two changes have helped to make another change: there are earlier marriages. One in four of all young women marry at 19 or earlier; and one in twenty of young men of the same age. Before the War the comparable figures would have been 1 in 9 of the young women and 1 in 50 of the young men. Beyond these dramatic changes is the changing world created by adults—the cinema and television, the special periodicals which adults produce for the young, and the goods specifically designed for them.

Delinquency.—In a White Paper published in February 1959 (*Penal Practice in a Changing Society*), attention was called to the increase in convictions of young men aged roughly 16 to 21 for offences of all kinds. This was an aspect of the persistence of crime which had increased during the War. This aspect naturally receives great publicity in the Press. But it should not blind us to the central fact that only a very small fraction—something under 2 per cent.—of young men are affected and that 98 per cent. of young people are sound.

The Education of the Young.—Unfortunately 80 per cent. of all young men leave school at 15. For a very long time it has been generally agreed that two advances were essential: to raise the school-leaving age to 16 and to introduce compulsory part-time education up to the age of 18. It is still so agreed. Indeed, powers exist in the Education Act of 1944 to do both these things. Unfortunately, although, sixteen years have elapsed, the powers have not been used. And they are unlikely to be used in the next few years unless there is energetic action now, which it cannot be assumed that there will be. There has, however, been some increase in the number of those staying on voluntarily at school after 15; and there has been a growth of day-release schemes whereby young people at work are able to attend technical colleges.

Education for Young People in the Next Twenty Years: the Crowther Report.—Recommendations on this subject were made at the end of 1959 by the Central Advisory Committee for Education (England). "We do not think," they said, "that the figure of about 12 per cent. of the age group still in full-time education at the age of 17 and of 6 per cent. at 20 is nearly good enough." They urged that the school-leaving age should be raised from 15 to 16. Many of the things that the schools can do for boys and girls can be carried much nearer completion by 16 than by 15. In their view the additional year should offer "new and challenging" courses and not simply be a continuation of what has gone before. They thought that the most favourable period for the change will be from 1965 to 1969, when it is estimated that the secondary-school population will be in a valley between two peak periods. If the change is made in 1969 it will be a quarter of a century after provision was made for it in an Act of Parliament. *See* graph (**E2**).

Further Education Proposals.—The Crowther Committee also recommended a planned programme of experiment leading to the introduction in the early 1970s of compulsory part-time education of all boys and girls of 16 and 17 not already in full-time education. This in effect would be carrying out the proposals of the 1944 Education Act on county colleges.

Youth at Work.—In the five years which will end in 1964 an extra million boys and girls will reach school-leaving age. Whether all these will find work will depend upon whether the economic expansion of the country is great enough to absorb them. During the first half of the decade 1950–60 there was an average increase of employment of 200,000 a year. But during the three years to 1958 there was a slight fall in employment. Apart from the primary need for economic expansion, a number of reforms have been urged to ensure that as many young people as possible should get skilled jobs. Among these reforms are that there should be an expansion of apprenticeship training facilities; Government emergency training centres; and a greatly improved Youth Employment Service. No more young men are being called up for National Service after 1960, so that a considerable number of additional 18–20-year-olds will be available for employment.

Exemption from National Service.—About fifty thousand men were exempted from call-up for National Service in 1960. They were the men whose deferment for training or study ended on or after June 1, 1960. Most of them were apprentices and the others included university students and those taking professional qualifications. As stated above, nobody will be called up after 1960, and men born in the fourth quarter of 1939 do not have to register.

Youth at Play.—Four out of five young people leave school at 15. The minority who remain at school (and the smaller number who go on to the University) all enjoy both the time and facilities not only for physical recreation but also for a wide range of interests. But for the great majority leisure needs are not adequately catered for. For the development of their energy and their sense of adventure and curiosity, they need better opportunities than are provided by commercial entertainment, enterprising as some of these may be. This situation is the more serious because County Colleges for compulsory one-day-a-week education up to the age of 18, as contemplated by the Education Act of 1944, have not been built. Even if they had been built, a good comprehensive Youth Service was also necessary; and, indeed, even before the Act youth welfare was officially declared to be part of the national system of education. But the Youth Service has been starved of official support and has been described as the Cinderella of the educational world. There are many excellent Youth Centres and Youth Clubs; but two-thirds of 15–20 age group do not belong to them. Thus, a challenge remains as to how to attract a much greater proportion of the young. Do not the facts warrant a nationally inspired campaign for better-trained Youth Leaders, better sports facilities of all kinds, more attractive youth centres and clubs, with dance halls, coffee bars, swimming-pools, libraries, hobbies rooms, quiet rooms, and lounges.

The National Youth and Sports Centre.—A scheme for such a centre at the Crystal Palace, London, was proposed by Sir Gerald Barry in 1954; and in 1960 the London County Council decided to go ahead with the plan. The Centre will be used for training coaches, leaders, and athletes, and for the reception and training of teams from overseas. It was intended that the centre should be for training rather than competition, but it was hoped that the scheme would be amended to make it a home for competitions—particularly indoor ones—by turning the projected gymnasium into an adaptable indoor stadium on the lines of recent buildings in Sweden, Germany, and Italy.

Youth and Marriage.—As we have said, there is a trend to earlier marriages, owing, in part, to greater prosperity of youth and to their earlier physical maturity. This means that the interval between school and marriage is narrowing. We are already accustomed to the fact of undergraduates being married; we may yet have to be accustomed, especially if the school-leaving age is raised, to seeing "children" at school engaged to be married. This suggests the need for more training in schools, not only in the physical and emotional aspects of sex but for more training for marriage and parenthood.

What the Community Owes to Youth.—The community owes them a much greater interest in their welfare. It needs to give them much better equipment and much better chances. "The restlessness of the young," wrote Sir John Wolfenden, "is, in fact, the only hope for all of us, the only hope we can have that when we have become too weary or discouraged or disillusioned they, with their vigour and uninhibited optimism, will change things for the better." A number of novel proposals have been made to stimulate better interest by adult groups in the new generation; and to encourage young people to embark upon imaginative voluntary projects. Among suggestions made have been "Adventure Scholarships" and "Second Chance" training courses. Whether the community should give the Parliamentary vote at a much earlier age, possibly at 18, is discussed on C11.

What Are "Adventure" Scholarships?—Dr. Michael Young suggested to the Labour Party Youth Commission the idea of 5,000 "adventure scholarships" of up to £500 to be awarded each year to young people between the ages of 16 and 25. The main purpose was to give opportunity for adventure to those who do not fit tidily into the educational or industrial worlds. The only qualification asked, under the scheme, is that the project proposed should be a genuine one and tha the young person concerned has the character to see it through. Over 20,000 young people have undertaken special activities under the Duke o Edinburgh's Award Scheme.

A Second Chance for Young People.—The Wa was won because so many young people, in changed circumstances, displayed unexpecte talent and shouldered more skilled and more responsible tasks than they had been accustome to. As a sequel, many ex-service men an women were trained for new careers. The question has therefore been asked whether some analogous chance should not be offered in peace time. A child may "miss the bus" at the age o 11; others may miss it when they leave school a 15. Should there not be a second chance for those who develop late or who, for whatever reason want to make a new start upon a better course, by providing them with "second chance" trainin courses?

Inquiries into Particular Problems of Young People.—A number of Committees are studyin particular problems, and these include: The Central Advisory Council on Further Educatio (1957), and the Wolfenden Committee on Spo (set up, in 1958, by the Central Advisory Counc for Physical Education). The object of the la named is to recommend measures to enable game sports, and outdoor activities to play their fu part in promoting the general welfare of th community.

Some Recent Reports.—The Report of th Labour Youth Commission on *The Young Generation*, August 1959.

Conservative Memorandum on the You Service, July 1959.

Booklets published by the Christian Econom and Social Research Foundation on *Setting up Home*, *Trends in Teenage Delinquency*, an *Teenagers' Problems*.

Report of the Albemarle Committee on Yout Service, February, 1960.

CAPITAL PUNISHMENT.

How the Problem Has Changed in a Hundre Years.—Persons were executed for small offence against property up to 1836. In 1814 a man wa executed in Essex for cutting down a tree. I 1833 a boy of nine (Nicholas White) was sentence to death at the Old Bailey for stealing two penny worth of paint, though he was reprieved. In th ten years up to 1818, 645 people were execute for crimes other than murder. The first attemp to mitigate the severity of the criminal law ha been made in 1810, when Sir Samuel Romilly introduced a bill into Parliament for the abolition o capital punishment for stealing five shillings an over from a shop. It was defeated by thirty-on votes to eleven. Gradually, however, some progress was made. Capital punishment wa abolished for cattle, horse, and sheep stealing i 1832; soon after for housebreaking and forgery and by 1837 the capital offences had been reduce to fifteen.

Capital Offences Reduced to Four.—It was no until 1861 that the number of crimes punishabl by death were reduced to four, viz.: (1) Hig Treason; (2) Murder; (3) Piracy with violence and (4) Destruction of public arsenals and dock yards. For the latter two offences, the deat penalty has fallen into disuse.

Public Executions were abolished in England i 1868 because instead of having a deterrent effec they had become an excuse for drinking an debauchery. When the penalty for pilfering wa death, public executions were the best opportu nities for the pick-pocket to get to work amon the crowd.

Children and the Death Sentence.—It was no till 1908 that sentence of death was abolished fo persons under 16; and not till 1933 that it wa

raised to 18. This latter position was more closely defined to cover persons who were under 18 at the time when the offence was committed. The Royal Commission on Capital Punishment (whose Report of 1953 is dealt with below) recommended, by a majority that the age-limit below which a person should not be sentenced to death should be raised from 18 to 21 in both England and Scotland. But the law has not been changed.

Inquiry by a House of Commons Select Committee, 1930.—During a debate upon a resolution against the death penalty in 1929, a Select Committee was promised to confirm the facts, particularly in regard to the experience of those countries which had abolished the death penalty. The Committee considered evidence from abolition countries and from experts and officials of all kinds, including some from the U.S.A. They elicited important facts and made definite recommendations.

Facts Proved by the Investigation.—The Inquiry found the following facts proved, amongst others:—

1. That abolition had not caused an increase in murder in a single European country; in most instances abolition had been followed by a decrease.
2. That the eight states in the American Union which had abolished Capital Punishment were among the states with fewest murders in proportion to population.
3. That eminent witnesses of wide experience in the administration of justice held that in spite of all our safeguards there was real risk of executing an innocent man.
4. That with the existing state of law and practice there is a real danger of executing a person of abnormal mentality.

The Select Committee's Report, 1930.—By a majority the Committee recommended that Parliament should, in the current Sessions, pass an Act to abolish the penalty for an experimental period of five years in cases tried by Civil Courts in time of peace; and that, in the meantime, the Home Secretary should recommend a reprieve in each case of a death sentence. (One of the minority later became an abolitionist.) But a Bill for suspension for an experimental period of five years, introduced in 1933, got no further than a first reading.

The House of Commons Declares Twice in Favour of Suspension.—Five years later, in 1938, the Commons carried a motion providing for suspension for five years, by 114 votes to 89. The Government refused to give effect to it. Ten years later, during a debate on the Criminal Justice Bill, 1948, the House, in a free vote, again declared itself in favour of suspension for five years, the voting being 245 to 222. But the Lords threw this particular clause out. Eventually the Government decided to appoint a Royal Commission, but its terms of reference prevented it from considering abolition itself, since it was authorised only to consider "whether liability . . . to suffer capital punishment for murder should be limited or modified". But the recommendations of the Royal Commission, if put into force, would considerably limit the imposition, as well as the execution, of the death penalty. If the most important recommendations were to be rejected, the Commission concludes, "that the issue is now whether capital punishment should be retained or abolished."

The View of the Royal Commission, 1949–53.—As we have said, this Commission was precluded by its terms of reference from recommending abolition. But it made the following declaration: "There is no clear evidence in any of the figures we have examined that the abolition of capital punishment has led to an increase in the homicide rate, or that its reintroduction has led to a fall." All the recommendations which the Commission made were designed to restrict the use of the death sentence.

The "Truce" Period in England.—There was a period in 1948 when capital punishment was not enforced, and it is sometimes referred to as the period when it was "abolished." It came about in the following way. In April 1948 the House of Commons, as explained above, passed a clause to the Criminal Justice Bill suspending the death sentence for five years. Thereupon the Home Secretary announced that he would reprieve all murderers, in view of their decision. But the Lords threw out the clause in June, and in July the Bill became an Act (without the clause suspending the penalty). So the original position was restored. In fact, all murderers were reprieved until November 18, so there was a period of seven months without executions. The claim which has sometimes been made that there was a significant increase in the murder rate during the "truce" is not borne out by the figures. It was too short, of course, to offer a basis for conclusions. The highest monthly figure of the year was December, by which time executions were resumed. The figures were:—

January	11	July	8
February	11	August	12
March	8	September	12
April	14	October	13
May	13	November	12
June	9	December	25

Are Murders Increasing?—The annual average of murders known to the police during the decade 1940–49 was 166. The annual average for the nine years 1950–58 was 142.

Abolitionist Countries.—Among the European states which have either abolished capital punishment by law for the civil crime of murder or allowed it to fall into abeyance by a policy of reprieve are:—

Austria	Luxembourg
Belgium	Norway
Denmark	Portugal
Finland	Roumania
W. Germany	Sweden
Holland	Switzerland
Iceland	U.S.S.R.
Italy	

(The sentence has been restored for political crimes in Roumania and for political crimes in the U.S.S.R.) Capital punishment is abolished in four states of the America Union and in two others, except for murder in what is known as the first degree while serving sentence for murder in the first degree. There has been no execution in Queensland, Australia, since 1913; and there is abolition in eleven countries of South America.

Present Inquiries.—A number of official committees are currently at work on aspects of crime. They include:—

1. Committee on the organisation of criminal courts (1958).
2. Standing Committee on the revision of the Criminal Law (1959).
3. Inter-departmental Working Party to examine practicability of a scheme (put forward by the late Margery Fry) for compensating the victims of crimes of violence.
4. Departmental Committee to inquire into all aspects of Probation Service.

The Howard League for Penal Reform exists to prevent crime and to promote the constructive treatment of delinquents; and members may consult, and borrow books from, the John Howard Library of Criminal Law and Penology. Among the reforms which it has helped to achieve are the training of magistrates, the abolition of judicial sentences of corporal punishment, the abolition of solitary confinement (except as a punishment), the introduction of lectures, classes, and prison visitors into prisons, and many other reforms. It advocates the total abolition of capital punishment and publishes a good deal of valuable literature on this and other aspects of penal reform. Its address is: Parliament Mansions, Abbey Orchard Street, London, S.W.1.

THE WOLFENDEN COMMITTEE AND HOMOSEXUALITY.

The Wolfenden Committee.—During recent years public interest has been aroused by the subject of homosexuality, and the recommendations of the Wolfenden Committee are being increasingly discussed. This Committee was set up by the Conservative Government in 1954, to consider what changes, if any, were desirable in the law and practice relating to homosexual offences and prostitution. Prostitution is not dealt with in these notes (which are confined to the other branch of the Committee's inquiry), and which attempt to answer some of the many questions asked upon a subject coming before Parliament and the nation for decision. Many are convinced that the law should be changed; others are equally convinced that it should not.

What is Homosexuality?—Does it affect many people? Ought it to be stamped out, and can it be stamped out? What changes have been suggested in the law, and what would happen if the law were changed? Homosexuality is not a kind of behaviour, but a condition: it is the condition of being attracted sexually by members of one's own sex. Many people have slight homosexual tendencies, but most of us are predominantly heterosexual—that is, we are attracted by members of the other sex. It is impossible to know exactly the numbers involved; one estimate suggests there are, perhaps, a million each of men and women in this country who are exclusively or predominantly homosexual. There is no exact parallel for this sexual orientation, but it might be compared with left-handedness. No one really knows what makes a man or woman homosexual. It is said that there is evidence that, in some cases, the deciding factor is inborn. Much more research is needed into causes. A large number, perhaps the majority, of adolescents pass through a homosexual phase. Many experts believe this is normal and that homosexual tendencies displayed by boys and girls at this stage of their development need not give cause for worry. But a minority of men and women are homosexual throughout their lives; and it is this minority with whom we are here concerned.

The Law.—Are homosexual acts punishable by law? If committed in private by women, no. If committed anywhere by men, yes. An attempt was made in Parliament in 1921, to prohibit homosexual behaviour between women, but the Bill was defeated; and it is very unlikely that such behaviour between women will ever be made a criminal offence in this country. As regards men, there are similar laws against homosexual behaviour in the U.S.A., Western Germany, and Commonwealth countries. In almost all other democratic countries the private sexual behaviour of consenting adults is not subject to the criminal law. There is no evidence of any increase of homosexual practices in such countries. Nor is there evidence that female homosexual behaviour is increasing in this country, where it is not illegal. Since homosexual tendencies cannot be acquired by choice, it is unlikely that there will be a significant increase or decrease in homosexual behaviour.

The Proposed Change in Law.—A Departmental Committee of the Home Office was set up in 1954 under the chairmanship of Sir John Wolfenden, and studied the evidence for three years. Its main recommendation, by a majority of 12 to 1, was that homosexual behaviour between consenting adults in private should no longer be a criminal offence. The Committee was representative of medical, legal, and religious opinion, for it included two High Court judges, two Members of Parliament, doctors, lawyers, ministers of religion, and two women. The fears about possible consequences of reform were shown in the Report to be groundless; and the most important legal distinction between "sin" and "crime" was reasserted.

An Objection.—One member of the Commission, Mr. James Adair, formerly Procurator General at Glasgow, dissociated himself from the recommendation to legalise homosexual acts committed in private by consenting males, on the ground that such conduct was contrary to the best interests of the community and could have severe effects on the whole moral fabric of social life.

The Attitude of the Churches has been largely favourable to the proposed change in the law. It received the support of the Archbishops of Canterbury and York, the Church Assembly, the Church of England Moral Welfare Council, the Roman Catholic Advisory Committee on Prostitution and Homosexual Offences, the Methodist Conference, and leaders of the Church of Scotland and the Free Churches. The recommendation for a change in the law is opposed by the General Assembly of the Church of Scotland and by the Salvation Army.

The Attitude of the Press and Political Parties.—The Press is largely favourable. It has the backing, for example, of *The Times*, the *Daily Telegraph*, and *The Guardian* among many other national papers and weekly reviews; and it has the support of the *Church of England Newspaper* and *The Lancet*. The Wolfenden proposal has not been made a Party issue. It is firmly supported by the Bow Group in the Conservative Party and the National League of Young Liberals; and by individual Members of Parliament in all three parties.

Parliament and the Proposed Change.—The proposal was debated by the House of Lords in December 1957 and by the House of Commons in November 1958. In both cases there was a fairly even division of opinion, and this division of thought cut across Party lines. In neither case was a vote taken. In both debates the Government spokesmen expressed the view that public opinion was not yet ready for such a change.

Objections to a Change in the Law: the Effect on the Young.—One fear expressed is that homosexual behaviour between adults, if it were not illegal, would corrupt young people. But interference with boys and youths would still be punished by law. The Wolfenden Report advocates more severe penalties against those who commit offences against young people. The overwhelming majority of homosexuals have no sexual interest in children. A minority of homosexuals seek partnerships with boys, just as a minority of heterosexuals seek relationships with young girls. Those who are addicted to molesting children present a difficult and tragic problem, but it is a different problem from the ordinary run of homosexuality. There is, of course, general agreement that children—both girls and boys—must be protected.

Some Further Aspects.—The present law lends itself to blackmail, since homosexuals become easy victims of blackmail. A very high percentage of blackmail cases have a homosexual origin. Victims who report this kind of blackmail are sometimes prosecuted for the homosexual behaviour which has given the blackmailer his hold over them. Another aspect is the inconsistent way the law is administered. Two opinions are therefore worth quoting. "The law is in considerable danger of being brought into disrepute, and reforms are needed," said Lord Justice Birkett. The Wolfenden Report's comment on legal practice was: "It is evident that this law does not command the universal respect of those who are charged with enforcing it."

The Homosexual Law Reform Society has been formed to educate public opinion on the subject of reform. Its Committee includes the Archbishop of York, five Bishops, and distinguished men and women in many walks of life. It publishes important literature on the subject and a book list. Its address is 32 Shaftesbury Avenue, London, W.1.

THE EXPANSION OF WORLD POPULATION.

Some surprising predictions have been made by the UN as to where and how population will expand in the remainder of the twentieth century. These probable patterns are not only interesting in themselves but they open up a variety of problems and possibilities. We therefore give below some of these predictions which have been based upon wide research.

The General Trend.—A main prediction is that world population may rise from 2,500 millions to 4,000 millions in the next twenty-five years. To understand the dramatic nature of this forecast we can ponder the fact that it took 200,000 years for the population of this globe to reach 2,500 millions, but it would take only another thirty years to add another 2,000 millions (on a low estimate). At the present rate of increase the number of human beings in the world in 600 years time would be so great that on average there would be only one square metre for each to live on. Six hundred years may seem a long time, but it is only the length of time which has elapsed since the discovery of the New World. This result cannot possibly happen. Having found the means to accelerate growth, mankind must now clearly find the means to slow down.

Increases in Different Continents.—The importance of the predictions becomes clearer when we look at the following break-up of the figures showing the estimates of population for different continents. The figures for Asia exclude the Asiatic part of the U.S.S.R., for which the figures are included in the European estimate.

Year.	Total for the world.	Africa.	North America.	Latin America.	Asia (excluding Asiatic part of the U.S.S.R.)	Europe, including the U.S.S.R.	Oceania.
1950	2,497	199	168	163	1,380	574	13
1975	3,828	303	240	303	2,210	751	21
2000	6,267	517	312	592	3,870	947	29

[These figures have been counted to the nearest million.]

Asia.—A glance shows that the populations of Asia (other than the Asiatic part of the U.S.S.R.) was a little over half the world population in 1950, but by the end of the century it may be more than three-fifths. During the same period while the proportion of population of some continents would have increased, that of Europe (and the U.S.S.R.) would have fallen dramatically. This is made clearer by the following table showing the percentage of estimated world population contained in each continent:—

Year.	World.	Africa.	North America.	Latin America.	Asia (excluding Asiatic part of the U.S.S.R.)	Europe (including the U.S.S.R.)	Oceania.
1950	100	8	6·7	6·5	55·2	23	0·5
1975	100	7·9	6·3	7·9	57·7	19·6	0·5
2000	100	8·2	5	9·4	61·8	15·1	0·5

Fertility and Mortality.—Why is this estimate made of such a relatively higher growth in Asia? Because it is believed that high fertility there will be maintained but mortality rates, which are now high, are declining. The opposite conditions obtain and are likely to continue to obtain in Europe and Japan, namely low fertility rates and low mortality rate. This is the probable picture as seen by the demographers (the specialists who study rates of births, deaths, diseases, etc.):—

High fertility	High mortality	Middle Africa
High fertility	High mortality but declining	North Africa South Africa Middle East Asia.
High fertility	Moderate mortality	North Latin America Central America.
Moderate fertility	Low mortality	North America South Latin America Oceania U.S.S.R.
Low fertility	Low mortality	Europe Japan.

We would therefore expect a rapid growth in North Latin America, Central America, the whole of Africa, the Middle East, and Asia; but less rapid growth in Europe, Russia, Japan, North America, South Latin America, and Oceania (Australia and New Zealand).

High-fertility Populations are, on the whole, those of the technically under-developed countries; and there is little evidence among populations of presently high fertility of those attitudes which, in Western countries and in Japan, seem to have been most closely associated with a deliberate control of the size of families.

Some Generalisations.—Some of the specialists on this subject agree on certain facts of major significance. Since the time of the Greeks and Romans, the wealthy classes have generally been characterised by a relatively low fertility. Fertility declined in the U.S.A. throughout most of the nineteenth century, and in the last quarter of that century fell in a number of western European countries. They make the broad generalisation that fertility varies inversely with income—that is to say, that as the income of groups rises the rate of fertility goes down. Broadly, also, fertility varies inversely with education and inversely, also, with the status of women. An exception to the latter generalisation is the U.S.A., where fertility is higher than in England, where women's status is not so high. Generally the wealthy or more industrialised countries have a lower fertility than poorer and less industrialised countries. However, a comparison of two industrialised countries with similar social and economic institutions (U.S.A. and England) shows that the wealthier country (U.S.A.) has a much higher birth-rate.

Marrying Younger in the U.S.A.—The rise in fertility in the U.S.A. referred to in the preceding

paragraph emphasises the need for caution in predictions of population changes. At the end of the nineteenth century an ageing—and eventually, a decreasing—population was forecast for America. But the returns of the Census Bureau for 1959 show that this position has changed. The average age for American women to marry is now just over 20 and for men just over 22. Whereas at one time the average family comprised not more than two children, now the ideal family contains three or four children. It seems as if a new element—of a rooted confidence—may come into effect in advanced industrial societies.

The Necessity for Increase of Food Production.—The world-wide increase of population could have occurred only by more food becoming available. New lands and new methods (for example, the use of chemical fertilisers) have led to higher yields. How will production be still further increased in the future? At present large tracts are only partly used for farming. In those tracts which are used fairly intensively the yield could be increased in many areas. With the advance of agronomy and other sciences lands which at present are used for farming only a little or not all will be brought into use. Chemical fertilisers will be used much more widely and also trace elements (that is small quantities of an element deficient in the soil, like copper or cobalt). New types of plant and new breeds of animals will be introduced. The elimination may be possible of many weeds and insect pests. Farm machinery, besides being more efficient, will release workers for other tasks. Irrigation will be extended; and distilled sea-water pumped to arid regions. So far, only small attempts have been made to breed and rear fish; and the seas of the world offer a vast potential source of food. At the first International Oceanographic Congress held in 1959 there was discussion of the whole new field of nutritional (and medical) research which is now developing in the study of the vitamins, antibiotics, hormones, and growth stimulants produced by living things in the sea.

Birth Control.—Besides raising production, another approach to a solution of the problem of overpopulation is to slow down the rate of increase. But there are difficulties in applying modern methods of birth control in the poorer countries with large rural populations. There may be government and religious objections; the problem of manufacturing and distributing contraceptives; the need to explain their correct use effectively; and the task will remain of persuading people, who have insufficient money for food or who do not receive wages at all, to buy or acquire contraceptives. These difficulties apply generally to three-quarters of the population of the world. Birth control has now become a question of world importance and discussion.

A GUIDE TO SOCIETIES.

On the following pages are the addresses of some of the societies working in the fields of social service, adult education, international affairs, and outdoor activities. The following addresses will be particularly useful for the lonely person who wants to find a congenial society, where, in company with like-minded people, some worth-while activity can be pursued. They are only a selection from all the societies working in these and allied spheres. See also list of societies, Q 10–12.

What the Societies Offer.—Many of the societies offer the facility of a unique specialised library, and most of them issue not only journals and magazines but pamphlets giving the latest authoritative views and discussions of contemporary problems. Besides these facilities the associations offer the individual the opportunity of hearing experts and of discussing the subject with others interested in the same subject. Many societies hold not only lectures but conferences, covering the week-end or several days, and some of them hold Summer Schools.

Social Service.

The National Council of Social Service (26 Bedford Square, London, W.C.1) is the main promotional and co-ordinating organisation of voluntary social work in Great Britain. It publishes *Handbooks on Voluntary and Public Social Services and Directory of Organisations.*

The Annual Charities Register and Digest is a famous reference book prepared by the Family Welfare Association (address below). It is a standard guide to every branch of charitable work, giving details of Adoption Societies, Almshouses, Homes for Incurables, Convalescent Homes of all kinds, and all Welfare Institutions.

Some useful addresses are:—

British Association of Residential Settlements,
Toynbee Hall, 28 Commercial St., E.1.
Central Council for Health Education,
Tavistock House, Tavistock Square, W.C.1.
Citizen's Advice Bureaux Service,
26 Bedford Square, W.C.1.
Family Planning Association,
64 Sloane St., S.W.1.
Family Welfare Association,
296 Vauxhall Bridge Rd., S.W.1.
Industrial Welfare Society,
48 Bryanston Square, W.1.
Institute for the Study and Treatment of Delinquency,
8 Bourdon St., Davies St., W.1.
National Association of Parish Councils,
26 Bedford Square, W.C.1.
National Association of Boys' Clubs,
17 Bedford Square, W.C.1.
Scottish Association of Boys' Clubs,
12 Alva St., Edinburgh, 2.
National Association of Girls' Clubs and Mixed Clubs,
30–2 Devonshire St., W.1.
Scottish Association of Girls' Clubs,
13 Eglington Crescent, Edinburgh, 12.
National Council of Women,
36 Lower Sloane St., S.W.1.
National Council of Y.M.C.A.'s,
112 Great Russell St., W.C.1.
10 Palmerston Place, Edinburgh, 12.
22 Howard St., Belfast.
National Federation of Community Associations,
26 Bedford Square, W.C.1.
National Federation of Women's Institutes,
39 Eccleston St., S.W.1.
National Union of Townswomen's Guilds,
2 Cromwell Place, S.W.7.
Federation of Women's Institutes of Northern Ireland,
28 Bedford St., Belfast.
National Federation of Young Farmers' Clubs,
55 Gower St., W.C.1.
National Marriage Guidance Council,
58 Queen Anne St., Grosvenor Square, W.1.
Save the Children Fund,
12 Upper Belgrave St., W.1.
Scottish Council of Social Service,
10 Alva St., Edinburgh, 2.
Northern Ireland Council of Social Service,
28 Bedford St., Belfast.
Tavistock Institute of Human Relations,
2 Beaumont St., W.1.
Young Women's Christian Association,
108 Baker St., W.1.
18 Atholl Crescent, Edinburgh, 3.
385 Malone Rd., Belfast.

Adult Education.

The National Institute of Adult Education (35 Queen Anne St., London, W.1) publishes a *Directory of Organisations* which describes all organisations which offer a direct educational service: and gives particulars of colleges offering educational courses. The National Institute also publishes a *Calendar of Residential Short Courses.*

Some useful addresses are:—

Workers' Education Association,
Temple House, 27 Portman Square, W.1.
177 Hill St., Glasgow, C.3.
56 Dublin Road, Belfast.
(For addresses of district secretaries see section "Family Affairs.")

Arts Council of Great Britain,
4 St. James's Square, S.W.1.
National Adult School Union,
35 Queen Anne St., W.1.
Association for Education in Citizenship,
3 Elm Mews, Bayswater, W.2.
British Drama League,
9 Fitzroy Square, W.1.
British Film Institute,
4 Great Russell St., W.C.1.
British Society for International Understanding,
36 Craven St., W.C.2.
English Folk Dance and Song Society,
Cecil Sharp House, 2 Regent's Park Rd., N.W.1.
National Book League,
7 Albemarle St., W.1.
Central Office of Information,
83 Baker St., W.1.
Hansard Society,
39 Millbank, S.W.1.
Council for Education in World Citizenship,
25 Charles St., W.1.
Council for Promotion of Field Studies,
Ravensmead, Keston, Kent.
Field Centres at—
Dale Fort, Haverfordwest, Pembs.
Flatford Mill, East Bergholt, near Colchester, Essex.
Juniper Hall, Mickleham, near Dorking, Surrey.
Malham Tarn, near Settle, Yorkshire.
Preston Montford, near Shrewsbury.
Slapton Ley, Slapton, Kingsbridge, Devon.
National Association of Women's Clubs,
26 Bedford Square, W.C.1.
National Central Library,
Malet Place, W.C.1.
National Council of Labour Colleges,
Tillicoultry, Scotland.
T.U.C. Education Dept.,
Transport House, Great Russell St., W.C.1.
Educational Centres Association,
Walthamstow Educational Settlement, Greenleaf Rd., E.17.
Educational Interchange Council,
43 Parliament St., S.W.1.
Institute of Sociology,
Le Play House, Ledbury, Herefordshire.
Rural Music Schools Association,
Little Benslow Hills, Hitchin, Herts.
Seafarers' Education Service and College of the Sea,
Mansbridge House, 207 Balham High Road, S.W.17.

International Co-operation.

The National Peace Council (29 Great James St., S.W.1), is a federation of national societies concerned in the promotion of peace. It publishes the *Peace Year Book*, which contains a directory of societies working for peace.

Useful addresses:—

United Nations Association,
25 Charles St., W.1.
Union of Democratic Control,
13 Prince of Wales Terrace, W.8.
Federal Union,
10 Wyndham Place, W.1.
Women's International League for Peace and Freedom,
29 Great James St., W.C.1.
International Voluntary Service,
72 Oakley Square, N.W.1.
British Society for International Understanding,
Benjamin Franklin House, 36 Craven St., W.C.2.
International Friendship League,
Peace Haven, Creswick Road, W.3.
Friends Peace Committee,
Friends House, Euston Road, N.W.1.
Africa Bureau, The,
65 Denison House, Vauxhall Bridge Rd. S.W.1.
United Europe Movement,
99 Park Lane, W.1.
Fabian International Bureau,
11 Dartmouth St., S.W.1.
English Speaking Union,
37 Charles St., W.1.
Council for Education in World Citizenship,
25 Charles St., W.1.
Royal Institute of International Affairs,
Chatham House, 10 St. James's Square, S.W.1.
Parliamentary Association for World Government,
21 Hampstead Lane, N.6.

The Citizen Outdoors.

Useful addresses are:—

The Ramblers Association,
48 Park Rd., N.W.1.
Scottish Ramblers Federation,
4 Kildonan Drive, Glasgow, W.1.
Youth Hostels Association,
England and Wales
National Office: Trevelyan House, St. Albans, Herts.
London Office: 22 Gordon Square, W.C.1.
Northern Ireland: 28 Bedford St., Belfast.
Scotland: 7 Bruntsfield Crescent, Edinburgh, 10
Eire: 39 Mountjoy Square, Dublin.
Co-op Holidays Association,
Birch Heys, Cromwell Range, Fallowfield, Manchester, 14.
Holiday Fellowship,
142 Great North Way, N.W.4.
Family Holidays Ltd.,
6 Dale St., Liverpool, 2.
National Parks Commission,
3 Chester Gate, N.W.1.
National Trust (for places of historic interest or natural beauty),
42 Queen Anne's Gate, S.W.1.
Council for Preservation of Rural England,
Council for Preservation of Rural Wales,
4 Hobart Place, S.W.1.
Commons, Open Spaces, and Footpaths Preservation Society,
11 King's Bench Walk, E.C.4.
Central Council for Physical Recreation,
6 Bedford Square, W.C.1.
Wales: 18 Windsor Place, Cardiff.
Northern Ireland: 45 Arthur St., Belfast.
Scottish Council: 4 Queensferry St., Edinburgh, 2.
Amateur Athletic Association,
54 Torrington Place, W.C.1.
Mountaineering Assn.,
102a Westbourne Grove, W.2.
British Mountaineering Council,
T. H. Sinclair, c/o Register of Restrictive Trading Agreements, Chancery House, Chancery Lane, W.C.2.
Scottish Mountaineering Club,
406 Sauchiehall Street, Glasgow, C.2.
Junior Mountaineering Club of Scotland (Glasgow Section),
28 Croftmont Avenue, Croftfoot, Glasgow, S.4.
Camping Club of Great Britain and Ireland,
35 Old Kent Road, S.E.1.
Youth Camping Association,
32 Summerlee Gardens, N.2.

Some Other Societies.

Political and Economic Planning,
16 Queen Anne's Gate, S.W.1.
Howard League for Penal Reform,
Parliament Mansions, Abbey Orchard St., S.W.1.
Progressive League,
20 Buckingham St., W.C.2.
Ethical Union,
13 Prince of Wales Terrace, W.8.
Proportional Representation Society,
82 Victoria St., S.W.1.

(*Note:* Unless otherwise stated the above addresses are in London, and this is further indicated by the postal number, *e.g.*, S.W.1. Correspondents writing from places other than London should include "London," as well as the postal number, in the address.)

THE MINISTRY

THE PRINCIPAL MINISTERS AS AT 1 MARCH 1960 IN THE CONSERVATIVE GOVERNMENT

THE CABINET (19)

Prime Minister, First Lord of the Treasury—Mr. Harold Macmillan.
Home Secretary—Mr. R. A. Butler.
Lord Chancellor.—Viscount Kilmuir.
Foreign Secretary.—Mr. Selwyn Lloyd.
Chancellor of the Exchequer—Mr. D. Heathcoat Amory.
Lord President of the Council, Secretary for Commonwealth Relations—The Earl of Home.
Secretary of State for Scotland—Mr. John Maclay.
Lord Privy Seal (and Minister for Science)—Viscount Hailsham.
Minister for Aviation—Mr. Duncan Sandys.
Colonial Secretary—Mr. Iain Macleod.
Minister of Defence.—Mr. Harold Watkinson.
Minister of Housing and Local Government (and Minister for Welsh Affairs)—Mr. Henry Brooke.
Minister of Education—Sir David Eccles.
Paymaster General—Lord Mills.
President of the Board of Trade—Mr. Reginald Maudling.
Minister of Agriculture, Fisheries and Food—Mr. John Hare.
Minister of Labour—Mr. Edward Heath.
Chancellor of the Duchy of Lancaster—Dr. Charles Hill.
Minister of Transport—Mr. Ernest Marples.

MINISTERS NOT IN THE CABINET.

First Lord of the Admiralty—Lord Carrington.
Secretary of State for War—Mr. Christopher Soames.
Secretary of State for Air—Mr. George Ward.
Minister of Pensions and National Insurance—Mr. John Boyd-Carpenter.
Minister of Health—Mr. Derek Walker-Smith.
Minister of Works—Lord John Hope.
Postmaster-General—Mr. J. B. Bevins.
Minister of Power—Mr. Richard Wood.
Minister without Portfolio—The Earl of Dundee.
Minister of State Scottish Office—Lord Craigton.
Minister of State for Foreign Affairs—Mr. D. Ormsby-Gore and Mr. John Profumo.
Minister of State for Colonial Affairs—The Earl of Perth.
Minister of State Commonwealth Relations—Mr. C. J. M. Alport.
Minister of State Board of Trade—Mr. F. J. Erroll.
Minister of State for Welsh Affairs—Lord Brecon.
Attorney General—Sir Reginald Manningham-Buller.
Lord Advocate—Mr. W. R. Milligan.
Solicitor General—Sir Jocelyn Simon.
Solicitor General for Scotland—Mr. William Grant.

SPEAKER OF THE HOUSE OF COMMONS—Sir Harry Hylton-Foster.
LEADER OF THE OPPOSITION—Mr. Hugh Gaitskell.

GENERAL ELECTION RESULTS

Party	1950 (*Electorate* 34,269,764)		1951 (*Electorate* 34,622,591)		1955 (*Electorate* 34,855,907)		1959 (*Electorate* 35,389,029)	
	Votes	*Seats*	*Votes*	*Seats*	*Votes*	*Seats*	*Votes*	*Seats*
Conservatives (and supporters)	12,501,953	298	13,724,418	321	13,311,938	345	13,750,935	365
Labour	13,295,736	315	13,948,385	295	12,405,246	277	12,216,166	258
Liberal	2,621,489	9	730,551	6	722,395	6	1,640,761	6
Communist	91,815	—	21,640	—	33,144	—	30,897	—
Others	258,454	3	177,329	3	288,031	2	223,949	1
	28,769,447	625	28,602,323	625	26,760,754	630	27,862,708	630

The Law of England

A Concise Survey of the English Legal System, its history and development from early times, with further detail of some particular branches of the law which are of practical interest to the ordinary citizen.

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THE LAW OF ENGLAND

A.—*The Sources*

Comprising

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2. The Rule of Law.

(a) *The Legislature:* The franchise, elections, Parliamentary procedure, relations between Lords and Commons, Bills and Acts.

(b) *The Executive:* The Crown, the Ministry, Government Departments and their powers.

(c) *The Judiciary:* The Courts and their functions, the Judges, means of controlling the Executive and inferior courts.

(d) *Local Government:* County, Borough, Urban and Rural District and Parish Councils and their powers.

(For further details, see C3–12.)

II. Criminal Law, dealing with the relations between the individual and the State.

A. Grave offences against—

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Subsidiary matters:

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1. Chattels.

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* *Note:* Equity is applied only in matters of civil law relating to persons and property. It has no application to constitutional or criminal law.

The Law of England

THE Table set out on D3 shows in concise form—

A—the sources, and
B—the subdivisions

of the Law of England. The intention is to give a general picture of the whole system in tabular form, to explain briefly what the Table represents, and finally to deal, in slightly more detail, with a few selected subjects which may be of particular interest to the ordinary reader.

A word of warning is necessary. Learned text-books have been written on every one of the many subjects referred to in the Table, and the application of the law in any particular case is a matter for the professional expert. The following pages do not claim to do more than to make a brief survey of the whole field of English Law, for the general guidance and interest of the ordinary citizen.

A. THE SOURCES OF ENGLISH LAW

The citizen who desires to make some acquaintance with the English Legal System must begin by disabusing himself of several popular fallacies: for example, that it is a fixed and unalterable code, that it is strictly logical, that it is coldly impersonal and uninfluenced by human factors. The history and practice of the law display precisely the opposite characteristics.

1. COMMON LAW AND CASE LAW

The English Legal System is a *living organism*, not a dead, static code. The system as we know it began to develop in the thirteenth century, when Henry II extended the practice of sending the royal judges about the country "on circuit," to deal with crimes and disputes, and to adapt and give official authority to the best of the local customs, some of which had been in force since Anglo-Saxon days. The judges did this by *empirical methods*—that is, by practical, commonsense decisions on the actual cases brought before them, and by setting out their reasoning in detail. Simple records of the most important decisions were kept from the earliest times; as the centuries passed, the gradual elaboration of a system of *law-reporting* ensured that the *facts* of significant cases, the *reasoned judgments* delivered on those facts, and the *principles* those judgments enshrined, should be recorded and preserved; at the same time the doctrine of *precedent*—the rule that those principles, enunciated by a superior court, should be followed by all courts inferior to it—ensured consistency throughout the country. Thus there was gradually developed a body of principles—living, growing, and adaptable to new sets of facts as they arose; principles, moreover, which rose above local differences of custom and became *common* to the whole Realm. Hence the expression *common law*.

Case Law. The system we have described is by no means a thing of the past: it is still in force today. New circumstances are continually arising; cases come before the judges for decision, and it frequently happens that the principles laid down in the past do not apply precisely, in all respects, to the particular facts in point. When this occurs it is the judge's right and duty to *interpret and adapt the principle to the new facts* before him; his judgment is reported, and his reasoning made clear. The adapted principle of that judgment becomes part of the law of England; it must be followed by all inferior courts; and it will not be ignored or abandoned by courts of the same rank, or any superior court, without reasoned argument and careful consideration. Thus the practising lawyer can never sit back with the comfortable assurance that he has "completed" his studies; he must continually keep his knowledge up to date. The practice of law is not a science, based on rigid rules, but an art—the art of *applying the known principles to the facts of new cases* as they arise.

2. EQUITY

But the English genius for practical improvisation has never excluded spiritual and *ethical motives* of conduct. For hundreds of years the Church was a great power in the land, extending its influence far beyond the strictly ecclesiastical sphere. The great church-leaders of the past took an important part in the secular activities of government and administration; from an early date the King's Chancellor was an ecclesiastic. The Chancellor was not only the King's Secretary of State and Keeper of the royal seal; as royal chaplain he was "the Keeper of the King's conscience." It was to him, therefore, that the King turned for advice on matters of state where *ethical and moral considerations* were involved.

All human institutions are fallible, and the rough-and-ready methods of the early common law sometimes fell short of those ideals of abstract justice that inspire men's minds. Despite, or perhaps because of, its practical outlook, the common law tended to become circumscribed by its own precedents. As the machinery of justice became more elaborately organised, the idealistic doctrine—"Where there is a right there is a remedy"—was apt to degenerate, in practice, into the realistic but soulless form—"Where there is a legal remedy, there is a legal right." Too close an adherence to legal formalities led sometimes to a denial of justice. This was particularly so for the weak, who could not help themselves—feeble-minded persons, tricked or cajoled into "legally" signing away their property; infants unconscionably treated by guardians who, having got legal custody (under a will or otherwise) of the infants' inheritance, refused to honour their solemn trust; borrowers who, having delayed beyond the date fixed for the repayment of a loan, found themselves deprived, under the strict terms of the mortgage deed, of property many times more valuable which they had pledged only as security. For such cases as these the common-law courts

provided no remedy, since the victims had suffered *no actual illegality*. Petitions were therefore sent to the King, "the father of his people," begging him to right such wrongs; and the question of redress was delegated by the King to his Chancellor. The Chancellor had no power directly to revoke or interfere with the decisions of the royal judges by depriving the oppressive party of the property he had "legally" acquired, but he could, and did, insist that that party should not enjoy such acquisition, *unconscionably*, for his own sole advantage. The defaulting guardian, though he continued legally to hold the infants' property, was compelled to use it for the infants' benefit; the oppressive creditor, who had legally got possession of or sold the debtor's estate, was permitted to take out of the proceeds the amount of his loan, with reasonable interest and expenses, but must hand back the balance to the debtor. Thus the Chancellor administered a kind of *abstract justice*, based upon the promptings of conscience, and not on legalistic rules. He dealt with these cases in his own court—the Chancellery or *Chancery*—where the yardstick was *equity*—that which was right or fair. And over the centuries the principles on which the Court of Chancery acted became crystallised into a set of rules which followed their own precedents and made *conscientious conduct* their guiding star.

Naturally enough, the activities of the Court of Chancery were viewed with jealousy and misgiving by the royal judges of the Common Law Courts, and many were the clashes between the two. Equity, however, had come to stay, and the two systems were administered independently until as late as 1873. In that year Parliament passed the Supreme Court of Judicature Act, which (in effect) fused the two systems into one. By means of that and subsequent legislation there was constituted *one High Court of Justice*, of which the *Queen's Bench Division*, the *Chancery Division*, and the *Probate, Divorce* and *Admiralty Division* are component parts. The first-named is concerned primarily with common-law suits, the second with equitable matters; but both these Divisions must have regard to *both common law and equitable principles*. In case of a conflict of principles, those of equity are to prevail. The last-named Division (for historical reasons) deals with the diverse subjects of wills and intestacies, matrimonial suits, and disputes relating to ships at sea. Criminal cases fall within the jurisdiction of the Queen's Bench Division, but are dealt with in special courts. The criminal law (in strict fairness to accused persons) must be absolutely certain and clearly defined; it is administered on strict legalistic principles, from which the doctrines of equity are excluded. (For further details of the Courts and their functions, see C11.)

3. STATUTE LAW

While, as we have shown, the Courts have the function of *interpreting and adapting* the principles of law laid down in earlier times, they cannot legislate—*i.e., the Judge cannot make new laws*, or repeal or amend old laws, even when changes are rendered desirable by developing social conditions. The law-making body, or *Legislature*, is *Parliament*. A *Statute* or *Act of Parliament* is the joint act of the Queen, the House of Lords, and the House of Commons; while each of these three "Estates of the Realm" has its own functions, new law can be made, and old law repealed, only by these three Estates acting together, *i.e.*, by *Parliament*, or by some person or body of persons to whom Parliament has *delegated authority* to make *rules having the force of law*. Parliament is free of control by any written constitution or any person or body of persons whatsoever; an Act of Parliament must be enforced by all courts as the law of the land, unless and until it is repealed or amended by Parliament itself. Parliament is not bound by the Acts of a previous parliament, which it is free to repeal or amend as occasion may require. It is equally free to modify the rules of the common law and the rules of equity, however firmly entrenched; but those rules, unless and until modified by parliamentary legislation, continue to guide the Judges both in their interpretation and enforcement of *Statute Law*—*i.e.*, the body of Acts of Parliament still in force for the time being—and in their decisions on those common-law and equitable rules which the Statute Law has left untouched.

THE ENGLISH LEGAL SYSTEM

These three main streams—*common law* (and *case law*), *equity*, and *statute law*—have flowed throughout the centuries, sometimes independently and sometimes in conjunction, to feed the waters of that great river which is the *English Legal System*.

B. THE SUBDIVISIONS OF ENGLISH LAW

I. CONSTITUTIONAL LAW

This is that part of the English Legal System which relates to four main branches of national administration:—

(a) *The Legislature*—*i.e.*, the *law-making* body known as Parliament.

(b) *The Executive*—*i.e.*, the *Government* and the functions of its various components.

(c) *The Judiciary*—*i.e.*, the *Judges*, their *Courts* and powers.

(d) *Local Government*—*i.e.*, the *Local Authorities* and their powers.

The two main principles of the Constitution are:—

1. **The Supremacy of Parliament.**—*I.e.*, there is nothing that Parliament cannot lawfully do, and there is no person or body of persons above Parliament. Its Acts cannot be unconstitutional, since it can itself modify the Constitution at will. Its Acts for the time being in force are the law of the land, and nobody can question their validity.

2. **The Rule of Law.**—This means that no person or body of persons is above the law of the land, and that there is one system of law, and one system alone, for everybody. There is not in England, as there is in some other states, a special system of law and special courts for scrutinising the acts of ministers, civil servants, or other functionaries; such persons are bound by the same rules of conduct as other citizens. A complaint by a private citizen against a Secretary of State or a Commissioner of Police is investigated by the same courts, and under the same legal rules, as a complaint against another private citizen. Any apparent exception will be found to result from some special provision in an Act of Parliament itself. For example, the Army Act sets up a code of conduct for officers and soldiers, and does not apply to civilians; but that code is part of the Law of England because it is contained in an Act of Parliament—a code which (incidentally) remains valid only if it is confirmed by Parliament in every successive year. Again, the Emergency Powers (Defence) Act, 1939, conferred upon the Crown and its Ministers extensive powers, during the last War, to make Defence Regulations which should have the force of law; but the Act itself had to be passed by Parliament with the proper formalities. Such Regulations derive their legal and binding effect solely from the

powers delegated by Parliament; and the High Court of Justice is competent to scrutinise, and frequently does scrutinise, the wording of the Regulations and the manner in which those powers are exercised, and to satisfy itself that the Minister concerned is not attempting to exceed the authority which Parliament has vested in him—in other words, to protect the citizen against the *arbitrary abuse of lawful powers* and against their *unlawful enlargement*. *Delegated legislation* is always subject to such control; parliamentary legislation is not, since *nobody can question the validity of an Act of Parliament*. But the *interpretation* of any Act of Parliament—the ascertainment of its legal meaning and effect—is one of the proper functions of the Courts.

(A detailed explanation of the working of the four bodies above mentioned will be found in A CITIZEN'S GUIDE.)

II. CRIMINAL LAW

This is that part of the English Legal System which deals with the relations between the individual citizen and society as a whole. Thus, if A murders or robs B, the question of redress is not one merely for B or his family; the victim cannot, in a civilised community, be permitted "to take the law into his own hands," nor can it be left to him to decide what action should be taken against the offender—otherwise blood-feuds and public disorder would result. For that reason it has been the law for centuries past that, in the case of offences (1) against public order, (2) against the person and (3) against property, *the State (representing society as a whole) itself intervenes* and *prosecutes* the offender, for the purpose of upholding public order and vindicating the rule of law by inflicting *punishment* upon him—*not* for the purpose of *compensating* the injured party (which, as will be seen below, is the contrasting function of *Civil Law*).

The two main categories of Crime (as the Table shows) are:—

(a) *Grave (or Indictable) Offences*, which are dealt with at Assizes, the Central Criminal Court, and Quarter Sessions, and which carry severe penalties—death or lengthy sentences of imprisonment; and

(b) *Petty Offences*, which are dealt with in *Magistrates' Courts*, and are punishable by light sentences of imprisonment or by fines (with short sentences in the alternative). Examples of this latter class are (*e.g.*, under the Road Traffic Acts) driving without due care and attention, exceeding the speed-limit, causing an obstruction, etc.

Examples of (a) *Grave (or Indictable) Offences* are set out in the Table under the three main headings of:—

(1) *Offences against Public Order*;

(2) *Offences against the Person*; and

(3) *Offences against Property*.

In connection with all these categories of offences the *Criminal Law* is concerned with the following general considerations:—

(a) **Criminal Responsibility.**—*I.e.*, the primary principles that every person is presumed (until the contrary is proved) to be sane and "to intend the natural consequence of his acts," provided that those acts themselves are *voluntary* (*i.e.*, *intentional*) on his part. It would, for example, be absurd for a man, accused of wounding another person by shooting, to plead that he did not intend, when he discharged the firearm at the other person, to do him any bodily harm. On the other hand, it would be outrageous to convict and punish a child of four who, without understanding the wrongfulness of his behaviour, picked up and took away some attractive and valuable object from a shop-counter; a lunatic who killed somebody under an insane delusion that the victim was a wild beast; a boy (like Oliver Twist) who was compelled, by force or violent threats, to break into a house, or a man who took an overcoat from a public cloakroom, honestly but mistakenly believing it to be his own. In none of these last illustrations is the act a *voluntary* one in the sense that there was the *intention to do something wrong*. To the rule that an act is not a crime unless it is intentional in this sense there are a few rare exceptions—cases where an Act of Parliament has expressly and clearly made some form of *conduct punishable in itself*, whether it was intentional or not; for example, during the War, permitting a light to be visible in black-out hours was punishable, even if it was unintentional and involuntary on the part of the accused.

Intention must not be confused with *motive*. For example, in what has become known as "mercy-killing"—*i.e.*, taking the life of a person suffering from a painful and incurable disease—the killer is often actuated by a good *motive*—the desire to relieve hopeless suffering; but the *intention* is to kill, and the act is therefore a crime. (It is not necessary for the prosecution to prove any motive.)

The *burden of proof* in criminal cases is on the prosecution, *i.e.*, it is the duty of the prosecution to prove the accused guilty; not the duty of the accused to prove his innocence. The accused is presumed to be innocent unless and until his guilt is proved to the reasonable satisfaction of a jury. The jury are the sole judges of the true facts of the case, and their verdict must be unanimous.

(*b*) **Unconsummated Crimes.**—*I.e.*, *attempts* to commit crimes which are frustrated by some outside event or by some person's intervention. For obvious reasons the *attempt* to commit a grave crime is *itself an offence* for which the offender can be prosecuted and, if convicted of the attempt, punished by fine or imprisonment. *Incitement*, by one person, of another to commit a crime, and *conspiracy* between two or more persons to commit a crime, are usually offences in themselves, whether the incitement or the conspiracy proves successful or not.

(*c*) **Joint Crimes** are those in which two or more persons take part. Such participation may arise in different ways. A *principal in the first degree* is the man who commits the actual offence with *guilty intention* (see (*a*) above), or who induces its commission by some other person who himself does not understand what he is doing. A *principal in the second degree* is one who *aids and abets* the guilty perpetrator at the time when the crime is committed. An *accessory before the fact* is one who *instigates* or *helps to prepare* the commission of the crime by another person, though not himself present when that other person commits it. In most cases of *grave crime* all these *three classes of participants* in a crime are *equally guilty*, and liable to the same punishment, provided that all of them shared the same *common criminal purpose*. (Thus, if two armed burglars break into a house, with their weapons drawn, and one of them shoots and kills the householder, both will be guilty of murder; while the accomplice who helped to plan the burglary will be equally guilty if the plan included the carrying of loaded weapons.) An *accessory after the fact* is one who, knowing that a *felony* (generally speaking, a grave crime involving *violence*) has been committed, shelters or receives one of the participators to enable him to elude justice. This latter kind of accessory is liable to prosecution, but the penalty in his case is less severe than that imposed upon any of the other three classes.

(*d*) **Punishment and its Purpose.**—The purpose of punishment is fourfold:—

(i) *Retribution*—to demonstrate to the community in general that crime "does not

pay" and thus to uphold the rule of law and to prevent the deterioration of public morals;

(ii) *Prevention*—to restrain offenders, so far as possible, from repeating their crimes by keeping them in custody;

(iii) *Reformation*—to make them, so far as possible, better citizens by means of moral and ethical training—teaching them to "go straight"; and

(iv) *Deterrence*—to inspire among offenders and would-be offenders a fear of and a healthy respect for the law and the strength of society as a whole, which it protects.

There has been much controversy on the relative importance of these four functions of punishment. Until comparatively recent times *deterrence* was considered the primary function, and punishments were correspondingly severe and, by modern standards, savage. Experience has shown, however, that *crime is not effectively reduced* merely by *severity* of punishment, but rather by the *certainty or probability of detection* and conviction, and by the *elevation of living standards* and improvement in social conditions. And, particularly during the past half-century, *reformation* of the offender, whenever possible, has become a paramount aim, not only on grounds of humanity, but also for the purpose of reducing the wastage of human material which can frequently be salved from a life of crime if it is taken in hand, firmly but kindly, at an early stage. (See, for example, the sections headed *Juvenile Courts* and *Probation Officers* in A CITIZEN'S GUIDE, C11.)

III. STATUS

A person's *Status*—*i.e.*, his legal position in society—affects his legal rights and duties in most civil matters and, in some few cases, in criminal matters too (see under *Criminal Responsibility*, D6).

1. Nationality, in this connection, means British Nationality under the British Nationality Acts, the latest of which was passed in 1948. Under that Act the term "Commonwealth Citizen" was created which can be used as an alternative to British Subject A person may be a British subject by birth, by naturalisation, or by marriage, though under the Act of 1948 a woman who was not a British subject before marriage does not automatically acquire British nationality merely by reason of her marriage to a British subject. The law and the courts of this country can determine whether a person is a *British subject* or an *alien*; they cannot determine whether or not he is a citizen of some particular *foreign state*, since that is a matter for the law of the foreign state concerned. Generally speaking, in times of peace, an *alien* in this country has the same rights and duties as a British subject, except that an *alien* has *no right to vote* in parliamentary or municipal elections, and that some professions (*e.g.*, that of a solicitor) are closed to him.

2. Domicil means the country where a person has his *permanent home* without any present intention of changing it. His *domicil of origin* is that of his parents while he is under twenty-one; over that age he is free to acquire a new domicil by making his permanent home elsewhere. Domicil is of particular importance in matters of—

3. Marriage and Divorce.—English law generally regards as valid a *marriage ceremony* carried out in this country after the proper preliminaries and with the proper formalities, whatever the nationality or domicil of the parties. English law also accepts the validity of a *marriage ceremony* which has been carried out abroad according to the law of the country where it took place. But if one party or the other has an *English domicil*, the *status of the marriage as an institution* must depend on English law, whether the *ceremony* was in proper form or not. For example, a man who has his permanent home in England cannot evade the English rule against consanguinity by going through a *ceremony* of marriage, in Ruritania, with his mother's sister—even if such a marriage is lawful by Ruritanian law, and even if the ceremony has been carried out with the usual Ruritanian formalities, it is still *null and void* by the law of England. The English court will *not*, generally speaking, grant a *divorce* to a man who is *domiciled abroad*, since the law of the country which is his permanent home may not recognise this divorce, or perhaps any divorce, as valid; and it is improper that he should be regarded as a single man in England and a married man in his homeland. Similarly, English law *will* generally recognise the validity of a divorce granted by the proper court of his domicil (*i.e.*, of the state where he had his permanent home at the time) or of a divorce which the law of his domicil regards as valid, even if it was granted by a court elsewhere—and that whether he is a British subject or not. But a person, whatever his nationality, whose permanent home is in England will not be regarded here as validly divorced merely because he has spent a few weeks in Barataria, where divorce procedure is simple, and has been granted a decree there. His *status*—married or single—generally *depends on the law of his domicil*—*i.e.*, the law of the country which is his permanent home. (Further detail relating to the law of husband and wife will be found at the end of this section.)

4. Infancy is the status of a person under the age of twenty-one. An *infant cannot vote at elections*; he *cannot hold freehold or leasehold property*, and *he cannot be made bankrupt*. If he enters into certain kinds of *contracts* during his infancy he *can repudiate* them, if he so desires, up to a reasonable time after his twenty-first birthday. He *cannot make a valid will*, and his rights under another person's will or settlement cannot be compromised or altered without the leave of the High Court. An infant *cannot make a valid marriage without consent* of his parent or guardian, or of the appropriate court. His rights are at all times the special care of the Chancery Division of the High Court, which will protect those rights according to the Rules of Equity (see D5).

5. Lunacy, in the broad legal sense, is the status of a person who is "incapable, by reason of unsoundness of mind, of managing his affairs." "Lunacy" in this sense is not necessarily identical with any of the mental conditions to which such psychological terms as "insanity," "imbecility," "idiocy," and the like are applied; there need be no actual mental *disease*. When a person becomes incapable, for this reason, of managing his affairs, the law, in order to protect both him and society at large, *changes his status* by putting the custody of his person, or the control of his property, or both, into reliable hands. Such matters come under the supervision of the Chancery Division, since one of the functions of Equity (see above) is to protect those who cannot help themselves. Certification of "insanity" (in the psychological sense) is not necessary; but with the proper medical certificate and legal safeguards the *patient* (as he must be called) may be removed to a mental hospital. Some reliable person (usually a near relative) may be appointed, by an Order of the *Court of Protection* (a branch of the Chancery Division), as *Receiver* of his property. The Receiver's duties are to look after the property and income of the patient, pay his debts and defray the expenses of his maintenance and medical care, and generally to deal with the patient's property on the patient's behalf. Periodical accounts must be submitted to the Court, which will scrutinise them strictly and at once intervene if there appears to be any irregularity on the part of the Receiver. If there is no relative to take the responsibility, the *Official Solicitor* at the Royal Courts of Justice will be

appointed as Receiver, with the same duties and liabilities.

Apart from these matters of administration, a person of unsound mind is regarded as incapable of making a valid will, of entering into a legal agreement, or of dealing with his property. None of these transactions is valid unless the person concerned *understood the nature and effect* of what he was doing; and whether he did understand or not is a question of *evidence* in every individual case: medical and other witnesses must testify to his conduct and demeanour at the time when he entered into the transaction in question. If the Court comes to the conclusion that he was unable to understand the nature and effect of the transaction, the Court will *rescind—i.e.*, set aside or cancel—the transaction, even though it was in proper legal form.

If a person does an act which, if *voluntary or intentional*, would constitute a *crime* (see *Criminal Responsibility*, D6), and his legal advisers put forward a defence of insanity, the general rule is stricter: he can still be convicted unless he can prove, to the satisfaction of a jury, that he was "suffering from such a *defect of reason*, due to *disease of the mind*, as not to know the *nature and quality of the act* he was doing, or (if he *did* know this) not to know that what he was doing was *wrong*." Medical men, psychologists, and social reformers have long regarded this rule (which has been in force since 1843) as too severe. It is a rule applicable to *all crimes*; but the controversy has become associated in the public mind chiefly with *murder*. As a result of a long period of agitation and discussion the rule has been amended by section 2 of the Homicide Act, 1957; but *only in its application to murder cases*. It is now provided that "a person who kills (or is a party to the killing of) another shall *not* be convicted of *murder* if he was suffering from such *abnormality of mind* as substantially *impaired his mental responsibility* for his acts and omissions in doing, or being a party to, the killing." (It does not matter whether the "abnormality of mind" arises from "a condition of arrested or retarded development of mind," or from "any inherent causes," or is "induced by disease or injury.") The Act goes on to provide that a person who, under the old law, would have been convicted of murder shall instead be liable to be convicted of *manslaughter*.

6. Bankruptcy is the creation of Statute Law—there was no common law of bankruptcy. It is the status of a person (the "debtor") who is *insolvent—i.e.*, who is unable to pay his debts (exceeding £50) as they fall due. By the appropriate procedure the State takes the management of the debtor's property out of his hands and places it in the hands of the *Official Receiver*, whose duty it is to realise it and (subject to certain privileged claims) to distribute it *proportionately among his creditors*. The procedure is that one of the creditors files at the Bankruptcy Court a *bankruptcy petition*, on which the Court may make a *receiving order*, which has the effect of *transferring the legal management* of the debtor's property to the Official Receiver. That official investigates the debtor's finances and draws up an account, called a *statement of affairs*, showing the debtor's liabilities and assets. There is a *meeting of creditors* and a *public examination* of the debtor in Court, as a result of which the Court may either *discharge the receiving order* (on the debtor's showing that he can pay his debts, if he is given time, or persuade the general body of creditors to accept his proposals for a *composition* of so much in the £), or the Court may *adjudicate* the debtor a bankrupt. In the latter case it is open to the creditors either to leave the management of the debtor's property in the Official Receiver's hands or themselves to appoint a *trustee in bankruptcy* (usually an accountant) nominated by some or all of them, and that trustee takes over the management of the debtor's affairs. The debtor is bound, under penalty, to give *full information* about his affairs to the Official Receiver and the trustee in bankruptcy; he cannot, while he is a bankrupt, sit or vote in Parliament or act as a Justice of the Peace or in certain other offices. He will be committing an *offence* if he conceals any property or debt or falsifies his books of account, if he obtains property on credit or secures credit of £10 or more without disclosing his status, if he trades without such disclosure or fails to keep proper books of account, or if he leaves or attempts to leave the country, taking with him property, worth £20 or more, which ought to be divided among his creditors. It is also an offence for him to transfer property with intent to defraud any creditor, and any such transaction may be set aside by the Court.

7. A Corporation or Incorporated Body is an association of persons recognised by *Act of Parliament*, or by its *Charter*, as *one single legal entity*. It may be a *chartered* or a *statutory corporation* (*e.g.*, the British Broadcasting Corporation or the London Transport Executive), a *local authority* (*e.g.*, the London County Council or the Westminster City Council), or a *company* incorporated under the Companies Act, 1948, or one of the earlier Companies Acts. Generally speaking, a corporation of any kind has power only to do such things as it is given power to do by its Charter or by the Act of Parliament under which it was constituted; if it goes beyond that power it is behaving *ultra vires* —"beyond its powers"—and such acts on its part will be regarded by the Courts as null and void. The Court may also restrain the corporation by *injunction*—an Order forbidding it to act in such a manner.

Every corporation, being a single legal entity, is a legal *person* distinct from the individuals who are its members. Thus the *corporation itself* can take *proceedings*, or have proceedings brought against it, in the Civil Courts, and it may itself be *prosecuted* in the Criminal Courts, if it commits an offence, and be liable to a fine. No personal liability rests upon its individual members, directors, or officers unless they have personally done something unlawful or aided and abetted the corporation in its wrongdoing. The corporation itself can *enter into a legal agreement* with one or more of its members or a member of the public, and any person injured by its acts can enforce his legal rights against the property or assets of the corporation, which are distinct from the property or assets of the individuals who compose it.

A *company* is usually a commercial concern and generally takes advantage of the principle of *limited liability*, in which case the last word in its name must be the word "Limited." The principle is that, in the event of the company's becoming *insolvent*, none of its members can be compelled to contribute to its funds a larger sum than the sum which he agreed to pay for his *shares*, however large the indebtedness of the company itself. Every company must file at the Companies Registry a *Memorandum of Association*, setting out its *name*, the situation of its *registered office*, its *objects* (beyond which it has no power to act), its *capital*, and whether or not it is *limited*. It must also file its *Articles of Association*, setting out its *rules of management*, the method of issuing, allotting, and transferring its *shares*, the procedure for *meetings*, the powers and duties of its *directors* and other officers, and similar matters. If and when its objects have been *fully achieved*, or if it is desired to *discontinue its activities*, or if it becomes *insolvent*, it will be *wound up* and *dissolved*. The winding-up is undertaken by a *Liquidator* whose duties are similar to those of the trustee in bankruptcy (described above under *Bankruptcy*). The liquidator may be nominated by the members of the company or, in case of the company's insolvency, by some or all of the creditors, and the liquidator's appointment must be confirmed at a special meeting. If the winding-up of an insolvent company takes more than a year the liquidator must report annually to the *Board of Trade*, the Government Department which watches the interests of the persons concerned.

IV. The CIVIL LAW or LAW OF PERSONS

This deals with the relations between *one individual citizen and another*, and their mutual rights and duties. If A makes a business agreement with B, and breaks it, or if A walks without permission across B's field of new-mown hay, B will be able to secure *redress* against A by proceedings in a court of law. But in neither case is it necessary for the State to intervene, by way of prosecution, to punish A for what he has done, since no offence against society at large, and no violation of public order, or the rule of law, has arisen. The issue is one merely between A and B; B may choose to ignore the wrong done to him, or he may negotiate amicably with A for the payment of compensation or, if this fails, he may *as plaintiff sue A as defendant* in a *civil action* for *damages*. Unlike a criminal prosecution, undertaken by the State for the preservation of public order and vindication of the rule of law, with a view to punishing the offender, the *civil action* will be brought, if B so chooses, *by B himself* for the purpose of recovering *compensation* in money for the harm he has suffered and (in some cases) of obtaining an *injunction*—a Court Order prohibiting A from continuing his wrongful conduct. Again, a criminal prosecution will not be discontinued even at the request of the injured party, since the State itself is interested to see justice done; but a *civil action* can be *discontinued* by B at whatever stage he desires, with or without an agreement for the payment of *damages* in compensation.

These *relations between one individual and another*, interference with which may give rise to a *civil action for damages or injunction*, may arise in two alternative ways:—

(1) from the acts of the parties themselves, or

(2) from the operation of law.

1. Law of Contract

The relations between individuals which arise from the acts of the parties themselves are usually brought about by a *contract—i.e.*, by an agreement between them. A contract may be (a) *expressed in words*, as where A agrees to buy B's motor-car for £400, on certain stated conditions, or (b) *implied by conduct*, as where A calls a taxi and tells the driver to take him to a certain address. (*a*) In the former case, particularly if the contract is put into writing, the parties will normally have *expressed* all the necessary terms and conditions. (*b*) In the latter case it is *implied* by A's conduct, and understood by law and custom, that A will be expected to pay, at the end of the journey, the amount of the fare recorded by the taximeter; it is not necessary for the driver to stipulate those terms in advance. Everybody, several times in the course of each day, enters into an *implied contract* of this kind—when he steps on an omnibus to go to his work, when he orders a meal in a restaurant, when he tells the grocer to deliver goods to his house, and so on.

Simple Contracts and Deeds

(1) **A Simple Contract** is a contract *expressed in words* (whether in writing or not) without the formalities of a *deed* (see below), or a contract *implied by conduct*. There is no legal contract (*a*) unless there is *complete certainty* on the terms; (*b*) unless the basis of the agreement is lawful; and (*c*) unless both parties are *legally capable* of entering into it (see above, *Status*), and (*d*) in *complete agreement* on their intensions. And the agreement is not enforceable (*e*) unless there is some *consideration*, *i.e.*, some *quid pro quo*, expressed or implied, on either side. Thus (*a*) a promise by A that he will buy B's motor-car cannot be enforced by either side unless the price is mentioned, nor (*b*) if the car has been stolen by B, nor (*c*) if A is of unsound mind, nor (*d*) if B owns two cars, and A is thinking of the Ford, while B intends to sell the Austin. Again (*e*) a promise by C, during the course of the year's work, that he will give his employee, D, a Christmas box of £5 is not enforceable by D unless *he* has made a promise, or done something in return. If C tells D that he will give D the £5 at Christmas *on condition that* D puts in certain *extra time* over and above his normal working-hours, and D complies or promises to comply, that compliance, or promise of compliance, will be sufficient *consideration* to turn A's promise into an enforceable contract. There need be nothing at all in writing, except in a few cases laid down by law; in all other cases the only *value of a written agreement*, signed by both parties, is that it provides clear *evidence* of the terms that were agreed. A written contract requires a sixpenny revenue stamp if it is to be produced as evidence in a court of law.

(2) **A Deed** (broadly speaking) is a contract or other written document, *signed*, *sealed*, and *delivered* by the parties. The formalities of *affixing one's seal* to a legal document, and pronouncing the formula, "I deliver this as my act and deed," have emphasised the significance and solemnity of certain important transactions for many centuries past; and even persons who were unable to write their names were capable of carrying out the formalities of *sealing* and *delivery*. The legal requirement that deeds should also be *signed* was imposed only in 1925, by section 73 (1) of the Law of Property Act. The chief practical distinction between a simple contract and a deed is that a *deed requires no consideration* to make it enforceable. The special formalities which constitute the *execution* of a deed (*i.e.*, signing, sealing, and delivery) take the place of that moral obligation which (in a simple contract) the common law required to be satisfied by consideration on the part of the person to whom the promise was made. For this reason a *deed* is required in a case where A makes a promise to B which he desires to render enforceable without any corresponding promise by B to A, and also in a case where A desires to make to B a *gift of property* of such a nature that it cannot be physically handed over. This second case arises particularly where the subject of the gift is *land or buildings*; in fact, by a provision of the Law of Property Act, 1925, a *deed* is always necessary to *transfer the ownership* of any *freehold or leasehold* property, and also to grant a *tenancy* for a term of *more than three years*. The transfer of a *legal right* of some kind (*e.g.*, a share in a company or the claim to moneys under an insurance policy) is effected *by deed*.

In connection with the Law of Contract the following subsidiary matters must be considered:—

Subsidiary Matters

(a) **Capacity of Parties.**—The question whether a party to a contract is *legally capable* of entering into it. This question usually depends on that party's *status* (see above):—

(1) *Nationality.*—Nothing turns on this, except that *no commercial contract* can be made with an *alien enemy* in time of war.

(2) *Domicil.*—Where the two or more parties to a contract have their *permanent homes in different countries* it is a wise precaution for them to state, in the contract, under which country's law and by which country's courts, in case of a dispute, its terms are to be construed. If they omit to do so, and some dispute is brought before the English Court, it will endeavour to decide, by considering the wording of the contract, the language in which it is written, the domicil of the parties, and the general circumstances in which the contract was made, what legal system the parties intended to apply and by what court they intended it to be judged.

(3) *Marriage and Divorce.*—There is now no practical difference in contractual capacity between single persons, married persons, and divorcees.

(4) *Infancy.*—It is not (generally speaking) impossible for a person under twenty-one to enter into a valid contract, but he will be entitled to

repudiate it at any time up to his twenty-first birthday (or a reasonable period after that) *unless* the contract is (*a*) clearly for the *infant's benefit* on the whole (*e.g.*, professional articles or an agreement for apprenticeship), or (*b*) for the provision of *necessaries—i.e.*, food, drink, clothing, or services which are necessary to the infant in his particular station in life. (The origin of this latter rule is probably the practical consideration that, in earlier times, few people would have taken the risk of providing an infant, on credit, with the bare necessities of life if they had been precluded from suing him for reasonable payment.)

(5) *Lunacy.*—A party to a "contract" who knows that the other party is of unsound mind will not be permitted to hold the latter to his bargain.

(6) *Bankruptcy.*—A bankrupt cannot make a valid agreement to deal with his property in a manner which contravenes the law of Bankruptcy (see above, under *Status* D8).

(7) *Corporations.*—Whether a corporation is capable of entering into a particular contract depends upon the legal powers conferred by the Charter or Act of Parliament under which it was constituted, or (if a company) by its Memorandum of Association (see above, *Status* D8). If the matter to which the contract relates is of grave importance it will usually signify its adherence to the contract by *affixing its seal* with the formalities laid down by its Rules or Articles of Association. If it is an everyday or trivial matter the corporation will normally enter into a contract through some agent (*e.g.*, its Town Clerk, Director, or Secretary, as the case may be) who is empowered to sign or speak on its behalf (see *Agency*, D11).

(*b*) **When Writing is Necessary.**—There are certain exceptions, laid down by Act of Parliament, to the rule (see D9 (1) that a contract is enforceable even if made only by word of mouth or implied by conduct. The Statute of Frauds, 1677, provides that contracts of these exceptional kinds cannot be enforced by action in the Courts "unless the agreement upon which such action shall be brought, or some memorandum or note thereof, shall be in writing, and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorised"—these last words mean an *agent* (see *Agency*, D11). It is *not necessary* that the *whole of the agreement* shall be formally set down in *writing*; but there must be a *written and signed record* of all the *essential terms*.

The most important of these exceptional cases are:—

(i) *A Guarantee.*—*I.e.*, a promise by A to B in the form—"Please lend money (or supply goods) to C, and if C does not pay you I will." A's promise by word of mouth cannot be enforced against him.

(ii) An *agreement* for the *sale or disposition of land* (*or buildings*) or of any interest in land (or buildings). We have already stated that the actual *transfer* of a *freehold or leasehold* interest must be effected by *deed* (see *Deeds*, D9). This is not the same as an *agreement to sell or dispose of* land or buildings; a *transfer* effects an *immediate change of ownership*, while an *agreement to sell* binds the party who signs it to make a transfer of ownership at some *future time*. Such an agreement need not be in the form of a deed, but its *essential terms* must be *in writing*.

(iii) An *agreement* which *cannot be carried out within one year* from the date when it was made, either because the actual carrying out of the transaction will take more than a year or because the agreement contemplates that more than a year is to elapse before the transaction is to be done. For example, A can make, by word of mouth, an agreement to employ B from month to month, or for not more than twelve months from the date of the agreement; but if he promises to employ B for three years, or for one year commencing in six months' time, B cannot enforce that promise unless the essential terms are in writing.

(iv) An *agreement in consideration of marriage.*—*e.g.*, a promise by A, to B, to give A's daughter, C, a certain dowry or income if B will marry her. (The words do *not* cover a *promise or agreement by B to marry C*; the breaking of the latter agreement —"breach of promise of marriage"—can give rise to an action for damages, by C against B, even if B has put nothing at all into writing.)

(*c*) **Mistake.**—Suppose that John Brown wants his portrait painted by a famous artist called William Brush, of whom he has heard but whom he has never met. He looks up "William Brush" in the directory and writes to him, at the address shown, offering him 100 guineas to paint the portrait. Suppose that particular "William Brush" is not the artist at all but a stockbroker of the same name. Even if that William Brush accepts Brown's offer, their apparent agreement will not constitute a valid contract, since Brown's *mistake* as to Brush's identity is so *fundamental* that it *destroys the very basis* of the agreement. Where there is a mistake of this kind, "going to the very root of the agreement," no valid contract has, in the eyes of the law, been made. In other special cases *equity* (see D4 (2)) may, on the ground of *conscience*, *relieve* one or both parties from liability under a concluded contract by *rectification* (*i.e.*, by correcting the terms they have inadvertently recorded) or by *rescission* (*i.e.*, by cancellation of the contract). It is not every mistake that will lead to these results; either the mistake must have been *fundamental* or the circumstances must have been such that it would be *unconscientious* for one party or the other to try and enforce his apparent rights.

(*d*) **Misrepresentation.**—Equity, on similar grounds, will often relieve a party from liability under a contract into which he has been induced to enter through a *representation* by the other party which is *substantially false—i.e.*, a statement which is misleading on some essential point. If it turns out that the *misrepresentation was deliberate*, the deceived party may in addition be entitled to claim *damages for fraud*. Whether the misrepresentation was *deliberate or innocent*, the deceived party will usually be able to have the contract *set aside—i.e.*, cancelled.

Suppose, for example, Jones wants to insure his life with the Markshire Insurance Company. Before issuing the policy, which is the contract between them, the Company will ask Jones—"Have you ever suffered from any serious illness?" Suppose Jones says "No," though he did in fact suffer from tuberculosis five years ago. Even if the policy contains a promise by the Company to pay Jones's widow £5000 upon Jones's death, the Company will be entitled to refuse to pay when that event happens; it has been induced to enter into the contract through Jones's misrepresentation.

(*e*) **Duress** means compulsion by *threats or force*. If a man has been compelled in this manner to put his name to a contract it is *voidable by him* at any time—*i.e.*, *he may repudiate* it on the ground of duress, and will be upheld by law in doing so. *Undue influence* means influence exercised by A upon B to such an extent that B could not have exercised any free and independent will in doing a particular act. Equity has always been jealous to protect certain classes of persons from this kind of influence; it goes so far as to *presume* that there has been undue influence where a guardian has got some benefit out of his ward, a parent from his child who is under (or only just over) twenty-one, a doctor from his patient, a solicitor from his client, or a priest from his parishioner. In most of such cases the onus is upon the person in the influential position, who has obtained the benefit, to prove that there was no undue influence; it is not for the other person to prove that his mind was wrongfully influenced by the former.

(*f*) **Illegality** of contract arises where the parties have agreed to do an act (i) forbidden by law or (ii) contrary to "public policy." (i) The former includes not only an agreement to commit a crime, but also an agreement to do an act which might be harmful to a third party and give him a right of action for breach of contract or tort. The courts will obviously not lend their assistance to a plaintiff who complains that the defendant has refused to honour his agreement to do something unlawful, whether (for example) the agreement was to burgle a house or merely to write a libellous article about another person. (ii) Even if the act agreed upon was not actually unlawful, the courts will refuse to enforce the agreement if it was to do something which is regarded as harmful to the community. It is not, for example, a crime for a man and a woman to live together without being married, nor is it even "unlawful" in the civil sense that such a way of life gives the one a right of action against the other; but no court would enforce an agreement by a woman to become a man's mistress, nor an agreement by the man to maintain her in return.

(*g*) **Breach of Contract** occurs when one of the parties breaks his promise and neglects or refuses to perform his duty under the contract. Breach by one party entitles the other party to sue for *damages*, the amount of which is usually assessed so as to compensate the latter for the *actual loss* he has suffered ("special damage"). In certain cases the court may award *general damages* in addition—*e.g.*, in an action for breach of promise of marriage the jilted woman may be awarded *general damages* for the distress she has suffered, her loss of reputation, etc., as well as *special damages* to cover the amount by which she is *out-of-pocket* by reason of giving up her employment, buying a trousseau, etc.

(1) *Damages* have always been the *common-law remedy* for breach of contract. In special cases, however, equity may grant two other remedies in addition to, or in substitution for, damages; but only where equity regards damages as an insufficient compensation. These additional remedies are:—

(2) *Specific Performance.—I.e.*, an order, to the party in breach, *actually to carry out* what he contracted to do. In practice this remedy is confined to: (i) contracts for the sale or letting of *land or buildings*, and (ii) contracts for the sale of some *article of a special nature* which cannot be replaced by spending money in the open market —for example, the sale of an original painting by Rembrandt. The remedy of *specific performance* is *never* granted to enforce a contract for *personal services*, since it would be impossible for the court to supervise the carrying out of such a contract.

(3) *Injunction.—I.e.*, an order by the court to the party in default *prohibiting him* from carrying out some positive act which would constitute a breach of contract. For example, where a singer has entered into a contract to work, for a certain period, only under the management of one particular impresario and no other, the court may order the singer not to offer or engage her services elsewhere during that period. Disobedience to an injunction constitutes *contempt of court*, and is punishable by fine or imprisonment.

Agency

(1) **The Status of an Agent.**—An *agent* is a person, who, being duly authorised, *acts on behalf of another person* who is called the *principal*. An agent is not the servant or employee of his principal. The principal tells his agent what transactions he wishes the agent to carry out, but does not exercise the control and supervision that a master exercises over his servant. Thus, for example, a solicitor is the *agent* of the client who has instructed him to attend to the purchase of a house; once instructions have been given it is left to the solicitor to carry out the work in his own way, as his skill and knowledge dictate. But the solicitor's clerk is the solicitor's *servant*; he is told what letters to write, what documents to prepare, what inquiries to make, and so forth. The two functions may sometimes appear to overlap; but the essence of agency is that there must be a *third party* with whom the principal is to be brought into relations; "the agent is the conduit-pipe connecting the principal and the third party." The agent is therefore debarred from acting for his *own benefit* without the principal's knowledge and consent.

Generally speaking, any person may do through an agent whatever he has power to do himself, except such transactions as depend upon some *personal qualification* peculiar to his own trade or profession. Thus, a man whose business is to sell or buy ordinary commercial articles can properly leave such business to an agent to perform; but an engineer, a lawyer, or a surgeon cannot entrust an agent with work that requires the exercise of *personal qualifications*, calling for special training and skill.

(2) **The Contract of Agency.**—Agency is brought about by *contract*—an agreement in writing, by word of mouth, or even one that may be implied from the conduct of the parties. No formal words are necessary: a request to an estate-agent to find a purchaser for your house will make him your agent for that purpose; if you ask a dealer to obtain for you a rare book or a Sheraton table, he is a purchasing agent on your behalf. The *terms* of the contract between the principal and the agent may be agreed upon in detail between them, or may depend upon the *usage* or general practice in the particular trade or profession. The parties are generally at liberty to agree upon whatever terms they please; in commercial agencies it is always desirable to set down in writing, for record purposes, the period for which the agency is to last, the area and scope of the agent's duties, his method of remuneration (usually by *commission*, at so much *per cent.* of the value of business he does), the prices at which he is empowered to sell or buy, and whether he is to be entitled to commission on sales to customers, or purchases from vendors, not introduced by him but carrying on business within his area.

In agencies of a special kind—where, for instance, a solicitor is instructed—his charges are regulated by a professional scale laid down by law; an estate-agent usually stipulates for payment of his commission on the recognised scale. Where no rate of remuneration has been agreed or implied, and after the work is done the parties cannot come to terms, the question must be decided by a court or arbitrator on the basis of *quantum meruit*—that is to say, an estimate of the *reasonable value* of his work.

(3) **Rights and Duties of Principal and Agent.**—These depend on the terms agreed between them; but if (as frequently happens) these terms are not on record, or are incomplete, certain legal principles apply. The first is that the relationship is one of *mutual trust*. The principal must do nothing to hinder the agent in earning his due; if he appoints a "sole agent," he must not entrust the transaction to other hands. If he does, he will have to pay the sole agent also. He must reimburse to the agent all expenses and losses properly incurred in doing what he was authorised to do. The agent must act honestly and loyally towards his principal; he must not make a secret commission or profit for himself, over and above what has been agreed; he must use proper skill and care, according to his qualifications, in his principal's business; he must keep proper accounts and pay over to his principal the money from time to time collected on the latter's behalf. If he has a *personal interest* in any transaction, he is bound to make *full disclosure*. The law will not tolerate any conduct which brings about a conflict between the agent's duty to his principal and his own *personal advantage*. The agent is therefore failing in his duty if, unknown to his principal, he buys the principal's property for himself, or sells his own property to the principal.

(4) The Principal and Third Parties.—So long as the agent has acted within the *scope* of his agency, the principal is bound by any authorised act done or agreement made between the agent and other parties. And even where the act was unauthorised, the principal is bound if he has, by words or conduct, led others to believe that the agent was authorised to do it. If the agent does something outside the scope of his agency—an act which no third party would reasonably expect the agent to have power to do—the principal is not legally bound towards the third party. These rules apply also to cases where the agent has received money or property from a third party on his principal's behalf, but fails to hand it over to him. The principal cannot claim payment over again from the third party unless the latter ought clearly to have known that the agent was not authorised to receive it. In other words, only contracts entered into and payments made by or to the agent in the *ordinary course of his business* are enforcable by and against the principal and third parties.

If the agent is also the *servant* of the principal, similar rules apply where the agent, in the ordinary course of his business, injures some third party by a wrongful act; the agent is liable in damages, and the principal also if the act (which turns out to be wrongful) was done within the *apparent scope* of the agency. So, if one of the agent's ordinary duties is to deliver goods on his principal's behalf by van, and while he is doing so he runs over a pedestrian through his own careless driving, the principal as well as the agent will be liable to pay damages for the injury.

But the principal cannot be *prosecuted and punished*, by fine or imprisonment, for an agent's *crime* unless the principal himself authorised or took part in it.

(5) The Agent and Third Parties.—If the agent makes a contract *without disclosing* that he is merely *acting as agent*, he is *personally* liable to the other party to the contract, even though he intended to act on his principal's behalf. If he discloses that he is acting merely as an agent, but does not disclose his *principal's name*, he (the agent) will not usually be personally liable. If the contract is in writing, he can safeguard himself by signing it "as agent," "on account of," "on behalf of," or "for" a named person.

If, on the other hand, the agent gives a third party to understand that he is acting for a certain principal but has *in fact* no authority to act for him, and if the principal later refuses to accept liability, the agent is liable to the third party for his false statement or pretence. This is known as *breach of warranty*—that is, he "warranted" or guaranteed that he had authority to bind his principal, but has broken his warranty; having thus left the third party without right of redress against the principal, the agent must bear the liability himself.

2. Law of Tort

This branch of the law deals with the relations, between one individual citizen and another, which arise from the operation of the law itself, without the necessity for the parties to do any act to put them into legal relations with one another. As was pointed out above (D9 (1)), if A and B are to be linked in a contractual relationship, each of them must take some step to bring that relationship about. No such step, however, is necessary in connection with the matters dealt with by the Law of Tort. Everybody has a right to expect that his person and his property shall be inviolable by other private citizens; he also has a right to expect others to refrain from attacks upon his character and his business reputation. These rights do not arise from any agreement or other act on his part, but from the general principles of the law.

A *tort* is the violation of such a right, which entitles the injured party to bring a *civil action* for damages to *compensate* for the injury he has suffered. The word *tort* (in French "wrong") is derived from the Latin *tortus* meaning "twisted" or "distorted."

It will be seen from the Table (D3) that some torts (*e.g.*, assault) may also be crimes—that is, they may entitle the injured party *either* to bring a *civil action* for *damages* or to *prosecute* the offending party and have him *punished* by a *criminal* court in cases where the offending party's action is liable to harm the community at large; a personal assault, for example, may lead in some circumstances to general disorder, and in that event it will become a matter for intervention by the State through the criminal courts. This section, however, deals only with the *civil remedies* which, as in breaches of contract, are primarily *damages* and sometimes *injunction* (see D11 (1).

The main headings under which torts may be committed are shown in the Table.

Trespass is a wrongful act committed by one citizen, against the will of another citizen, either against the latter's person or in disturbance of his possession of land or other property.

(1) Trespass against the Person may be by way of *assault, battery*, or *false imprisonment*. An *assault* is an attempt to do violence to the person of another; if the act is fully consummated it becomes a *battery*. Thus it is an *assault* for one man to shake his fist in the face of another, or to adopt a threatening attitude towards another, or deliberately to set his dog on another person. If the first person actually strikes the other person, or if the dog, encouraged by the first person, actually bites or harms the other person, that is a *battery*. In order to constitute an assault or battery, and to render the trespasser liable to an action for damages, his act must be *deliberate*. It is not assault and battery if A *accidentally* knocks against B in a crowd, with the result that B falls and is injured. The act by the trespasser must also be *against the will* of the person injured. Thus an operation performed by a surgeon, though it may seriously affect the body of the other person, is not an assault or battery if the other person has consented to the operation; but such an operation, performed without the other person's consent, may amount to an assault or battery.

Certain acts which would in the ordinary way constitute assault or battery are excusable; it is recognised, for example, by the common law, that a parent or a teacher has the right to inflict reasonable chastisement upon a child or pupil in his care, and provided that the chastisement is not excessive the child or pupil has no right of action. If, however, the chastisement results in serious injury or amounts to brutal violence, then the person inflicting it will be liable to an action for damages.

False imprisonment means the *unlawful restraint* of one person by another. It need not amount to actually locking up a person in a room; it is sufficient if his freedom of movement is *totally restrained* either by confinement or by the use of force or threat of force. It should be noted that the restraint must be unlawful; it is not, for example, unlawful for a police officer to arrest a person engaged in committing a crime, or a person whom the officer has reasonable grounds for suspecting of committing, or being about to commit, a violent crime. Even a private citizen may lawfully arrest a person who has actually committed a violent crime or whose behaviour has led to a breach of the peace.

The tort of *malicious prosecution* is committed by a person who makes a *criminal charge* against another person where the proceedings terminate in the acquittal of the latter, where the first person was actuated by spite or ill-will, where there was no reasonable or proper cause for the proceedings, and where the second person has suffered damage as a result. The essence of the tort is *malice* on the part of the person who

brought the criminal charge; it is not sufficient that he was honestly mistaken.

(2) **Trespass to Land** arises whenever one person *enters unlawfully* upon land or a building in the possession of another person. Two important points should be noted, as several popular fallacies exist about this tort. First, trespass to land is not in the ordinary case a crime, unless there is some Act of Parliament which makes the trespass a criminal offence (for example, under certain statutes it is a criminal offence for an unauthorised person to cross a railway-line or to enter a Government building from which considerations of security require unauthorised persons to be excluded). Secondly, it is not necessary, to constitute a trespass, that *actual damage* should be done to the land or building on which the trespasser has set foot. The essence of the tort is interference with the possession of the other party, and this may arise by merely walking across his field, or throwing refuse upon it, or placing or erecting anything on the land without the other party's consent; any act of *physical interference* suffices.

The *tort of nuisance* arises when an occupier of land or premises does something there which substantially interferes with the enjoyment by a neighbouring occupier of his land or premises. In *trespass* (see above) the interference must be *physical*; this is not so in cases of nuisance. For example, it is a nuisance if A allows his factory chimney to emit volumes of thick smoke which drifts continually into B's house or garden, or for A to carry on, in a building belonging to him, a trade or process which causes noxious smells or disturbing vibrations liable to interfere with B's enjoyment of his property. It is not, however, every such act that gives rise to an action for nuisance; there must be a certain amount of "give and take," particularly in urban areas, but people must not use their premises in an unreasonable or wilfully annoying manner. Thus it has been held that a teacher of music who had pupils singing in her house for several hours a day and on several days a week, which caused considerable disturbance to the person next door, was not committing a nuisance, since it was not unreasonable for her to use her house in this manner. On the other hand, when the person next door retaliated by clashing domestic implements and deliberately making as much noise as possible while the lessons were going on, he was held to have committed a nuisance because his conduct was unreasonable and wilfully annoying. But every case depends upon its own special facts. A building contractor who keeps a pneumatic drill going outside a private house, in connection with building operations, is not liable to an action for nuisance, provided that the use of the drill is necessary to the work, that it is confined to reasonable working hours and limited to a temporary period; but if the owner of a motor-cycle were to keep its engine running, merely to demonstrate its power, outside his own garage for several hours a day, and on several days a week, his neighbours could claim that that was (in law) a nuisance.

All the above examples may be classed as *private nuisances*, and they are torts but not crimes. There is, however, another class, known as *public nuisances*, which become criminal offences if they are liable to injure the public in general. Examples of these are leaving an unlighted obstruction on a public road, blocking a public footpath, or allowing a building to get into such a state of disrepair that it causes a danger to users of the public highway. In such cases the person causing the public nuisance may be prosecuted and punished and, moreover, any individual citizen injured by such conduct may have a right to bring a civil action for damages.

(3) **Trespass to Goods** is an unlawful disturbance by A of B's lawful possession of his goods. Such disturbance may arise by seizure or removal of the goods without the owner's consent or by conduct causing damage to the goods. It follows that every theft of goods is also a trespass; but for the preservation of public morality it is laid down that, if there is a criminal element in the conduct of the wrongdoer which makes his trespass theft, the injured party cannot bring a civil action for damages unless the thief has first been prosecuted in a criminal court.

The *tort of detinue* consists in the wrongful detention by one person of another's goods and his failure or refusal to deliver them up when demanded.

The *tort of conversion* or *trover* arises when A wrongfully appropriates the goods of B to his own use or to the use of another person, depriving the owner of them permanently or for a substantial time, or destroying them. These torts of *detinue* and *conversion* can be committed only against goods or articles of property; they cannot arise from interference with fixtures permanently attached to a building, growing crops or trees; but these torts may be committed if, after such things have been removed or cut down, the wrongdoer detains or converts them to his own use.

(4) **Negligence** in law has a very specialised meaning; it is not "neglect" or "carelessness" in the ordinary sense, but failure to take such care as the circumstances of the particular case demand. In the *tort of negligence* there are two essential elements—first, a *legal duty* to exercise proper care and, secondly, a *failure* to take such care. No action for negligence can be brought by A against B, even if B has been grossly careless, unless the relations between the parties were such that B was under that legal duty towards A. Moreover, the *degree of care* which A is entitled to expect from B will vary according to the nature of those relations.

One obvious example where the legal duty of care arises is among persons using the roads. All of us have the right to use the roads for the purpose of travelling, on foot or in some vehicle, and the manner in which each of us exercises that right will obviously affect the safety and comfort of other road-users. There is therefore a *legal duty of care* upon every road-user (under the common law, and quite apart from the provisions of Acts of Parliament relating to motor-cars) to exercise his right to walk or drive with due regard to the similar rights of other road-users. And, equally obviously, the *standard or degree of care* which it is reasonable to expect from the driver of a powerful car is higher than that which is expected from a pedestrian, since the amount of damage which will be caused by carelessness on the part of the driver is very much greater than that which the pedestrian is capable of inflicting.

We are *not* here referring to *offences* under the Road Traffic Acts, for which drivers or pedestrians may be *prosecuted and punished* under the *criminal law*. Careless or reckless driving or walking may be a criminal offence under those Acts, even if it has caused no injury to any person or property. In cases where such injury *has* been caused the *test* to be applied, in determining whether the injured person can *sue and recover damages* against the other party, is whether that other party has fallen short of the *standard of care* reasonably to be expected from him. It is true that disobedience to a provision of the Road Traffic Acts, or neglect of the Highway Code, may constitute *evidence* helping to prove that the latter party was lacking in the proper standard of care required of him; but there may be other circumstances which show that he was *negligent* in law, and liable to an action by the injured party for *damages*, even though he committed *no criminal offence*.

There are many other relationships where the *duty to take care* arises. One of these is the relation between *the occupier of premises* and persons *coming on to the premises*, whether they have a right to be there or not. Towards *trespassers* (see above) the duty of the occupier is merely a negative one—he must not "set a trap"—*i.e.*, he must not deliberately do anything calculated to cause injury, nor must he do any act which, if done carelessly, is reasonably likely to cause injury. If he knows a trespasser is on the

premises he must *warn* him before he *does any dangerous act*; the fact that the trespasser has no lawful right to be there does not entitle the occupier (for example) to weaken the supports of a bridge or set off an explosion without warning. If the occupier does so, he will be liable to be sued for damages, in an action for negligence, even by a trespasser who is injured as a result.

The law before 1958.

Towards a person who is *lawfully on the premises* the duty of the occupier varies according to whether that person is a *licensee* or an *invitee*. A *licensee* is one who has been licensed—*i.e.*, given permission, or who is permitted, to come on to the premises for his own benefit or convenience. A guest or visitor in a house, a person permitted to walk along a private road or in private grounds or to bathe in a private stretch of water is a licensee. Towards him the occupier has the same duty as towards a trespasser and, in addition, the duty of warning the licensee against any *concealed danger*, whether natural or not, which the occupier *knows to exist*. He is *not* expected to *guarantee* the *safety* of the premises nor to give *warning of obvious dangers*; but he will be liable to a licensee who is injured through dangers which are known to the occupier but concealed from the licensee. Thus the occupier of a building will be liable to a person visiting somebody living there if the visitor is injured by a broken stair on an unlighted staircase; similarly, the occupier of a farm will be liable to a person whom he permits to cross one of his fields if that person is attacked and injured, on his way, by a savage bull which the *occupier knew to be there* but the *licensee did not*.

An *invitee* is a person who goes to the premises on business which *concerns the occupier* and on the occupier's invitation, whether that invitation is actually expressed in words or merely implied. The best example of an invitee is a customer in a shop, or a traveller in a railway station, who is there not merely for his own benefit or convenience but also for that of the occupier. Towards an invitee the occupier's duty is the highest of all: he must take *reasonable care that the premises are safe* and *to prevent injury* to the invitee from *unusual dangers* which are *more or less hidden* and of the existence of which the occupier *is aware or ought to be aware*. If these duties are neglected, an invitee who is injured by such dangers can recover damages for his injuries.

The law after 1957.

The above rules, relating to the duty of care owed by an occupier to persons coming on to his premises, have been modified (as from January 1st, 1958) by the Occupiers' Liability Act, 1957.

The occupier's duty towards a *trespasser* remains *unchanged*. The Act, however, abolishes the distinction between an *invitee* and a *licensee* both of whom it describes by the new term, *visitor*. The principal rules are:—

1. The occupier owes the *same duty* (" the common duty of care ") *to all his visitors*, except in so far as he is free to, and does, extend, restrict, modify, or exclude his duty, to any visitor, by agreement or otherwise.

2. The " common duty of care " means a duty to take such care, as in all the circumstances is *reasonable*, to see that the visitor will be *reasonably safe* in using the premises for the purpose for which he is invited or permitted to be there.

There are *subsidiary rules*—*e.g.*, that an occupier must expect *children* to be *less careful than adults*, and that a person " in the exercise of his calling " (*e.g.*, a window-cleaner) can be expected to appreciate and guard against special risks incidental to that calling. And a *landlord* of premises, if he is under a *legal obligation towards his tenant* to keep the premises in repair, is to owe *to visitors the same duty* as if the landlord were the occupier, so far as concerns dangers arising from his default in carrying out that obligation.

Among the classes of persons upon whom the law imposes a *duty to take care* are those who practise a *profession or calling* which, from its nature, demands some special skill, ability, and experience. A man who is advised or treated by a physician, surgeon, or dentist, or who consults a lawyer or an architect, is entitled to expect him both to possess and to exercise a reasonable degree of such skill, ability, and experience. If the professional man falls short of the *proper standard* the patient or client may bring against him an action for damages on account of his negligence. But a mere error of judgment on a difficult point does not amount to negligence, provided that the professional man possesses the proper standard of knowledge and skill and has used them carefully and conscientiously to the best of his ability. And he is not liable, by virtue of his professional status, to an action of negligence for something he has done while acting otherwise than in his professional capacity—*e.g.*, a solicitor who is asked to express an opinion on the value of a house (which is no part of his professional duty).

(5) **Defamation.**—The tort of *defamation* is committed by a person who *attacks the reputation* of another by " publishing " a *false and defamatory* statement concerning him to a third party. If the defamatory statement is *in writing* or some other *permanent* form (*e.g.*, a picture, a film, or a gramophone record), then the action will be for *libel*. If the defamatory statement is in *spoken words* or some other *non-permanent* form (*e.g.*, by signs or gestures) it will be *slander*.

Another important distinction must be observed at the outset. In cases of *libel* the person whose reputation has been attacked may sue for damages *without proof of " special damage "*—*i.e.*, proof that he has *suffered actual harm* from the libellous statement; while in *slander no action* can normally be brought *unless special damage* can be proved. There are, however, five exceptional cases where such proof is unnecessary, *viz.*, in slanders:—

(*a*) *disparaging* a person in the way of his *business, profession*, or *office of profit* (*e.g.*, saying of a doctor that " he is ignorant of the first principles of medicine ");

(*b*) imputing *dishonesty* to a person holding an *office of honour* (*e.g.*, saying of a Councillor that " he gives contracts to his friends ");

(*c*) imputing that a person has committed a *crime punishable by imprisonment* (*e.g.*, saying of a man " he is no better than a thief ");

(*d*) imputing that a person is suffering from a *contagious disease* of a disgraceful kind (especially a venereal disease);

(*e*) imputing *unchastity* to a *woman or girl*.

In these five cases " publication " of the slander alone is sufficient to give rise to an action, without proof of special damage; for slanders of other kinds no action can be brought unless special damage can be proved.

Note also that no action can succeed, either in libel or slander, unless the statement complained of is (1) *false*, and (2) *defamatory* and unless (3) there has been *publication* to a *third party*. (1) The statement must be false "in substance and in fact"; if it is substantially true the person complaining has suffered no injury, recognised by law, to his right (see D12 (2)) to the inviolacy of his reputation. (2) The statement must be *defamatory*—*i.e.*, it must be one which " tends to lower him in the estimation of right-thinking members of the community," or which is " calculated to expose him to hatred, ridicule, or contempt." (3) *Publication*, in this context, means simply *making known* the defamatory statement to at least one *third party*. If the defamatory statement is conveyed *only to the person defamed*, and to no one else, there is no " publication," and the person defamed has *no civil remedy*.

In one exceptional case—where a defamatory statement, *in writing*, is likely to lead to a *breach of the peace*—the person making it may be *prosecuted* for the offence of *criminal libel*, for the purpose not of compensating the injured party, but of upholding law and order (see D6 (I)). In this exceptional case the *truth* of the statement (see above) is *no defence*, and *publication* to a third party is not necessary to secure a conviction. But there is no such offence as "criminal slander."

If a defamatory statement is made reflecting on a *class of persons* generally (*e.g.*, an attack on "Methodists" or "coloured people" or "money-lenders") that will not entitle a person who happens to belong to that class to bring an action unless he can show that *he personally* was aimed at and defamed. The family of a *deceased person* cannot bring an action for a libel or slander upon the reputation of the deceased.

If the person sued puts forward the defence that the words he used were "not published of and concerning" the person bringing the action, the question must be decided whether those to whom the statement was published could *reasonably understand* it to refer to him. If such understanding is reasonable, then it is no defence for the person who made the statement to show that he *did not in fact intend* to refer to the other person, or even that the latter's existence was unknown to him.

Some statements are defamatory in their *natural and primary sense* (*e.g.*, "John Brief is a thoroughly dishonest lawyer"); others may appear unexceptionable if looked at literally, but may have a defamatory meaning in a particular context, or in particular circumstances known to the persons to whom they are published (*e.g.*, "I hear Mrs. B has left her doctor a lot of money. A fine kind of doctor *he* is!"). In cases of the latter kind the person who claims that the published words are defamatory of him must plead an *innuendo*—*i.e.*, he must set out, in his statement of claim, the meaning in which he alleges the words complained of were used. It will be the duty of the judge to decide, as a matter of *law*, whether the words are *capable* of bearing that meaning; the jury will have to decide, as a question of *fact*, whether the words complained of did actually convey that meaning to those who heard or read them.

There are several recognised defences to an action of libel or slander:—

(1) *Justification.*—A plea that the words complained of were *substantially true*. Once the words have been shown to be defamatory, it is for the person who used them to prove their truth—not for the party injured to prove them false.

(2) *Absolute Privilege.*—By common law, or by Act of Parliament, defamatory words used on certain particular occasions, though published to third parties, cannot give rise to any right of action. The occasion is "absolutely privileged." No party to any *legal proceedings*, nor any witness, counsel, or member of the jury, nor of course the judge, can be called upon to answer for any words he has used *during the proceedings*, however spiteful, and however harmful they may have been to the reputation of any other person. The rule applies to *pleadings* (*i.e.*, allegations in writing, filed at the court) as well as to statements made in court by word of mouth.

Similar protection applies to words spoken *in Parliament* by a member of either House (though words spoken outside either House are not protected). And under the Parliamentary Papers Act, 1840, those who publish (in the ordinary sense of the word) the proceedings of either House, by its authority, are protected in the same way; so are official communications, on *affairs of State*, made by a minister to the Monarch, or by one officer of State to another in the course of his official duty. To all these *absolute privilege* applies.

(3) *Qualified Privilege.*—Apart from the cases just mentioned, there are other *occasions* which are *privileged*, not absolutely, but in a *qualified* sense. The *nature of the qualification* will be explained below; meanwhile it may be said that a *privileged occasion* of this latter kind arises whenever the person making a communication has an *interest*, or a legal, social, or moral *duty to make it*, and the person to whom it is made has a corresponding interest or duty to *receive it*. A common example is a reference given, about the character of a servant, by a former to a prospective employer; another is a report made, on the commercial credit of a trader, by one person who has dealt with him to another who intends to do so. Other occasions of *qualified privilege* are *reports* of *judicial proceedings*, of *public meetings*, and of the *proceedings* of municipal or other *public bodies*.

Such occasions are *privileged* to this extent and with this qualification—that there was no *malice* (*i.e.*, spite or other *improper motive*) in the mind of the person when he made the communication. If there was malice, then the fact that the occasion was one of qualified privilege will not protect him from an action for damages at the suit of the person defamed. In any such action it is the duty of the judge to decide, as a question of *law*, whether the occasion was one of qualified privilege; it is for the jury to decide, as a matter of *fact*, whether the defendant was malicious in what he wrote or spoke. (Contrast occasions of *absolute privilege*, where the presence or absence of *malice is immaterial*.)

(4) *Fair Comment* "on a matter of public interest."—This form of defence is most commonly employed by newspapermen, reviewers, and critics. If this defence is to succeed, the words to which it relates must be really *comment* (*i.e.*, expressions of opinion, not statements of fact): the comment must be concerned with *a matter of public interest* (*e.g.*, a book, a play, a musical performance, a political speech, or the public actions of men in the public eye—but not their private lives). Lastly, the comment must be *fair*—and it cannot be fair if it is actuated by *malice* in the mind of the commentator. If he has mingled with his comment some statement of *fact*, and that statement is inaccurate or misleading, that in itself will prevent the comment from being regarded as fair. The *onus is on the defendant* who is pleading fair comment to establish that what he is seeking to defend is really *comment*, that the matter on which he commented was one of *public interest* (not, for example, private scandal), and that the comment is *not based on any misstatement* of facts or *otherwise unfair*. Dishonest or insincere comment cannot be fair; but, on the other hand, an honest belief in the commentator's mind that his comment was fair is not enough for a successful defence. The comment must be fair *in fact*.

The usual *remedy* in actions of *libel* and *slander* is damages—a sum of money sufficient (in the jury's view) to compensate a man for the harm his reputation has suffered. In certain rare cases the Court may, in its discretion, grant an *injunction* ordering the defendant not to publish or not to repeat the publication of a libel.

The Defamation Act, 1952, reduces the risk of legal proceedings against anyone who *innocently* "published" a libel. The "publisher" may make an *offer of amends*, *i.e.*, an offer to "publish" a *correction and apology*, and to take practicable steps to *notify* those who have received copies of any defamatory document. (*a*) If the offer is *accepted* and the promise performed, the party defamed cannot bring, or continue, an action for libel or slander. (*b*) If the offer is *rejected*, then the "publisher," in any action taken against him, may plead, *in defence*, that the words were "published" innocently, and that the offer of amends was made as soon as practicable. *Innocent* publication means: (1) that the "publisher" did not intend the defamatory words to refer to the other party, and knew of no reason why they might be understood to refer to him; or (2) that the words were not in themselves defamatory, and that the "publisher" knew of no reason why they might be understood to defame the other party; also that, in either case, the "publisher" exercised all reasonable care in regard to the "publication."

V. THE LAW OF PROPERTY

I. In General

(1) **Living Persons.**—The special rights and disabilities which affect the ownership and disposal of property by certain classes of persons have been already dealt with under the heading of *Status* (D7–8). It is unnecessary to add anything here on the law of property *in general*, so far as living persons are concerned; but different rules are applicable (as will be seen below) to the ownership and disposal of *land and buildings* as compared with *property of other kinds*. The reason for this main distinction is that the former are, in their nature, *immoveable* and *cannot be physically transferred*, as can money and "chattels" (*i.e.*, animals and *tangible objects* which are capable of being owned). In addition, there is a third class—certain *intangible things* which can be owned and dealt with—for example, the right to be paid a debt, a share or stock in a company, an insurance policy, or a patent; these are known as *things in action*, and they can be transferred only in certain formal ways, which will be described below.

(2) **Deceased Persons.**—It is obvious that the law of any civilised community must make provision, not only for the *transfer by a living person of his property*, but also for the *transmission of that property (his "estate") upon his death.* English Law permits every person who is *not disqualified by infancy or lunacy* (see D7) to *give directions, during his lifetime, as to the disposal of his estate upon his death*; he can do this by means of a *will*. If he leaves *no valid will* he is said to die *intestate*, and in that event *the law itself* lays down how his estate is to be distributed. A concise survey of the law governing the estates of deceased persons is given below.

Wills and Intestacies.—The law of wills is highly technical; much trouble can be caused by a "home-made" will, and it is wise to seek a solicitor's advice. It is only possible here to outline the *formalities* necessary to make a valid will, and the *procedure* to be adopted after a death. The rules stated are those under English law—applicable to England and Wales, but not Scotland or Northern Ireland.

(1) **The Nature of a Will.**—The person making a will—the *testator*—sets down how he wishes his property to be disposed of after his death, and states the names of the persons (the *executors*) who are to attend to its disposal.

The executors may be, but need not be, some or all of the persons whom the testator desires to benefit under his will. One executor alone is sufficient in law; but if that one dies before he (or she) has completed his duties, delay and difficulty may arise. It is therefore better to appoint *at least two* executors; if one dies, the other has full powers to continue the work. If the testator's *estate* (that is, his property) is large, it may be best to appoint a bank as executor; all banks have trustee departments which are experienced in such matters. They have scales of charges for executorship work, which will be supplied on request. A personal executor is not permitted to charge for his work, unless the will authorises him to do so—a thoughtful provision for a complicated estate. Nor is the executor bound to accept the executorship when the death occurs.

A will "speaks from death"—that is, it has no legal effect until the testator dies; it can be *revoked* (that is, cancelled) in various ways, or alterations can be made by *codicil*, which is really a supplementary will. Further, the property to which it relates is that of the testator *at the date of his death*, which may be more or less than what he owns at the date when the will is made. The will can be revoked or varied as often as desired to suit changing circumstances; its provisions are not final until death.

Generally speaking, a testator may make whatever provisions, in regard to his or her property and the persons to be benefited, he or she thinks fit. He or she may even direct that his or her wife, husband, or children are to be deprived of all benefit from the estate; but, if he or she does so, it will be well to give the reasons, either in the will itself, or in a signed, witnessed, and dated document, which should be left with the will.

Under Acts of 1938 and 1952, a husband or wife, an unmarried daughter or son under twenty-one, or a son or daughter "under disability" (that is, one who for some reason is incapable of looking after himself or herself), who is not adequately provided for under the will, may apply to the Court for "reasonable provision for maintenance" out of the estate; the Court has power either to refuse the application or to grant the applicant whatever maintenance it thinks fit. In making its decision the Court will take note of the testator's reasons for his failure to provide for the applicant in question.

If a person dies without leaving a valid will, he is said to die *intestate*. In that case somebody (usually the husband or wife or next of kin) must apply to the Probate Registry (at Somerset House in London or in the nearest District Registry elsewhere) to be appointed *administrator*. An administrator has the same rights and duties as an executor. If there are children under twenty-one, and in certain other cases, there must be at least two administrators, and the procedure on death is more involved and troublesome than where executors have been appointed by will. Further, as the testator has not directed what is to happen to his property, the law has laid down an *order of succession*, which the administrators must observe. The intestate's husband or wife is then entitled first to the *personal effects* (furniture, household goods, motor-cars, books, etc.); next, to the whole of the estate, if there are no children or near relatives, or £5,000 if there are, and, after that, the husband or wife and children have certain rights in the remainder of the estate, if any, details of which can be found in the Intestates' Estates Act, 1952. If there is no husband or wife, or no children, or neither, the next of kin of the intestate will benefit in order of nearness of their relationship to the deceased.

It is always prudent to make a will, however simple, since by doing so, the testator exercises control over the disposal of his property and saves considerable trouble for his family.

(2) **The Execution of a Will.**—The formalities must be strictly observed, except in the case of soldiers, sailors, and airmen on active service (including members of the Women's Services and nurses), for whom informal directions, even in a letter or by word of mouth, are sufficient. For all other testators, inattention to the formalities may render the will invalid, and will in any case cause considerable trouble and expense.

The will must be *in writing—i.e.*, not by word of mouth—handwritten, typewritten, or printed, but the wording need not be in legal or formal language, so long as it clearly identifies the testator, the executors, the various kinds of property dealt with, and the persons to be benefited. It should also state that the following formalities have been carried out when it was executed—that is, signed by the testator and *attested—i.e.*, witnessed by two competent persons:

(a) *The will must be signed* by the testator, or by some other person in his presence and by his direction. If the testator can write, his *usual* signature will suffice; if he is illiterate or too unwell to sign in full, he may make his "mark" or his initials alone. If he is incapable of holding a pen, someone else may sign for the testator, provided he is present at the time and authorises the signature. If the testator is blind or otherwise incapable of reading the will, it should be read over to him before his signature or mark is placed on it.

(b) *The signature or mark must be at the foot or end* of the will. This means (i) nothing added

below the testator's signature, and (ii) nothing written anywhere on the document *after the testator himself has finished signing*, will be valid, except the signatures, addresses, and descriptions of the witnesses. If, therefore, at the last minute the testator desires some addition, alteration, or deletion to be made, he and the same witnesses must sign or put their initials against the addition, alteration, or deletion, which otherwise will be ignored.

(c) *The testator's signature* must be made or (if he cannot sign) acknowledged *in the presence of two witnesses*, who must both be *present at the same time*. Any persons may be witnesses, so long as they are capable of understanding what is going on. They need not read the will or know its contents; but if either of them is a *person who is to take a benefit* under the will, he or she will *lose that benefit*. It is therefore safest to call in witnesses who are strangers to the testator. Both witnesses must be *present together* when the testator signs (or acknowledges) his signature; it will not be a valid attestation if first one witness, and then the other, is called into the room.

(d) *The witnesses must sign* the will *in the presence of the testator*. Either witness may, if necessary, sign by mark or initial, but no other person may sign on his behalf. For identification purposes it is usual and desirable for the witnesses to add their addresses and occupations, in case of a subsequent dispute which may necessitate their being found to give evidence.

If the will consists of several pages, they should be fastened together before execution and the signatures of the testator and witnesses should appear at the end of every page, not to satisfy the rules set out above, but as evidence that every page formed part of the will when it was executed.

It is desirable (though not legally essential) that the will should bear, just above the signatures of the witnesses, an *attestation clause*—that is, a formal statement that these formalities have been carried out. The usual wording of this clause will be found in the example shown below.

All these rules apply in exactly the same way to a *codicil*.

(3) **The Contents of a Will.**—The opening words should clearly identify the testator by his full names, occupation or description, present address and (if possible) other recent addresses, and declare that this is his *Last Will*. It is sometimes found at death that a testator has a banking account or stocks and shares registered in his name at some past address, and in such cases the bank or company concerned, wishing to be sure that his identity is clear, may insist upon a sworn statement to the effect that he is the same person as the person they knew as customer or shareholder. (See the example below.)

Next follows the *revocation clause*—a declaration that the will now being made *revokes* (that is, cancels) all previous wills and codicils. If this is not inserted, doubts may arise after death as to whether the new provisions are intended to be substituted for, or merely to supplement, provisions in an older will. If it is intended that the older will is to remain valid in part, that should be clearly stated. If the document now being executed is a *codicil*, it should be described as such, and the date of the original will to which it is a codicil should be mentioned, and also which parts of the original will are being *confirmed*, to stand good, and which *revoked*.

The next clause should appoint the executors, who must be identified by their full names and descriptions or addresses. "My brother John," "my son Charles," or "my mother" will suffice, since only one person could possibly answer to any of these descriptions; but "my wife" is not enough without giving her names in full, since it does not follow that the person who is the testator's wife at the time of his death was necessarily his wife when the will was made.

Next follow the directions for disposal of the testator's property. *Bequests or legacies* of particular articles ("my pearl necklace," "my oak bedroom suite") or of particular investments ("my 3% War Stock")—these are *specific legacies*—must clearly identify exactly what is being bequeathed. In the case of land or a house, the full description should be given—"my leasehold house and grounds at 31, Acacia Road, Redhill in the County of Surrey," or "my freehold farm known as 'Newlands' at Northgate in the County of Derby." The words "I devise" are the technical words appropriate to freeholds: "I bequeath" to all other kinds of property: the effect is the same. (Bequests or legacies of *sums of money*—*pecuniary legacies*—should preferably be stated in words rather than figures; if figures are used the accidental omission of a nought may be disastrous.)

Finally, there is the clause that deals with the *residue* of the Estate—that is to say, whatever will remain after the executors have paid the funeral expenses, death duties (if any), legal and other fees, the testator's debts, and the pecuniary legacies he has bequeathed, and after the specific bequests have been handed over to those entitled. Such a clause is necessary because no testator can be sure, when he makes his will, that he has disposed exactly of everything of which he may die possessed, or that all the persons to whom he has made bequests will necessarily be alive when he dies. In general, the death of such a person—a *legatee*—before the testator causes that person's legacy to *lapse*; but if there is a bequest of the *residue* to one person, or for division among a number of persons, no harm is done: the *lapsed legacy*, being left over and undisposed of, becomes *part of the residue* and passes under the final clause.

(4) **Revocation and Revival.**—A will or codicil may be *revoked*—cancelled—by "burning, tearing, or otherwise destroying" it with the intention of revoking. Destruction by accident, or without the testator's desire to revoke it, is ineffective, and if a copy exists, its provisions may be put forward as still valid. The revocation clause in a later will (see above) will be equally effective to revoke an earlier will; or some part of the earlier will may be revoked by a later codicil clearly referring to that part.

A will is also *revoked*—generally speaking—by *subsequent marriage*, since the law assumes that, if the testator who is newly married had had time for or given thought to the matter, he would have altered his will. If he did not do so after marriage, he will die intestate.

If a testator makes *Will A*, and later on *Will B* containing a revocation clause, Will A is revoked—*i.e.*, cancelled. But if *Will B* is in turn revoked by *Will C*, that does *not revive*—*i.e.*, revalidate—*Will A*, unless *Will C* says, in so many words, that "*Will A* is hereby revived."

SPECIMEN WILL

I JOHN SMITH of 31 Acacia Road Redhill in the County of Surrey Company Director [1] HEREBY REVOKE [2] all wills and testamentary documents [3] heretofore made by me AND DECLARE this to be my LAST WILL.

1. I APPOINT my wife JANE SMITH [4] and my Solicitor EDWARD JONES to be jointly the Executors of this my Will.

2. I DEVISE my freehold farm known as "Newlands" situate at Northgate in the County of Derby unto my son JAMES SMITH in fee simple.[5]

3. I BEQUEATH the following specific legacies: [6]

(1) To my son THOMAS SMITH any motor-car of which I may be the owner [7] at the date of my death.

(2) To my said son JAMES SMITH all my shares in the Company known as John Smith & Sons Limited.

(3) To my said wife all my personal chattels [8] not hereby or by any codicil hereto otherwise bequeathed [9] for her own absolute use and benefit.[10]

4. I BEQUEATH the following pecuniary[11] legacies:

(1) To my daughter JULIA SMITH the sum of TWO THOUSAND POUNDS.

(2) To my secretary EVELYN ROBINSON the sum of ONE HUNDRED POUNDS.

5. I DEVISE AND BEQUEATH all the residue [12] of my real and personal estate whatsoever and wheresoever not hereby or by any codicil hereto otherwise expressly disposed of as to my freeholds in fee simple [5] and as to my personal estate absolutely unto my said wife JANE SMITH for her own absolute use and benefit.[10]

6. I DIRECT that any executor of this my Will being a Solicitor or a person engaged in any profession or business may be so employed and act and shall be entitled to make all proper professional charges [13] for any work done by him or his firm in connection with my Estate including work which an executor not being a Solicitor or a person engaged as aforesaid could have done personally.

IN WITNESS whereof I the said JOHN SMITH the Testator have to this my LAST WILL set my hand this twelfth day of April One Thousand Nine Hundred and Fifty-Five.

[14] SIGNED AND ACKNOWLEDGED by the above-named JOHN SMITH the Testator as and for his LAST WILL in the presence of us both present at the same time who at his request in his presence and in the presence of each other have hereunto subscribed our names as witnesses: } John Smith

George Matthews,
6, Elm Road,
Redhill, Surrey.
Chauffeur.

Ida Gray,
10, Oaktree Road,
Redhill, Surrey.
Children's Nurse.

Notes

[1] Profession is usually inserted for identification purposes.

[2] Revocation Clause—cancels all *previous* wills and codicils.

[3] "Testamentary documents"—includes both wills and codicils.

[4] Wife's *name* should be mentioned—he may have a different wife by the time he dies.

[5] "In fee simple"—technical words showing that the entire freehold interest is disposed of.

[6] "Specific legacies"—*i.e.*, legacies of actually specified things.

[7] Not "my motor-car"; he may sell his present car before he dies and perhaps buy a new one, in which case there might be a dispute as to whether he meant only the car he owned at the date of his will.

[8] This expression is defined in the Administration of Estates Act, 1925. It includes furniture, plate, china, wines, cigars, books, and other *personal effects*. It is better to use a word clearly *defined* by Act of Parliament than a vague word like "possessions."

[9] *i.e.*, all personal effects which the Testator has not left or will not leave to anybody else.

[10] These words show clearly that, although the wife is one of the Executors, with the duty of clearing up the estate for the benefit of *all* the persons to be benefited, these particular bequests are for *her own personal benefit*.

[11] "Pecuniary"—*i.e.*, money.

[12] "Residue"—everything left after all the other gifts have been disposed of.

[13] Charging Clause, without which the Executor who is a Solicitor would not be able to charge for his work on the Estate.

[14] This is the proper form of *attestation clause*—*i.e.*, the clause showing that the proper formalities for signing and witnessing were observed.

Probate and Letters of Administration.—It is a peculiarity of the English system that a deceased person's estate, upon his death, does not "vest in" (*i.e.*, fall into the possession of) the persons to whom he has left it by will, or among whom it has by law to be distributed (the "beneficiaries"); the estate vests, in the first instance, in his executor or executors, if he has appointed any such. (If he has made no such appointment, then, pending the appointment of administrator or administrators (see above), the estate vests (for the time being) in the Presiding Judge of the Probate Division of the High Court of Justice; that Judge has no duties in relation to the estate, but any notices that would, if there were executors, have to be served upon them, must be served for the time being upon him.) The generic name that applies both to executors and administrators, when their title has been lawfully recognised, is *legal personal representatives*; that is to say, they are *recognised by law as representing the deceased person*, for all purposes under the law of property, and for most purposes under the law of contract and the law of tort. Generally speaking, the deceased person's rights and liabilities are transmitted to his legal personal representatives, and can be enforced by or against them as soon as they have taken out a *grant of probate* or of *letters of administration*.

This "grant," in either case, is a document issued by one of the Registries and bearing the seal of the Probate Division of the High Court and the signature of one of its Registrars. It states the deceased's name and address, the date and place of his death, and *either* (1) that his *last will* has been *proved and registered* in the Registry concerned, or (2) that he died *intestate* (as the case may be); that (in the former case) the *executors*, or (in the latter case) the *administrators*, whose names addresses, and descriptions are given, are *entitled to administer* (*i.e.*, to deal with) all the estate which "vests in" them by law; and the document concludes by certifying that an *Inland Revenue Affidavit* has been delivered, showing the *gross and net values* of the estate and the amount of *estate duty and interest* (if any) paid. Where a will has been "proved," a photostat copy of the will is bound up inside the "grant"; if no will has been "proved" the "grant" consists of a single sheet bearing the above-mentioned particulars. It is important to note that, in either

case, the *title* of the *legal personal representatives* (*i.e.*, their legal right to deal with the estate) is evidenced by the "grant"—*i.e.*, the document by which the Court's authority is conferred upon them—and not directly by the terms of the will or by their relationship (if any) to the deceased. Anybody, for example, who is *purchasing property of the deceased* from the legal personal representatives is required only to *satisfy himself that probate or letters of administration have been granted to them*; such a purchaser is not in the least concerned with the terms of the will.

Whenever any *formal transaction* has to be carried out in connection with the deceased person's estate the "grant" must be produced; this applies in particular to dealings with land or buildings, "things in action" (see D 23 (2)), the initiation, defence, or continuation of legal proceedings for the benefit of the estate, and the transfer of the deceased's contractual rights. There are, however, a number of *informal acts* which the persons (if any) appointed by the will to be executors, or the nearest relatives who intend to apply for letters of administration, may properly do before the issue of the "grant"; these include such common-sense matters as arranging the funeral, safeguarding and insuring documents and valuables, feeding livestock, locking up premises, and preserving property which would deteriorate if neglected. All persons should, however, take care *not to sell or dispose of any part of the estate before the "grant"* is issued; a person who, without lawful authority, meddles with the estate may find himself regarded as *executor de son tort*—*i.e.*, placed in the position of an executor by his own wrongdoing—and thereby bound to meet the liabilities of the deceased person, and pay the death duties (if any), for which he ought to have provided. Even a person named in the will as executor takes a risk if he does more than the most urgently necessary acts before probate, since it may turn out that that will is, for some technical reason, invalid, or some later will may come to light in which he is not named.

Not more than four persons can apply for a grant of probate or letters of administration. If therefore the will names more than four executors, the persons named will have to decide among themselves which of them are to apply. Even if there are no more than four, *none of them is compelled* to apply, unless he has already meddled with the estate; he can renounce his right by signing a form of renunciation. If the deceased has appointed no executor by will, one or more (not exceeding four) of the next-of-kin can apply for letters of administration. Apart from the special cases (see above) in which there must be at least two administrators, no grant will be made to any more distant relative of the deceased unless and until all nearer relatives have renounced their rights or been "cleared off"; this last expression means that it must be clearly shown that they are dead or for some other reason are incapable of acting as administrators. (The order of priority among the relatives entitled to take out a grant is: (1) husband or wife; (2) children and their "remoter issue" (*i.e.*, grandchildren, great-grandchildren, etc.); (3) parents; (4) brothers and sisters and issue of deceased brothers and sisters; (5) half-brothers and half-sisters and issue of deceased half-brothers and sisters; (6) grandparents, and so forth.)

It has been said above that the property of a deceased person "vests" on his death in his executor or executors, if any; if there are no executors it "vests" in his administrators as soon as they have been duly constituted as such by the "grant." *In law* these *legal personal representatives* (executors or administrators) have the same *powers* of disposing of the deceased's property as if they were the owners of that property in the fullest sense; but in accordance with the rules of *equity* (see D4) they must exercise their powers of disposal strictly in accordance with what is *just and conscionable*—*i.e.*, they must distribute the property itself, or sell it and distribute the net proceeds, as laid down by the terms of the *will* (if any); in case of an intestacy, as laid down by the *law of succession*, as set out in the Intestates' Estates Act, 1952. That strict exercise of their powers which conscience demands will be enforced, in case of need, by the Chancery Division of the High Court of Justice (see D5), *at the suit of any beneficiary* under the will or intestacy. But *purchasers* and persons other than the beneficiaries can safely deal with the legal personal representatives as though they were legal owners of the deceased's property, provided the "grant" is produced as evidence of their powers.

The *procedure* in applying for a *grant of probate* or *letters of administration* is that the applicants must make a *valuation* of the various kinds of property of which the estate consists; the value of each item is to be the value on the date of death. (It is not usually necessary to employ a licensed valuer, though this may be helpful if the estate includes valuable jewellery, antiques, or works of art.) An *Inland Revenue Affidavit*, for death-duty purposes, must be *completed* and *sworn before a Commissioner for Oaths*. This document is one of a number of printed forms (varying according to the nature and composition of the estate, and obtainable from Somerset House, the Estate Duty Office, and certain principal post offices). It is divided into headed columns showing (*a*) the descriptions and the values of the various parts of the estate (*e.g.*, cash at bank, Government securities, stocks and shares, furniture and effects, and so forth); a separate section shows (*b*) the funeral expenses and the debts which the deceased left owing. The *gross estate* consist of the items under (*a*); the *net estate* is calculated by deducting those under (*b*) from the gross total (the cost of a tombstone cannot be deducted).

In the simplest cases *estate duty* is payable on the *net estate*, according to a sliding scale; but no duty is payable on an estate of £3000 or less. (In all but the simplest cases it would be wise to consult a solicitor, as the law relating to estate duty is excessively complicated.)

Another part of the document sets out particulars of the deceased and of the applicants, and the kind of grant required. The document, when sworn, must be forwarded to the Estate Duty Office, who will *assess the duty payable* (if any) and interest on such duty from the date of death. This must be *paid in full* before proceeding further, *except* the part of the duty that relates to *freehold property*, which may be paid by instalments. (The deceased's bank will usually grant a loan or overdraft for the purpose of such payment.) When the duty has been paid the Inland Revenue Affidavit will be returned to the applicants receipted

The second document required is the *Form of Oath for Executors or Administrators*. This gives particulars of the deceased and of the applicants, as before, and declares *either* (*a*) that they believe the "paper writing" before them to be the deceased's *last will*, or (*b*) that the deceased died *intestate*; in either case they declare their *relationship* (if any) to the deceased, and the *capacity* in which they apply (*e.g.*, "the executors named in the will," or "the lawful widow of the deceased," or as the case may be); and they swear *to administer* the estate (the gross amount of which they mention) *according to law*, and to produce proper accounts whenever called upon to do so. This Oath must also be sworn before a Commissioner.

If there is a will it must now be signed (for identification purposes) by the applicants and the Commissioner for Oaths. If there is no will a third document is required, known as an *Administration Bond*. This is a printed form which must be completed and signed, sealed, and delivered (see D9 (2)) by the applicants and two *sureties*—*i.e.*, independent persons who are willing to *guarantee* that the applicants will carry out their duties according to law, under the *penalty* of forfeiting double the value of the estate if there is any default. (In practice, an *insurance company* will usually undertake *the duty of surety* for a reasonable premium, and in that event no other surety is required.) The Bond must be executed (*i.e.*, signed, sealed, and delivered by the individual

sureties, or sealed by the insurance company, and also signed, sealed, and delivered by the applicants) before a Commissioner for Oaths.

Finally, the applicants must take to the Principal Probate Registry at Somerset House, or to one of the District Registries outside London, (*a*) the receipted Inland Revenue Affidavit; (*b*) the duly sworn Oath for Executors or Administrators; (*c*) *either* the will (if any), duly marked with the signatures of the applicants and the Commissioner, *or* the Administration Bond, duly executed. If there is no hitch, the *grant of probate* or *letters of administration* will usually be posted to the applicants (or their solicitor) within about fourteen days.

(For the convenience of persons who have no legal adviser, there is a Personal Applications Department, situated in the Royal Courts of Justice, Strand, W.C.2, where the officials are extremely helpful in answering questions and showing applicants how to complete the forms. But in most cases trouble and delay will be avoided by employing a solicitor.)

II. Property in Land (Immoveable Property)

Although the *logical distinction* preserved in the legal systems of other countries is between property in land and buildings and property of other kinds ("immoveables" and "moveables"), English law has from an early date made the more artificial distinction between *real property* or *realty* (*i.e., freeholds*) and *personal property* or *personalty* (*i.e., leasehold* land and property of all other kinds). The reason is historical. In early times, if the possession of freehold land was withheld from its rightful owner his remedy was an action for recovery of the actual thing withheld—*i.e.*, the freehold land itself—and that very *thing* (in Latin, *res*) would be restored to the owner under an order of the Court. On the other hand, when property of other kinds (including leaseholds) was withheld from its rightful owner, his remedy was an action against the wrongdoer, in which the remedy would be the award of *damages* against the wrongdoer *personally* (*in personam*)—not an order for the restoration of the actual goods or other property withheld. Although that distinction in the remedies is no longer generally applicable, the terms (*realty* and *personalty*) have been retained.

1. Realty or Freehold Property.—The difficulties of this branch of the law are due principally to historical reasons which go back to the Feudal System. In a very practical sense that System recognised only the Monarch as the *owner* of land; those who held it from him were *tenants* (in French, "holders"). If the tenancy was one which was not limited to expire at the end of a fixed period it was known as "an estate in fee simple"—*i.e.*, a *freehold*; a tenancy which was for a fixed period only was known as "a term of years absolute," or a *leasehold*.

When the Feudal System came to an end this distinction remained. A freehold estate in land is still an interest which has *no fixed expiry date*; and the freeholder, out of that unlimited interest, can "carve," as it were, *fixed leasehold terms*, during which tenants will hold the land of him.

The property legislation of 1925 has profoundly changed and simplified the law. Until the end of 1925 one important characteristic of the freehold estate was that of *primogeniture*—the rule that, on the death of the freeholder intestate, the freehold passed intact to his *eldest son* or (if he left no son) to his eldest male heir. This was abolished by the Administration of Estates Act, 1925, which enacted that, in the event of a person's dying intestate after December 31st, 1925, the *whole of his property* (realty as well as personalty) should devolve upon his legal personal representatives (see D18); and that it should, as one whole, be sold and converted into money so far as necessary for the payment of the deceased's funeral expenses and debts, death duties, administration expenses, and for distribution among his next of kin. The eldest son, or heir, has no longer any special privilege.

Settlements.—On the other hand, a freeholder (whom we will call Charles), having a freehold estate in land—*i.e.*, an interest which has no expiry date—can *during his lifetime* create *successive interests* to take effect one by one. Charles can, if he so desires, *settle* his freehold estate to be enjoyed by himself during his lifetime; after his own death, by his eldest son George during that son's lifetime; then by his second son John, during John's lifetime, and finally by George's son Peter "in fee simple." The successive interests of Charles, George, and John are called *life interests*; the ultimate, future freehold interest, reserved for Peter to enjoy after the deaths of his grandfather, his father, and his uncle, is called a *remainder*. Both the life interests and the remainder are *rights of property* to which Charles, George, John, and Peter become *entitled immediately* the settlement is made—that is, they are *present rights* to the *future enjoyment* of the property, and those rights can be dealt with at any time, even before they "fall into possession." Since Charles, George, and John *must* some time die, Peter knows *now* that his freehold remainder *must* come, some time, to him or his personal representatives and, through them, to his next of kin (see above); for even if he dies young, while George and John are still alive, his right will not be "defeated" but will be preserved for those to whom his property may eventually pass under his will or intestacy. Therefore that *present right* to *future enjoyment* is a piece of property which Peter can deal with *now*, unless he is under twenty-one, or unless he is restricted by the terms of the settlement from doing so. George and John can, if they are so minded, do the same with their life interests—that is, they can *now* sell to another person, for hard cash, their present rights of future enjoyment, or they can mortgage (*i.e.*, pledge) those rights against a loan, on the understanding that they will get back those rights when the loan is repaid.

To watch over these successive interests, and to preserve the rights of the ultimate successor, Charles appoints *trustees* of the settlement, whose duty it is to act impartially by all the beneficiaries. A *trust corporation* (usually one of the bank trustee companies), which never dies, or *at least two individuals*, may act as trustees. The Trustee Act, 1925, provides for the appointment, by a simple procedure, of new trustees to take the place of those who die, become unfit, or unwilling to go on acting, etc. In the last resort the Chancery Division of the High Court (the guardian of equity) has power to make such an appointment; for "equity never lacks a trustee."

In order to enable landed property to be freely disposed of, it is provided by the Settled Land Act, 1925, that the person who is for the time being enjoying the current life interest (see above) has power to *sell the entire freehold* estate if he so desires. Nevertheless, the scheme of interests under the settlement is not defeated, for the purchaser from the tenant for life must pay the purchase-money not to him but to the trustees; they must invest the money in safe investments, and carry out the provisions of the trust with the necessary modifications. Each *tenant for life* will then receive the *interest or dividends* on the investments during his lifetime, just as formerly he would have received the rents and profits of the land during his lifetime; while the *remainder-man* (Peter) will ultimately come into the *capital* of the trust fund (*i.e.*, the investments themselves) in lieu of the freehold interest.

2. Leaseholds.—We have seen above that the freeholder, out of his estate which is unlimited in time, can "carve" fixed *terms of years absolute* or *leasehold* estates. These terms may be of any length; the most common are terms of 999 and 99 years. The document by which such a term is granted is called a *lease*; the person granting the term is the *landlord* or *lessor*; the person to whom

it is granted is the *tenant* or *lessee*. But the lessor, by the grant of a lease, has not given up *all* interest in the land. The lessor's freehold estate is unlimited in time; when, therefore, the leasehold term (however long) comes to an end, the right to possession and enjoyment of the land will *revert* to the freeholder. That right, known as a *reversion*, is again a *present right* to *future enjoyment* and, as such, a piece of property which the freeholder can, if he wishes, dispose of *now*. The "sale of a reversion" is, in fact, equivalent to the sale of the freehold subject to an existing lease; it confers upon the purchaser the lessor's right to receive rent from the lessee throughout the leasehold term, and at the expiration of that term to *repossess and enjoy* the land without limit of time.

The *lessee* has a *legal estate* in the land for a *fixed term* of years, and he in turn (unless prohibited by the provisions of his lease) can grant *sub-terms* to expire at any time before his own *head-term*. This is a process which can be repeated, in turn, by each lessee, underlessee, sub-underlessee, and so forth, who will become respectively the underlessor, sub-underlessor, and so forth, of the person to whom the next subordinate interest is granted. Thus Michael, the freeholder, by granting to James a term of 999 years, leaves himself with a *freehold reversion* which will revert, at the expiration of the 999 years, into the possession of the then freeholder. James, by the grant of an underlease, can carve (out of his leasehold term of 999 years) a sub-term of 99 years in favour of William, whose underlessor or landlord he becomes, leaving himself with a *leasehold reversion* of 900 years. William, in his turn, can grant to Anne a sub-underlease for 21 years, leaving himself a *leasehold reversion* of 78 years, and so forth. The relationship of lessor and lessee, or landlord and tenant, subsists between William and Anne, James and William, Michael and James; this relationship is one of *privity of estate* as well as *privity of contract*. The former phrase means that each of these pairs of individuals is linked by their *mutual interest in the same term of years* as above described. The latter phrase, *privity of contract*, means that the *link is contractual*—it arises from the agreement between Michael and James contained in the headlease; the agreement in the underlease between James and William, and that in the sub-underlease between William and Anne. But between Anne and James, between William and Michael, there is no relationship of any kind, neither of contract nor of estate; Michael can look only to James, James to William, and William to Anne, to carry out the terms of the respective tenancies.

In certain circumstances, however, there may be *privity of estate* between two parties without *privity of contract*. Suppose Michael *conveys* (*i.e.*, transfers) his freehold reversion, *during the subsistence of James's lease*, to Robert. Thereby Robert will take over all Michael's rights; *i.e.*, he will become lessor, in place of Michael, to James as lessee, as well as being entitled to possession of the freehold when James's lease expires. Between Robert and James there will be *privity of estate*, arising from their mutual interest in the term of 999 years (as lessor and lessee respectively); but there is between them no *privity of contract*, for Robert and James have made *no agreement* with one another. The distinction may in certain circumstances be important.

The Form and Contents of a Lease.—A lease for a term of more than three years must be made by deed (D9 (2)) between the lessor and the lessee. It names and describes the parties, and sets forth that, in return for an annual *rent* (and sometimes on payment, in addition, of a lump sum called a *premium*), the lessor *demises* (*i.e.*, lets) to the lessee, for a term of so many years from such and such a date, the land in question with the buildings erected thereon. (In the law of property the buildings go with the land on which they stand.) Then follow the *lessee's covenants*—the promises which he is to perform: to pay the rent by stipulated instalments, on certain dates; to pay rates, taxes, and other outgoings on the property; to put and keep the property in full repair; to paint the inside and the outside of the buildings at stated times; to keep the property insured, to its full value, in the names of the lessor and himself; to permit the lessor periodically to inspect the condition of the property; to carry out repairs which the lessor, as a result of such inspections, may call upon him to carry out. These are some of the stock clauses; but every individual lease must be carefully studied in order to ascertain what the lessee's obligations are.

Next come the *lessor's covenants*—the promises which the lessor is to perform; the chief of these is that, if the lessee carries out his part of the bargain, the lessor will permit him "quiet enjoyment" of the property without disturbance during the term. Some leases also contain *stipulations* binding on both parties; for example, a *stipulation* that the rent shall be reduced or suspended if the property is damaged or destroyed by fire, and sometimes an arbitration clause. At the end of most leases comes a *proviso*, for the protection of the lessor, to the effect that he shall be entitled to expel the lessee, and to re-enter and repossess the property, if the lessee ceases to pay his rent or to perform his covenants as required, or in the event of the lessee's bankruptcy.

One copy of the lease (the *original*) is signed, sealed, and delivered (D 9 (2)) by the lessor, and handed over to the lessee as evidence of his *title* to the leasehold interest. The other copy (the *counterpart*) is signed, sealed, and delivered by the lessee, and handed over to the lessor as evidence of his entitlement to the rent and to the performance of the covenants by the lessee. The counterpart requires a stamp (impressed by the Stamp Duty Branch of the Inland Revenue) of only five shillings; but the original must be stamped at the rate of £1 for every £50 of the rent (in addition to £2 for every £100 of the premium, if any).

(*Note. Landlord and Tenant.*—In earlier editions of this work much space was devoted to the subject of *Rent Restriction*. Between the First World War and the summer of 1957 the common law rules applicable to the landlord and tenant relationship were modified on innumerable occasions by Acts of Parliament, particularly the Rent Restrictions Acts. These Acts, because of the shortage of housing accommodation, provided an elaborate code to prevent landlords from taking advantage of that shortage; they "controlled" all dwellings up to a rateable value of £100 a year by providing, broadly speaking, certain limits beyond which rents could not lawfully be increased, and by giving tenants security of tenure after their contractual tenancies came to an end.

The subject has now lost a good deal of its importance, since, by the Rent Act, 1957, such control is abolished for dwellings above a rateable value of £40 a year in London and £30 elsewhere, and power has been reserved to the Minister of Housing to decontrol those still controlled, as and when he thinks fit, by ministerial order, without further legislation. So many complications are likely to arise in the transitional period that landlords and tenants will be wise to seek legal advice in cases of doubt. To attempt to summarise the position at this stage would be confusing and dangerous in the extreme.)

3. Mortgages.—The word *mortgage* is Norman-French; its literal meaning is "dead pledge." The process of mortgaging land and buildings is roughly analogous to that of pawning a piece of jewellery as security for a loan of money—with the important difference that the land cannot, of course, be physically handed over to the lender (as can the jewellery) to be kept in his custody until the loan is repaid. But a pledge and a mortgage have this in common—that the parties intend no change of *ownership*; the *borrower* (or *mortgagor*) is and remains *owner* of the property *after, as well as before, the transaction*. In exchange for a loan of a certain sum, the lender (or mortgagee) temporarily enjoys a *charge* upon property worth (it may be) much more than that sum, as *security* for the repayment of the loan, with the stipulated interest, at the stipulated time. The *borrower* is still the property-*owner*.

Because of the essential immoveability of land, the mortgage transaction is effected by a *mortgage deed*, which sets out the terms on which the loan is granted. Generally speaking, the borrower (or mortgagor) is permitted to remain in *possession* of the mortgaged property unless and until he fails to pay an instalment of interest or to repay the capital when called upon, or unless and until he breaks some condition of the mortgage deed. In early times such failure was often the signal for the lender (or mortgagee) to oust him *permanently* from possession, and even to deprive him of *ownership* of the property. But the courts of equity (as we have seen, D4 (2)) gradually evolved the rule that it was unconscionable for the lender to enrich himself, at a low cost to himself, from a transaction in which the intention of the parties was to *pledge the property temporarily* as a *security*, not to sell it permanently for a small sum. Hence was evolved the concept known as the *equity of redemption*—the rule that, even *after the legal date* fixed by the deed for repayment of the loan and for freeing the property from the mortgage, the borrower should still remain entitled to *redeem* the property (*i.e.*, to free it from the charge) by tendering to the lender the balance of the loan, with all interest and costs to date; and that the lender should thereupon be *bound* to give the borrower full and unfettered rights over the property, free from all the conditions of the mortgage, and in the same state as it was in originally. The lender (or mortgagee) must get no collateral (or additional) advantage of a permanent kind once the loan, interest, and costs were paid off; and this is still the law today.

The law, as stated above, has established the principle that the borrower who mortgages his freehold or leasehold interest, as security for a loan of money, shall not be deprived of his ownership, but shall retain such ownership after the execution of the mortgage deed. That deed is, in the first place, a *contract or agreement* under which the borrower promises to repay the loan to the lender, with interest at a certain rate, in one sum or by instalments, and meanwhile, for the lender's protection, to keep the property insured, in proper repair, and so forth. But that is not all; it is clearly important that the lender (the mortgagee) should, in addition, be granted an interest *in the property itself*—an interest which will enable him to take actual *possession* of the property, if need be, to enforce his rights, much as the pawnbroker has the right to *possession* (though not *ownership*) of the pledged article until the loan is repaid.

The Law of Property Act, 1925, devised a method of giving the lender (the mortgagee) a legal estate in the property while still preserving the rights of ownership of the borrower (the mortgagor). That Act provides that the grant of a mortgage of land, in *whatever form* it is effected, shall confer upon the lender (the mortgagee) *a term of years absolute*—*i.e.*, a *legal estate* in the *land itself*, which the mortgagee can deal with by sale, and which will be transmitted, as an interest in land, to his legal personal representatives upon his death. It is further provided that, on the final discharge of the mortgage (*i.e.*, the repayment of the loan, with all interest and expenses due to the mortgagee), that term of years shall *cease and be extinguished*, the mortgagor thereafter continuing to hold his freehold or leasehold estate *free from the mortgage term of years*, and free also from all the conditions of the mortgage deed.

In such a scheme it was necessary to distinguish the term of years conferred by the mortgage from any term of years absolute which might be or might have been conferred upon a lessee or underlessee by way of a lease or tenancy (see above, *Leaseholds*). For the purpose of such distinction the Act provides that, if the mortgagor's legal estate is a *freehold*, the mortgage deed confers upon the mortgagee a *term of 3000 years*, thus leaving to the mortgagor a legal *reversion* to commence after the expiration of that term (since the freehold estate is not limited to expire at any particular time). And if the mortgagor's legal estate is a *leasehold*, due to expire at the end of a fixed period, the mortgage deed confers upon the mortgagee a *term of years to expire ten days before* the leasehold term, thus again leaving the mortgagor with a legal reversion (in this case of ten days only).

In this way each party has a legal estate in the *land itself*, quite apart from the *contractual* rights and obligations in regard to the loan, which can be enforced by and against him *personally*. The mortgagor can sell his freehold *subject to the mortgage term* and the obligations of the mortgage deed; the mortgagee can *sell his mortgage term* with the benefit of the rights that go with it. The sale of a freehold (whether subject to a mortgage or not) is effected by a deed called a *conveyance*; the sale of a leasehold is effected by a deed called an *assignment*. The mortgage term can be dealt with in a deed called a *transfer of mortgage*. In every case the purchaser takes over the vendor's legal estate in the land, subject to, or with the benefit of, the personal obligations or rights in the original deed. In case of the death of the mortgagee or mortgagor, the legal estate in question, and the rights or obligations, are transmitted to his personal representatives.

Finally, it should be mentioned that, as an additional safeguard, the *title deeds* (evidencing the mortgagor's freehold or leasehold title) must be handed over to the mortgagee when the mortgage deed is executed, as part of the latter's security. The mortgagor must take care to get them back when he *redeems* the property by paying off the loan, interest, and expenses.

4. Title.—(a) *Evidence of title.*—Before freehold or leasehold property changes hands, it is the duty of the purchaser's solicitor to *investigate title*—*i.e.*, to satisfy himself that the vendor has a proper title himself and a proper right to convey or assign. Generally speaking, the purchaser's solicitor must go through the deeds (evidencing sales, transmissions on death, grants of leases, grants and redemptions of mortgages) for at least *thirty years back*; he must check every step in the *devolution of title* (*i.e.*, every change in ownership) and make *requisitions* (*i.e.*, demand explanations) on any point which is doubtful. This is still the system over the greater part of the country.

(b) *Registration of Title.*—With a view, however, to simplifying such procedure the Land Registration Acts have provided for a different system. In areas to which an Order in Council has made the system applicable, *registration of title* is *compulsory* upon any sale of freeholds, or of leaseholds having more than forty years to run. Registration is effected in the following way: the Government lawyers at H.M. Land Registry, in Lincolns Inn Fields, London, W.C. 2, investigate the title of every freehold or leasehold sold after the appropriate date, *once and for all*. If they are satisfied that it is in order, they register the owner as *registered proprietor* of the land with *absolute title* to his freehold or *good leasehold title* to his leasehold. (These kinds of titles indicate that the title is unexceptionable, but if there is a slight doubt the proprietor may be granted a *qualified title*; and if he is in possession of the land he may be granted a *possessory title*, which signifies little more than the fact of possession. The Chief Land Registrar is empowered, however, to convert both qualified and possessary titles into absolute or good leasehold titles, after fifteen years in the case of freeholds, and after ten years in the case of leaseholds.)

The Land Registry issues to the registered proprietor a *land certificate*, certifying (on behalf of the Government) that a registered title of the appropriate kind has been granted. In any further transactions relating to that particular land the purchaser's solicitor need not concern himself with the original deeds save in exceptional cases; he can generally rely upon the certified statements made in the *land certificate*, on which the name of the new registered proprietor is entered by the Land Registry officials when a *transfer* in his favour, or the grant of a lease to him, is lodged at the Registry. There are appropriate sections in the land certificate for

registration of a mortgage and the particulars of the mortgagee for the time being.

At the time of going to press, registration of title is compulsory in the Counties of London, Middlesex and Surrey, in the County Boroughs of Eastbourne and Hastings, in the City of Oxford, and in certain parts of Kent. But any land-owner elsewhere may voluntarily apply for registration of his title.

5. Joint Ownership.—If two or more persons are the owners of freehold or leasehold property, that does not mean that A owns one part of the land and buildings, and B and C other parts; the effect is that all of them *jointly own the whole*. (The analogy will be clear if the reader considers the case of a motor-car owned jointly by A, B, and C; clearly *all three own the entire car* between them; it cannot be said that A owns the engine, B the chassis, and C the body.) The Law of Property Act, 1925, recognises such joint ownership of land by means of a device known as a *trust for sale*. The respective rights of A, B, and C (equal or unequal) can be fully enforced only if and when the property is *sold* and the net proceeds of sale, in money, divided up in the proper proportions; and any or all of the joint owners can insist upon such sale or division for the purpose of obtaining their proper shares. But, while the property remains unsold, all the joint owners have rights according to the proportions of their shares; if, for example, the property is let, the net rents, after paying for repairs and other expenses, must be divided between them in those proportions. Up to four persons can jointly own a freehold or leasehold legal estate in land; if more than four are entitled to the *beneficial interest*, then four of their number only must hold the *legal* estate, and *equity* will enforce the *beneficial rights* of all against the legal owners. A purchaser from joint owners of the legal estate is concerned only with the latters' *legal title*; provided he hands over the purchase-money to them (not being less than two), or somebody authorised by them, *the purchaser is not responsible* for what they may do with that money. If those legal owners, from whom the purchaser buys, fail to pay over the proper shares to those *beneficially interested*, it is for the latter to enforce their rights against the vendors, who have sold the legal estate, by action in the Chancery Division, the guardian of equity. The purchaser's title to the land itself is not affected by the vendors' failure properly to carry out the terms of the trust for sale, so long as the *legal estate* has been properly transferred to him and he has paid the purchase-money to *not less than two* legal owners.

III. Property Other than Land (Moveables)

1. Chattels.—Chattels are *concrete things* which can be the subject of ownership, other than land or buildings, and other than objects so closely affixed to land or buildings that they are regarded as part thereof (*e.g.*, growing crops and trees, or "landlord's fixtures" built into some structure or so closely attached that they cannot be removed without serious damage to the structure).

In the ordinary way chattels can be *sold* or *given away* without any special legal formalities—merely by *physical transfer*—*i.e.*, by the owner handing them over to somebody else. If a chattel is to be *mortgaged* as security for a loan, the procedure differs according to whether the person pledging it (the borrower) is or is not to retain *possession* of the chattel. (His *ownership*, in either case is not disturbed.)

(*a*) If, as happens when an article is *pawned*, the borrower is not to keep the article in his possession, he hands it over to the pawnbroker, who hands him in exchange the agreed loan and a *pawn-ticket*. On production of the pawn-ticket, and the repayment of the loan with the stipulated interest, the borrower is entitled to receive the article back. (Provision is made by law for cases where the borrower defaults in payment, or where an unreasonable time elapses before he seeks to *redeem* what he has pledged.)

(*b*) If, however, the arrangement is that the *borrower* is to *retain possession* of the mortgaged article (as may happen if he borrows from a *moneylender* on the security of his furniture), then the borrower must execute and hand to the lender a document called a *bill of sale*. The law relating to such a document is extremely complex; but the most important provision is that the lender cannot enforce his rights unless he *registers* the bill of sale, at the Bankruptcy Court, in a register which any member of the public can inspect for a small charge. If then some member of the public desires to purchase the article from the person in whose possession it remains, but has reason to suspect that that person, though he may be the owner, has mortgaged it to a money-lender, it is open to the proposing purchaser to inspect the *register of bills of sale* to satisfy himself on the point. If he finds an entry against the owner's name, he will be wise not to proceed with the transaction. If he finds no such entry, and has no reason to believe the owner to be bankrupt, he can usually assume that there is nothing to prevent the person in possession from passing a good title to him.

2. Things in Action.—These (see D16 (1)) are *intangible rights* which can be owned and dealt with but, because of their abstract nature, cannot be *physically* transferred. If Brown owes Jones £50, Jones (the creditor) can transfer to Robinson the right to collect the £50 from Brown. Jones does this by a document called an *assignment* of the debt and (most important) by giving *written notice* to Brown (the debtor) that Robinson is now the creditor instead of Jones.

Similarly, if Jones owns ten shares in Brown & Co., Ltd., Jones will hold a *share certificate*—*i.e.*, a document certifying the amount of his shareholding. He has certain rights in the company, but these depend upon the company's *memorandum and articles* (D 8 (2)) and upon the *registration* of his name in the company's register of shareholders. The share certificate is only *evidence* of his rights—it is not in itself a piece of property, and the physical handing over of the certificate will effect nothing unless Jones executes a *share transfer* in Robinson's favour and Robinson sends it to the company for registration, together with the old share certificate in Jones's name. After *registration* of Robinson's name, the company will destroy the old certificate and issue a fresh one to him.

Again, if Jones has insured his life with the Brown Life Assurance Society, he will have received a *policy* which is *evidence* of the right of his legal personal representatives to be paid £1000 on Jones' death. If Jones wishes, during his lifetime, to transfer that benefit to Robinson, he can do so, but it will not suffice for him merely to hand Robinson the policy. To transfer the *rights* under the policy he must execute an *assignment* in which it is stated that Jones, being the policy-holder and entitled to certain rights thereunder, now *assigns* those rights to Robinson. But no transfer of those rights will have been effected until Robinson has *notified* the Assurance Society of what has been done and sent it the policy and the assignment for *registration* in its books.

These examples illustrate the principle, set out in the Law of Property Act, 1925, that an *unconditional assignment*, in writing, by a person (the assignor) entitled to any debt or other thing in action, in favour of another person (the assignee), if *notice in writing* is given *to the debtor* or other person on whom the obligation rests (in the above examples, to Brown, the Company, and the Assurance Society), shall entitle the assignee to all the assignor's rights, including the right to enforce those rights by action in the Courts, without calling upon the co-operation of the assignor in whom the right to the debt, or other thing in action, was originally vested.

DIVORCE AND OTHER MATRIMONIAL CAUSES

1. HISTORICAL SKETCH

The anomalies in this branch of the Law of England, and the legalistic attitude of the Courts to the subject, are principally due to historical reasons. For centuries the Church of Rome was the supreme ecclesiastical authority, and the law of that Church (Canon Law) applied to *matrimonial causes*—that is to say, disputes relating to any marriage and the mutual rights and duties of the spouses. Marriage was *indissoluble*—that is, there was no such thing as divorce in the modern sense of *breaking the legal tie*. But the Ecclesiastical Courts, which alone administered the matrimonial law before 1858, might for certain reasons grant a *decree of nullity* (a declaration that a particular "marriage" was null and void). In other cases they might grant what is now called a *legal separation* (known, in those days, as "divorce *a mensa et thoro*," *i.e.* banishment from bed and board); this latter decree, however, *did not dissolve* the marriage bond, but merely gave judicial sanction to the spouses' living apart from each other, and regulated the terms of the separation. After the Reformation the Ecclesiastical Courts continued to deal with matrimonial causes on the same legal principles as before.

As a result of the Acts of Supremacy passed in the reigns of Henry VIII and Elizabeth I, the Sovereign was declared to be the supreme governor of the Realm in all spiritual and ecclesiastical, as well as temporal, causes. This royal supremacy, exercised constitutionally through Parliament, was part of the law of the land; since there was no limitation upon the power of Parliament (see D5), special Acts were passed, from time to time, to effect that which neither the Ecclesiastical nor the Civil Courts then had jurisdiction to do, *viz.*, to break the marriage tie itself. A divorce of this kind, known as "divorce *a vinculo matrimonii*" (a divorce from the marriage bond) was rare, for the procedure was cumbersome and expensive. Except by the passing of a special Act of Parliament, there was no means of getting a marriage dissolved before the year 1858.

The Matrimonial Causes Act, 1857, transferred the jurisdiction in matrimonial matters from the Ecclesiastical Courts to the new Civil "Court for Divorce and Matrimonial Causes"; but perpetuated the old ecclesiastical practice with regard to nullity suits and judicial separation (formerly known as "divorce *a mensa et thoro*"). Apart from this rearrangement, the Act took the revolutionary step of conferring upon this Court a new judicial power—that of granting a *divorce in the modern sense* of a complete *dissolution of marriage*. As we have seen (D5), the Supreme Court of Judicature Act, 1873, and subsequent legislation, set up one single High Court of Justice, of which the Probate, Divorce, and Admiralty Division formed part, taking over (with other work) the jurisdiction which had been conferred in 1857 upon the "Court for Divorce and Matrimonial Causes." This jurisdiction remains in the hands of the Probate, Divorce, and Admiralty Division to-day. Great changes have been effected *by statute* (notably in 1923, 1925, 1937, and 1950) extending the grounds for divorce and the jurisdiction of the Court; but in the *interpretation and adaptation of principles* the great body of *case law* (see D4), which enshrined the principles and practice of the old Ecclesiastical Courts, is not without its influence to-day. The principles of equity (see D4), however, have not modified the strict legalism of this branch of the law; *equity has no application to the law of matrimonial causes* (except for resort to *injunction* (see D11) for the protection of the wife's person or property).

2. POWERS OF INFERIOR COURTS—SUMMARY JURISDICTION

Concurrently with the jurisdiction of the Divorce Division of the High Court, Magistrates' Courts now have power, by virtue of the Summary Jurisdiction (Separation and Maintenance) Acts, 1895 to 1949, to grant relief to the injured spouse in certain cases of matrimonial misconduct. The procedure is simpler, quicker, and less expensive than in the Divorce Division of the High Court. A Magistrates' Court may grant a *separation order* (which has the same effect as a High Court decree of judicial separation) and (in appropriate cases) an order for *legal custody of any child under sixteen* to either spouse. Where a *wife* is the applicant, a Magistrates' Court may also make an *order for maintenance* (maximum, £5 a week for the wife and 30*s*. a week for each child in her legal custody). Applications by a *husband* are limited to cases: (1) where the wife is an habitual drunkard or drug-addict; (2) where she has been guilty of persistent cruelty to the children; or (3) where she has been guilty of adultery. In case (1) the Court may order (with the wife's consent) that she be committed to and detained in "a licensed retreat for inebriates."

A wife may apply for relief in any of the following cases:

(1) Where her husband has been convicted summarily (*i.e.*, in a Magistrates' Court) of an aggravated assault upon her

(2) Where her husband has been convicted on indictment (*i.e.*, by a jury) of an assault upon her, and sentenced to a fine exceeding £5 or to imprisonment exceeding two months.

(3) Where she has been deserted by her husband.

(4) Where her husband has been guilty of persistent cruelty to her or her children.

(5) Where her husband has been guilty of wilful neglect to provide reasonable maintenance for her or her infant children whom he is legally liable to maintain.

(6) Where her husband is an habitual drunkard or a drug-addict.

(7) Where her husband, while suffering from a venereal disease, and knowing that he was so suffering, insisted on sexual intercourse with her.

(8) Where her husband has compelled her to submit to prostitution (or been guilty of such conduct as was likely to have, and has had, the same result).

(9) Where her husband has been guilty of adultery.

The Court may order that the *costs* of any application shall be paid by either party, as it thinks fit.

The general rule is that an *application* must be made *within six months* of the ground of complaint;

but this time limit does not apply to such continuing offences as desertion (see below) or wilful neglect to maintain. An application may be made to any Magistrates' Court acting within the district in which the cause of complaint wholly or partly arose, or in which the wife or husband ordinarily resides.

These "domestic proceedings," as they are termed, may be heard before one stipendiary (legally qualified magistrate) or two or three justices of the peace, including, so far as practicable, both a man and a woman. The *hearing* is *in private*, the public being excluded, and newspapers are prohibited from publishing details; "domestic proceedings" must be dealt with separately from other matters, and reports from probation officers may be received on the subject of any attempted reconciliation or on the means of the parties. In general, the magistrates should apply the same general principles as are applied in the Divorce Division; lay justices of the peace are advised on the law by their legally qualified clerk.

A *Magistrates' Court*, however, has *no power to grant a divorce* or *to annul a marriage;* the sole jurisdiction to make such a decree is in the hands of the Divorce Division of the High Court of Justice

An order may be enforced by committing the husband to prison if his failure to comply with the order is shown to be due to wilful refusal or culpable neglect.

No order is enforceable while a wife is *residing with her husband*, and *no order* may be made on the application of a wife where it is proved that she has been *guilty of adultery*, unless the husband condoned or connived at (see below), or by his wilful neglect or misconduct conduced to (*i.e.*, tended to lead to), the adultery. An *order already granted* will be *discharged* (*i.e.*, its effect will be terminated) on *proof of the wife's adultery*, or on proof that she has *voluntarily resumed cohabitation* with her husband.

If a matrimonial cause is pending in the Divorce Division of the High Court no application for a separation or maintenance order ought to be dealt with by a Magistrates' Court. And a Magistrates' Court may refuse to make any order when the suit in question would, in its opinion, be more conveniently dealt with by the Divorce Division.

Appeals. A Magistrates' Court has power "to state a case," upon *a point of law* (not a question of *fact*) arising on the application, for decision by a Divisional Court consisting of two or more judges of the Divorce Division. And an appeal from a Divisional Court lies to the Court of Appeal, by leave of either the former or the latter.

3. MATRIMONIAL CAUSES in the DIVORCE DIVISION of the HIGH COURT

(1) Constitution of the Court

The President of the Probate, Divorce, and Admiralty Division and not less than three other High Court Judges attached to that Division are the permanent judges for Matrimonial Causes. They sit both at the Royal Courts of Justice in London and at Assizes. Certain subsidiary duties are performed by the seven Registrars of the Principal Registry of the Division at Somerset House, and by District Registrars in the principal cities of England and Wales.

(2) Practice and Procedure

In contrast to "domestic proceedings" in Magistrates' Courts, the *Judges* of the Divorce Division sit normally in *open court*, though they have power to sit *in camera* (in private) where the ends of justice so require. In *nullity proceedings*, however, it is provided by statute that evidence on the question of *sexual incapacity* must be heard *in camera* unless the Judge is satisfied that the ends of justice require such evidence to be heard in open court. Press publicity is limited by statute to certain matters, and the publication of indecent matter may give rise to prosecution, in *any* matrimonial proceedings.

In general, practice and procedure in the Divorce Division are governed by statute, by rules of Court framed by a judicial committee under statutory authority, and by the principles and practice of the old Ecclesiastical Courts—except in proceedings for dissolution of marriage, which the old Courts could not entertain (see para. 1 above).

(3) Relief and Grounds for Relief

(a)—Nullity of Marriage. The Court has power to declare a "marriage" null and void in two main classes of case:

(i) *"Marriages" Void from their Inception —i.e.*, where one of the parties had *another husband or wife living* at the time of the ceremony; where there was a *mistake* as to the *nature* of the ceremony, or the *identity* of the other party; where one party had been declared of *unsound mind* and was detained as a lunatic at the time of the ceremony; where the parties were within the *prohibited degrees* of relationship (*e.g.*, brother and sister, or uncle and niece); or where the *ceremony was not in due form*, or was a mock "marriage."

(ii) *Marriages which are Voidable—i.e.*, which stand good unless and until one party or the other ("the Petitioner") successfully petitions the Court for annulment—*i.e.*, where either party was sexually *impotent at the date of the ceremony*; where either party has wilfully *refused to consummate* the marriage; where the marriage was *induced by threats* or fear or duress (*i.e.*, force), or where one spouse was *intoxicated* at the time of the ceremony.

The Act of 1950 has (somewhat illogically) added certain other grounds: (*a*) where either party was, at the time of the ceremony, in fact of *unsound mind* but had not been declared so, or was then a *mental defective*, or then subject to recurrent fits of *insanity or epilepsy*; (*b*) where the other spouse was, at the time of the marriage, suffering from *venereal disease* in a communicable form; and (*c*) where the wife was, at the time of the marriage, *pregnant by some person* other than the petitioning husband. But in these last cases (*a*), (*b*), and (*c*) the Court must not grant a decree unless it is satisfied that the petitioner was, at the time of the marriage, ignorant of the facts alleged; that the proceedings were instituted within a year of the marriage, and that there has been no sexual intercourse between the parties, with the consent of the petitioner, since he or she discovered that there were grounds for a decree of nullity.

Where a "marriage" is *void* (see above) the law regards it as *never having taken place* at all. Where it is *voidable*, the decree *annuls the marriage retrospectively* from its inception; but certain transactions between the parties while they actually

remained married are validated, and the Court has power to order maintenance for the woman; and *any child* who would in the normal way have been the legitimate child of the parties *remains legitimate*, notwithstanding the annulment.

Sterility—i.e., inability to produce children—is not, in itself, a ground for annulment of the marriage. If the *impotence* of one spouse appears to be *curable* without danger the Court may, before pronouncing a decree, require that opportunity for *cure* be first given. If he or she *refuses to undergo examination or treatment* the Court may infer, after hearing the other party's evidence, that impotence exists. The petitioning husband or wife may ask for a nullity decree on the ground of *his or her own impotence*, provided he or she did not know of it at the time of the marriage.

Apart from the one-year rule (mentioned in the last paragraph but two) in certain cases, delay (however long) in petitioning for nullity is no bar to the grant of a decree.

(b) Divorce.—(i) *Its Nature and Purpose.*—Divorce means the *breaking of the legal tie* of marriage by a decree of the Court. There is much controversy on the subject, some of it ill-informed, and much of it tinged with emotion and prejudice. It is not the purpose of this sub-section to take sides in the controversy, but (so far as possible) to remove misconceptions and to set out the various points of view.

We have to start by facing the unpalatable ruth that *some marriages do break down* in fact. The symptoms of break-down may be continual strife, and sometimes violence, between the spouses, so long as they continue to live together; or there may be an actual breaking-up of the home because one or the other finds the situation intolerable and leaves. The function of the law should be to deal with this state of affairs as best it can, paying due regard: (*a*) to the interests of the children (if any), who are innocent parties to the dispute: (*b*) to the interests of the spouses and of any third party involved; (*c*) to the interests of public decency and the safeguarding of family life generally.

The problem has suffered from over-simplification by the Press and the protagonists on either side. Sometimes it is represented (quite inaccurately) as a conflict between those who want divorce to be "easier" or "harder" to obtain. Sometimes it is said that divorce as an institution is "causing the break-up of family life." This is a superficial view, ignoring the true nature of the problem, and confusing effect with cause. Happily married couples do not seek divorce. Divorce is the drastic *remedy* provided by the civil law in the case of a marriage which has already *broken down in fact*; the availability of divorce does not bring about the break-down, any more than the availability of surgical treatment can be said to bring about ill-health. A marriage may break down—that is to say, the "kernel" of the marriage, the mutual respect and affection between the spouses, has withered away; only an empty shell—the legal tie—continues to subsist between them. How should this situation be dealt with by law?

It is common ground, among both the upholders of the orthodox view and those who advocate reform, first, that every possible effort should be made, by private individuals and public institutions, to effect a reconciliation, if at all possible. Such efforts are favoured by the law, and excellent work is done to this end by religious organisations, medical men, probation officers, lawyers, and such institutions as the Marriage Guidance Council.

Secondly, it is common ground that, if such efforts are unsuccessful and the *breach proves irreparable* in fact, the interests of the children (if any) should be paramount, and no pains should be spared to secure their proper care and maintenance. This is laid down by law; the Judge in a matrimonial cause may take the initiative in providing for the custody, maintenance, and education of the children, or for placing them under the care of the Chancery Division (see D5); whether the initiative is taken by the Judge or by one of the parents, the welfare of the children is the *paramount consideration*, irrespective of the rights and wrongs as between the parents. Nobody will deny that, once the marriage has broken down *in fact*, the children will suffer to some extent; but it does not follow that they would suffer less if the legal tie between the parents were preserved, or if the home, with its atmosphere of strife, and perhaps of violence, were kept together at all costs—even assuming such a thing were possible.

It is at this point that the main controversy begins. Where the "kernel" of the marriage has withered away, should the "shell"—the legal tie—be preserved or discarded? And if discarded, then in what circumstances and on what conditions? The present answer of the law is a not altogether satisfactory compromise.

The Christian Churches declare that marriage is not merely a civil institution but a religious sacrament, and the Roman Church regards it as indissoluble. This last is a matter of religious dogma and belief; not a question for rational argument. It is a view as deserving of respect as any other; but, as we have seen, it was abandoned by Parliament a century ago, and is unlikely to be reinstated in the civil law of England. Many churchmen regard this view as binding on their consciences, but it is no longer the law of the land. For better or worse, a marriage can now be legally dissolved, leaving each party free to contract another union if he or she so desires. On what basis, then, ought such dissolution to be granted?

This is the second stage of the controversy. The conventional view, the attitude of the present law, is that a decree of divorce can, and ought to, be granted solely as a result of some *matrimonial misconduct* by the "guilty" party, entitling the "innocent" party—and only the "innocent" party—to go to the Court for relief. According to this view, the decree of divorce (though in law a merely civil remedy) is regarded virtually as in the nature of a *penalty* upon the "guilty" party for his or her wrongdoing—a view that has survived from biblical times. The reformers consider this an anachronism and an anomaly, pointing out: (*a*) that in those times (as is the case under Jewish and Islamic law to-day) it was only the husband who could divorce his wife (not *vice versa*)—a step which was then a very severe punishment, since divorce meant, for the woman, disgrace, degradation, and poverty; whereas there is to-day little or no economic penalty or social stigma upon the "guilty" spouse, who is frequently no less—and often more—desirous than the "innocent" spouse of obtaining his or her freedom. The reformers further emphasise: (*b*) that the matrimonial law has never pretended to identify itself wholly with the doctrines of the Church; for example, the Book of Common Prayer declares, of marriage, that "first, it was ordained for the procreation of children"; yet not even the Ecclesiastical Courts went so far as to annul a deliberately childless marriage, and under the present law a refusal to have children is not a matrimonial offence and involves no penalty. Finally, (*c*) the reformist view is that the essence of the married state—the "kernel"—is the mutual respect and affection between the spouses; once that "kernel" has withered away and the marriage has *irretrievably broken down in fact*, the preservation of the legal tie is a mere pretence; the breaking of that legal tie, from the point of view of public decency, should be regarded as the necessary and proper result of the break-down of

the essence of the marriage, or the break-up of the marital home. Under the present system, a refusal by the "innocent" party to take proceedings for divorce, however malicious his or her motive for such refusal, cannot be questioned, and this makes for irregular unions and illegitimate births; on the other hand, the law's insistence that there must be an "innocent" and a "guilty" party inevitably induces two spouses, who find their union intolerable, to resort to unworthy subterfuges; under a more rational system (such as obtains, for example, in the Scandinavian states) both parties might amicably join forces to have the marriage dissolved, once it was quite clear that reconciliation was out of the question.

All these view-points, and others, were considered by the Royal Commission which heard evidence in 1951–55 and made certain recommendations in 1956; its Report, however, was by no means unanimous, and the law, by and large, remains unchanged. That is to say—only the "innocent" party, except in "discretion cases" (D29 (1)), can take proceedings for divorce against the "guilty" party; the law has sternly set its face against "divorce by consent" in any circumstances—if such consent comes to light.

(ii) *Grounds for Divorce.* The *Petitioner* (*i.e.*, the husband or wife who is *asking the Court for a divorce* against the other spouse) may present a petition on the ground that the *Respondent* (the other spouse):

(*a*) has since the celebration of the marriage *committed adultery*;

(*b*) has *deserted* the Petitioner *without cause* for at least *three years* preceding the presentation of the petition;

(*c*) has since the celebration of the marriage treated the Petitioner with *cruelty*; or

(*d*) is *incurably of unsound mind* and has been *continuously under care and treatment for at least five years* immediately preceding the presentation of the petition.

Further, a *wife* may petition for divorce on the grounds that:

(*e*) her husband has, since the celebration of the marriage, been guilty of *rape, sodomy*, or *bestiality*.

Finally, to cover those cases where one of the spouses has disappeared and not been heard of for many years:

(*f*) any married person who alleges that reasonable grounds exist for *supposing the other party to be dead* may petition the Court *to have it presumed* that the other party is dead and *to have the marriage dissolved.*

No petition for divorce on any ground may be presented *until the expiration of three years* from the date of the marriage, unless a Judge is satisfied that there is a case of *exceptional hardship* upon the Petitioner or *exceptional depravity* on the part of the Respondent. Whether there is such a case is a question for the Judge's discretion upon the evidence brought before him.

As to the above-mentioned grounds for divorce:

(a) *Adultery* means *voluntary sexual intercourse* between a husband and a woman who is not his wife, or between a wife and a man who is not her husband. (A woman who has been raped—*i.e.*, forced to have intercourse with another man against her will—is not guilty of adultery.) For obvious reasons, *direct evidence* of the act of adultery is rare, and the Court may infer from circumstantial evidence that adultery has taken place.

(b) *Desertion* means, primarily, the *intentional permanent abandonment*, by one spouse of the other, *without that other's consent*, and *without reasonable cause.* Therefore there is *no desertion* in such cases (for example) as: (i) where a husband *cannot* live with his wife because he is serving a sentence of imprisonment; (ii) where a husband leaves his wife for a *short time* for necessary business or family reasons, *intending to return to her*; (iii) while a *separation continues with the consent of both parties*; (iv) where the spouse who abandoned the other had *just cause* to do so.

Indeed, in certain cases under (iv) the doctrine known as constructive desertion may apply *against the other spouse*, if he or she has (figuratively speaking) *driven the first spouse away. Constructive desertion* means, not "desertion" in the literal sense of walking out of the matrimonial home, but conduct on the part of a husband which is intended to force, and virtually forces, his wife to leave him, or *vice versa.* Thus, if a husband brings his mistress to live with him in the matrimonial home and, as a result, his wife leaves him, not only is the wife innocent of desertion in the legal sense, but the husband is himself guilty of constructive desertion; it will be presumed against him that he intended to terminate his marital association, and he has in fact *carried out that intention.* Such a case illustrates the principle that there are *two elements* in the legal meaning of *desertion*—the *act* of physical separation and the *intention* to bring normal married life to an end.

In order to bring about desertion it is not necessary that the spouses should cease to live under the same roof; "desertion is not withdrawal from a place, but from a state of things." It is sufficient that the Respondent (the "guilty" spouse) has withdrawn from, or forced the other to withdraw from, *cohabitation*—*i.e.*, from sharing a common "home" in the full sense of the word. A wife "deserts" her husband if she refuses (against his will) to share his room, to take her meals with him, and to perform the usual duties of a wife. On the other hand, the mere refusal of sexual intercourse, in itself alone, does not amount to desertion.

It should also be noted that desertion is not a single act but a continuous state of affairs. The Petitioner must prove beyond reasonable doubt *that desertion without cause continued* during the entire period of *three years* required by law as the basis of a divorce petition. Although (see above) desertion in the legal sense must be *without the consent* of the petitioning spouse, recent judicial decisions have tended to dispense with the requirement that the deserted party must prove a *continuing desire* for the deserting party to return, and a *continuing willingness* to receive and reinstate the deserting party, during the *entire period of three years* preceding the commencement of proceedings; in other words, once the latter party's *original act and intention of deserting* has been proved, that intention is *presumed to have continued*, unless there is evidence to the contrary. But any kind of *agreed separation* is fatal to the case, whether the agreement be in writing, by word of mouth, or implied by conduct. An agreement, however, by a husband, who is *already living apart* from his wife, to *maintain* her and the children does not constitute a separation by agreement, unless there is evidence that the *wife actually consented* to his leaving her. A *maintenance order* made by a Magistrates' Court (see (D24 (2)) does not necessarily prevent the period of

desertion from running, unless the order contains a clause, deliberately inserted, to the effect that "the parties shall no longer be bound to cohabit."

If the deserting party makes an *offer to return* to the matrimonial home it is the duty of the other party to receive him (or her) back and to resume normal married life together, *if the offer to return is genuine* and if no other matrimonial offence (such as adultery or cruelty) has been committed by the deserting party. Whether such an offer is "genuine" is a question of fact, to be decided on all the evidence; it will generally be a wise safeguard for a deserted party who receives such an offer to *take legal advice* before accepting or rejecting it; for if rejection of the offer subsequently proves to have been unjustified, he (or she) may become the deserting party. This situation, again, arises from the legal view that "desertion" consists of two elements—the *act* and the *intention* of deserting.

An *honest and reasonable belief*, by one spouse, that the other spouse has committed, or is committing, adultery, if such a belief is induced by the other spouse's conduct, may be "just cause" for the first spouse to refuse cohabitation, and prevent him (or her) from being regarded as the deserting party.

(c) *Cruelty* is not defined by statute, but has been decided, in reported cases, to mean conduct causing danger to life, limb, or bodily or mental health, or giving rise to a reasonable apprehension of such danger. (The term "Mental Cruelty" is unknown to English law; but there may be *cruelty* in the legal sense *without physical violence*.) The Courts have refused to commit themselves to a comprehensive definition; *every case* must be considered on its *own facts* in the light of the whole history of the marriage. One single act, even of violence, can seldom be regarded as "cruelty"; but the conduct complained of must be of a *grievous nature*—not mere conduct which (however reprehensible) may be regarded as "part of the wear and tear of married life." In order to constitute cruelty, the conduct must be *intentional* on the part of the guilty spouse, *aimed at* the injured spouse, and calculated to break the latter's *health or spirit*. An *insane person*, who does not understand the nature and quality of his acts, and so cannot form the necessary "intention" (see D8), *cannot be guilty of cruelty*.

Drunkenness, in itself, is *not* cruelty; but if it is so *persistent*, or its effects so inevitably *distressing* to the other spouse, as to *threaten his or her health*, it may amount to cruelty. Similar considerations apply to persistent refusal of sexual intercourse, excessive sexual demands, or sexual malpractices either forced upon the other spouse or committed with third parties.

A *divorce petition* based wholly or partly on cruelty must *set out specifically the acts* complained of, evidence of which is to be given at the trial. (This ensures that the Respondent knows the details of the case he has to meet.)

(c) **Restitution of Conjugal Rights.**—Either spouse may petition the Court for such a decree where the other spouse has "wrongfully withdrawn from cohabitation" (see above). *Willingness to return* to cohabitation, *if genuine*, or *proof of just cause* (see above) for refusal are good defences. If the petition succeeds, and the Court orders the erring spouse to return, his or her *non-compliance* with the order *will not lead to enforcement* by arrest or otherwise; but it will (so to speak) fix upon him or her responsibility for the separation, and *establish* his or her status as the deserting party (see above). And *non-compliance* with a restitution decree is in itself *a ground* for the other party to petition for a decree of *judicial separation* (see below).

(d) **Judicial Separation.**—A petition for this form of relief may be presented by either spouse on the ground last mentioned in the foregoing paragraph, or on any of the grounds for which a divorce petition (see above) might have been presented. The *effect of the decree* (as in the case of a separation order made by a Magistrates' Court) is that the Petitioner is *no longer bound to cohabit* with the Respondent, and cannot therefore be regarded as a deserting party. (The *legal bond* of marriage *remains in force*; the procedure is therefore often employed by a spouse who does not desire divorce, perhaps for reasons of conscience, perhaps merely so as not to allow the other party freedom to marry somebody else.) It is, however, open to a Petitioner, who has obtained a decree of judicial separation, to petition for divorce, on the same facts, at a later date—*provided that three years have elapsed* since the date of the marriage (see D27 (1)).

Bars to Relief.—(1) *Absolute Bars.*—It is, by statute, the duty of the Court to investigate, so far as it reasonably can, the facts alleged in any petition for divorce or judicial separation, and to inquire whether there has been any *connivance* or *condonation* on the part of the Petitioner, and whether any *collusion* exists between the parties. *The Court must dismiss* the petition, and *refuse a decree, even in an undefended suit, unless* it is satisfied: (*a*) that the *Petitioner has proved his or her case*; (*b*) that the Petitioner has not been *accessory to or connived at* the adultery (if any) of the other party; (*c*) that the Petitioner has not *condoned* the adultery (if any) or the cruelty (if any) of the other party; (*d*) that the petition is not presented or prosecuted *in collusion* with the other party.

(a) *The Petitioner must prove the case*—that is to say, satisfy the Court that there are *proper grounds* for a decree *according to law*; there is no such thing, in suits for divorce and judicial separation, as judgment by consent, by admission, or in default of defence (as is possible, for example, in actions for breach of contract (D11) and tort (D12)). *In matrimonial suits* the *State*, and not merely the parties themselves, must see that the provisions of the law are *strictly observed*.

(b) *There must be no connivance*—that is to say, the Petitioner must not have intended *to promote or encourage or provide opportunity for* the commencement or the continuance of the Respondent's adultery. Merely *keeping watch upon a suspected spouse*, for the purpose of obtaining evidence, is not necessarily connivance; there must be active *encouragement or acquiescence*—wilfully "shutting one's eyes" to what is going on or likely to take place.

(c) *There must be no condonation* of adultery or cruelty—that is to say, *forgiveness* of all such acts as are known to, or suspected by, the injured spouse, and the restoration of normal marital relations with the offending spouse. ("Forgiveness" means forgiveness *on condition* that there shall be *no further matrimonial offence*.) Condonation may be by words or conduct. The Petitioner *cannot obtain a decree* on the ground of any offence or offences which he or she has *condoned*, except in case of *revival*.

Revival—If, subsequent to the condonation, the offending spouse again commits some matrimonial offence or offences, the former offence or offences are *revived*—*i.e.*, the effect of the forgiveness and restoration (see above) is cancelled, and

the former offence or offences will again afford a ground for divorce or judicial separation. It does not matter whether or not the new offence is of the same nature as the old; condoned adultery will be revived by new acts of cruelty or desertion; condoned cruelty will be revived by a new act of adultery, and so forth.

(d) *There must be no collusion*—that is to say, *no agreement* or *bargain* between the parties (whether for financial consideration or otherwise) that the Petitioner will commence or conduct a suit for divorce or judicial separation, or that the Respondent will not defend such a suit. There is, for example, *collusion* if one party *requests or suggests* that the other *should commit adultery* in order to provide evidence for a divorce, and the other party *accedes* to the request or suggestion. But it is not necessarily collusion for the Petitioner, knowing that *adultery has already been committed*, to ask the other party *for details or for evidence* on which the Petitioner can act. The Court regards financial arrangements between the parties with suspicion, if they are entered into *before the suit is commenced*, and it will carefully investigate such arrangements to satisfy itself that they are not collusive (*e.g.*, for the purpose of inducing the Petitioner to start proceedings). But once the petition has been filed, tnere is no objection to discussion between the parties, or their advisers, of necessary financial arrangements as to alimony or maintenance (see D30 (1)) or the disposal of the matrimonial home.

(2) *Discretionary Bars*—Apart from connivance, condonation, and collusion, any of which (as we have seen) is an *absolute bar* to the granting of a decree, the *Court has a discretion either to refuse or to grant* a decree of divorce or judicial separation, according to circumstances, if it finds that the *Petitioner* has himself (or herself): (*i*) been *guilty of adultery* during the marriage; (*ii*) *shown unreasonable delay* in presenting or prosecuting the petition; or (*iii*) been guilty of cruelty, or desertion without reasonable cause, *before* the Respondent's acts of adultery or cruelty on which the petition is based. The Court has a similar *discretion*, where the ground for the petition is *adultery, desertion*, or *unsoundness of mind*, either to refuse or to grant a decree to a *Petitioner* who has (*iv*) been guilty of such *wilful neglect or misconduct* as has conduced to (*i.e.*, helped to bring about) the Respondent's adultery, desertion, or unsoundness of mind.

In a case where each party is asking for a divorce against the other, each admitting his (and her) own misconduct and asking the Court to exercise its discretion in his (and her) favour, the *Court may exercise its discretion in favour of both* and dissolve the marriage.

In case (*i*) above, where the *Petitioner* has himself (or herself) been *guilty of adultery*, it is the Petitioner's duty to lodge in the Divorce Registry a *discretion statement*—*i.e.*, a written statement in a sealed envelope (to be opened only by the Judge at the hearing) admitting the facts and explaining the circumstances of his (or her) adultery. The *petition* in such a case must *contain a clause praying the Court* "to exercise its discretion in the Petitioner's favour." (*No details* of the Petitioner's adultery appear *in the petition* itself, thus preventing the Respondent from obtaining evidence of that adultery for use as a weapon against the Petitioner.)

Decree Nisi and Decree Absolute.—When the case comes on for trial the Judge will hear the *evidence of the Petitioner* and his or her witnesses, *and legal argument* on his or her behalf; *if the case is defended* by the Respondent spouse, or by the Co-respondent (*i.e.*, any *man* accused, in the petition, of adultery with a Respondent *wife*), or by any *woman named* in the petition as having committed adultery with a Respondent *husband*, the Judge will hear their evidence and legal argument on their behalf. The Judge, if not satisfied on points (*a*), (*b*), (*c*), and (*d*) (D28–9) in a case of divorce or judicial separation, must *dismiss the petition*, in which event the married status of the parties will remain unchanged. If the Judge *is* satisfied on the points mentioned he will, in a suit for *judicial separation*, pronounce a *final decree*; in a *suit for restitution of conjugal rights* he will *order* the deserting spouse to *return to cohabitation* (the effect of the decree and the order is described above, D28 (1)).

In a suit for *nullity* or *divorce*, the Judge will pronounce a decree *nisi*—*i.e.*, an order that the marriage is to be *annulled* or *dissolved* unless (*nisi*), before that event takes place, *some cause* is shown to the Court *why final annulment or dissolution ought not to be permitted*. Intervention for this purpose may be made by an official known as the *Queen's Proctor*, or by any member of the public. Such interventions after decree *nisi* are rare, but may be made on the ground, for example, that there was a collusive arrangement (para. (*d*) above) between the parties, or some other material fact, which was concealed from the Court at the hearing.

If such intervention succeeds, the decree *nisi* will be *rescinded* (*i.e.*, cancelled) and the parties will retain their former status. If there is *no such intervention*, or if such intervention is *dismissed*, then the marriage will be *finally annulled or dissolved* on application (on a special form), at the Divorce Registry concerned (not in open court), by or on behalf of the *Petitioner*, not earlier than *three months* after the decree *nisi* (unless the Court fixes a shorter time by special order). If the Petitioner does not make such an application, then the Respondent may do so after the lapse of a *further three months* (*i.e.*, six months after the date of the decree *nisi*), and the Court has power to grant or refuse such application or to deal with the case as it thinks fit.

The decree which *finally annuls or dissolves* the marriage is called a *decree absolute*. Unless and until it is granted, the marriage tie still subsists; the decree *nisi* does *not* terminate the status of husband and wife. But the *decree absolute* does terminate that status, leaving both parties free to marry again.

Incidental Matters

(1) **Custody and Maintenance of Children.**—Apart from the general power of the Chancery Division, as guardian of equity (D5), *to protect the person and the property of any infant* (D7) (even though there may be no matrimonial proceedings between its parents), and apart from the additional powers of that Division and of Magistrates' Courts, under the Guardianship of Infants Act, 1925, *to appoint a guardian or guardians for any infant*, and to make orders for either parent to have *access* to the infant (*i.e.*, to see it periodically) and for the infant's *maintenance*, the Divorce Division itself may make orders for the *custody, maintenance, and education* of the *children of the marriage* which is the subject of any matrimonial proceedings, and give directions for placing them under the protection of the Court, and for access to them by either or both of the parents. The expression "children of the marriage" includes children lawfully adopted by both husband and wife, children of a bigamous "marriage" which has given rise to nullity proceedings (D25), and also children born before the marriage of their parents and legitimated by that (subsequent) marriage. The Court may make such orders and give such directions at any time after proceedings have been commenced for nullity, divorce, judicial

separation, or restitution of conjugal rights; it may make interim orders, and give interim directions, from time to time *during the proceedings*. It is, however, *unusual* for the Divorce Division to make orders for custody of or access to any child *over the age of sixteen* (since such orders would be difficult to enforce).

In all such proceedings, in *whatever court* they may be taken, the *paramount consideration* is the *welfare of the children—not the punishment of the "guilty" parent, nor any privilege* of the father as against the mother, or *vice versa*. (It is, for example, unusual for the Court to deprive the mother of the custody of a very young child, even though she has committed or is living in, adultery —unless, or course, she is neglecting the child or is a "bad mother" in the widest sense.) In some cases, for good reason, both parents may be passed over, and the custody of the child may be given to some third party.

(2) **Financial Provision.**—(a) *Alimony Pending Suit.*—On any petition for nullity, divorce, judicial separation, or restitution of conjugal rights, the Divorce Division may make such *order* for *payment by the husband to the wife* of *alimony pending suit* (*i.e.*, a periodical sum for or towards her support *during the proceedings*) as the Court thinks just. The Court may also *order a wife Petitioner*, in a suit for divorce or judicial separation on the ground of the *husband's insanity*, to pay *alimony pending suit* for or towards the *support of the husband during the proceedings*.

(b) *Permanent Alimony* is the term used for similar payments which the Court may order the husband to make to the wife *after* the pronouncement of a *decree of judicial separation* on any ground, and such an order *in favour of the wife* may be made even where a decree has been pronounced *against her*. An order for *permanent alimony* may also be made *in favour of the husband* in a case where the *wife petitioned* for judicial separation on the ground of *his insanity*. *Permanent alimony* may also be ordered in favour of the wife where an order for *restitution of conjugal rights* has been made in her favour.

(It will be observed that, in all the above cases, the period during which the payment of *alimony* may be ordered is *while the status of marriage remains in being*.)

(c) *Permanent Maintenance* is the provision which the Court may order the husband to make in favour of the wife *after a decree absolute* of *divorce or nullity*—*i.e.*, for the period *after the married status has been terminated*. (The Court may, *in exceptional cases*, make an order for *permanent maintenance* in favour of a "guilty" wife.) In *one case permanent maintenance* may be ordered *against a wife* and *in favour of a husband*—where the *wife petitioned* for divorce on the ground of *his insanity*. The order may be for payment of a *monthly or weekly sum* during the *joint lives of the parties* (*i.e.*, so long as they shall *both* live), or for a capital sum to be invested so as "to secure to the wife such gross or annual sum of money, for any term not exceeding her life," as the Court thinks reasonable, in both cases having regard to "*her fortune* (if any), to the *ability of the husband*, and to the *conduct of the parties*." The amount of the order is therefore left to the *discretion of the Court*; and it may be varied by the Court from time to time as the circumstances of the parties change. (The words "conduct of the parties" show that, in fixing the payments, the Court does not necessarily regard the question of "guilt" or "innocence" as clear-cut on the one side or the other; it may take into consideration the *whole history of the marriage*. The Court also takes into account the *property and income* of *both parties*.)

(d) *Periodical Payments* may be ordered to be made, *by the husband to the wife*, on or after the making of a *decree for restitution of conjugal rights*, for the joint lives of the parties. The Court may order the husband to "secure" such payments as in the case of permanent maintenance. Where the *husband successfully applied* for the decree, the Court may order the wife, if she is "in receipt of any *profits of trade or earnings*," to pay to the husband, or for the benefit of the children, such part of those profits or earnings as it thinks reasonable.

Where a husband has been guilty of *wilful neglect to provide reasonable maintenance* for his wife or infant children, then, in any case where the wife might have petitioned for judicial separation, the Court may (on the wife's application) order the husband to make to her such *periodical payments* as may be just, and it may order the husband to "secure" such payments (as described above). (Thus, where there has been wilful neglect to maintain, on the part of the husband, the wife may apply for financial relief in the Divorce Division instead of in the Magistrates' Court; there is *no limit* in the Divorce Division to £5 a week, as there is in the Magistrates' Court (D24 (2)). And the wife may make such an application even if she does not wish to petition for a decree of nullity, divorce, judicial separation, or restitution of conjugal rights.)

(e) *Settlements.*—In any case in which the Court pronounces a decree for divorce or judicial separation by reason of the *wife's adultery, cruelty, or desertion*, the Court has power to order the wife's property, or any part of it, to be *settled* (D20) for the benefit of the innocent party, or of the children of the marriage, or both.

The Court also has power, after a decree for nullity or divorce, to vary the terms of any settlement which may have been made on the parties before or after their marriage; the variation may be made to benefit the children, or the parties or either of them, as the Court thinks fit.

(f) *Damages against Co-respondent.*—A husband who is petitioning for a decree of *divorce or judicial separation*, on the ground of his *wife's adultery*, may ask for an award of *damages against the Co-respondent* (*i.e.*, the man with whom she has committed adultery). Such a claim, which is comparatively rare nowadays, is usually tried before a judge and jury; the damages should be assessed so as to *compensate the husband*, so far as possible, for the loss of his wife where she has been seduced from his side by the adulterer.

(g) *Costs.*—The costs of the proceedings are *always in the discretion of the Court*, each case depending on its own facts. Generally speaking, however, the costs "follow the event"—*i.e.*, when a decree or order is made against a husband, he will usually be ordered to pay the costs incurred; costs, however, are rarely awarded against a "guilty" wife, but are not infrequently ordered to be paid by the Co-respondent (if any). An order for costs may be made, but rarely is, against the "woman named" in a petition as having committed adultery with the husband.

Note on Domicil.—It has been explained above (see D7) why the English Court will *not, generally speaking*, grant a *divorce* to a man who is *domiciled abroad*. Since the *domicil of a wife* is the same as *that of her husband* (even if she has not lived with him for many years), the refusal of the English court to accept jurisdiction has caused hardship in many cases. To mitigate this hardship the Matrimonial Causes Act, 1950, confers upon the Divorce Division an additional statutory jurisdic-

tion in the following cases, *in favour of a wife*, even if her husband is *not domiciled in England*:

(*a*) In *any* matrimonial proceedings, *other than* for a "decree of presumption of death and dissolution of marriage" (see below), if: (i) the wife has been deserted by her husband, or the husband has been deported from the United Kingdom as an alien; and (ii) immediately *before the desertion or deportation* the husband *was* domiciled in England.

(*b*) In proceedings for *divorce* or *nullity*, if: (i) the wife is *resident* (*i.e.*, actually living for the time being) in England; and (ii) has been *ordinarily resident* there for a period of *three years* immediately preceding the commencement of the proceedings; and (iii) the husband is *not* domiciled *in any other part of the United Kingdom*, or in the Channel Islands or the Isle of Man. (The two last-named territories have their own separate systems of law.)

(*c*) In proceedings for a decree of "presumption of death and dissolution of marriage": the husband is presumed by law (*for the purpose of ascertaining the wife's domicil*) to have died "immediately after the last occasion when she knew, or had reason to believe him, to be living." (Thus the wife can acquire an English domicil of her own as from that date.)

And, under the Matrimonial Causes (War Marriages) Act, 1944:

(*d*) In the special case of *marriages celebrated during the Second World War*, where: (i) the *husband* was, at the time of the marriage, domiciled *outside the United Kingdom*; (ii) the *wife* was, immediately before the marriage, *domiciled in England*; and (iii) the parties *never resided together* in the country which was the husband's domicil at the time of the marriage, the Divorce Division may deal with proceedings for divorce or nullity *as if both parties* were at all material times *domiciled in England*. (This provision was to cover the special cases of soldiers from the Dominions or Colonies, the United States or other foreign countries who, while stationed here during the War, married English girls and had to go back to their own countries, *leaving their wives behind*—in some instances without communicating with them again.)

RECENT CHANGES IN THE LAW

Since the above survey was completed, there have been certain important changes in the law, effected by Acts of Parliament:

A. By the Matrimonial Proceedings (Children) Act, 1958

1. The powers of the Divorce Division to provide for the *custody, maintenance, and education of the children* of the parties (D29 (2)) are enlarged to apply also to *a child of one of the parties* (including an *illegitimate* or *adopted* child) "who has been accepted as one of the family by the other party," as they apply to a child (whether legitimate or illegitimate) of *both parties*.

2. Where a husband has been *guilty of wilful neglect to provide reasonable maintenance* for his wife or infant children (D30 (2)), enabling the Divorce Division to order the husband to make *periodical payments* to the wife, the words "infant children" are to include any *illegitimate child* of *both* parties, and the Court may make orders for *custody of and access to* (D29 (2)) any such children. If the Court considers it in the *child's best interests*, it may order the periodical payments for the child's benefit to be made *to the child* itself, or *to some other person* on the child's behalf, instead of to the wife (D30 (2)).

3. The same Act contains further enlightened and much-needed reforms for the *protection of the children* in matrimonial proceedings (whether defended or undefended). The Court, generally speaking, is *not* to pronounce a decree of *judicial separation* (D28 (2)), or make *absolute* any decree for *divorce or nullity* (D29 (2)), unless and until the Court is satisfied *either*—

(*a*) that arrangements have been made for the *care and upbringing* of every such child under 16, and that such arrangements are satisfactory or the best that can be devised in the circumstances, *or*

(*b*) that it is impracticable for the party or parties appearing before the Court to make any such arrangements

But the Court *may* proceed without observing these requirements if: (i) there are *special reasons* against delay, and (ii) either or both of the parties have given to the Court a *satisfactory undertaking* to bring the question of such arrangements for the children before the Court within a specified time.

4. On any application to the Court for *special leave* to present a divorce petition *within three years from the date of marriage* (D27 (1)), the Judge must consider, not only the *possibility of a reconciliation* between the parties and the *interests of the children of the marriage* (which was his duty under the Act of 1950), but also the interests of any child referred to in para. A1, above.

5. Even if proceedings for divorce, nullity, or judicial separation are *dismissed*, the Court may still make provision for the custody, maintenance and education of any child referred to in para. A1 above, and may vary such orders from time to time.

6. Finally, the Court is given power, in exceptional circumstances, to commit the care of any such child *either*: (i) to a *county council* or *county borough council*, *or* (ii) to an *independent person* under the *supervision* (if the Court think fit) of a *welfare officer* or of a county council or county borough council.

B. By the Divorce (Insanity and Desertion) Act, 1958

1. The words "continuously under care and treatment" (in relation to a spouse of unsound mind) (D27 (1)) are to be interpreted *more liberally and more broadly* (in various ways) then has been the practice of the Court in the past.

2. A person who has *deserted* his or her spouse and is now of *unsound mind* may be regarded (for the purpose of divorce or judicial spearation) as *capable of forming the intention of continuing* the desertion, if the Court takes the view that the "deserting" party would in any event have stayed away (even if no unsoundness of mind had supervened). (*Note.* Hitherto the Petitioner has faced almost insuperable difficulties in such cases, since it is not normally possible to attribute to a

person of unsound mind the capability of forming any "intention" whatsoever (D8 (1)).

3. Where the Petitioner is seeking *divorce* on the ground of the Respondent's *desertion* without cause for at least *three years* preceding the presentation of the petition (D27 (1)), any *agreement for separation* (whether in writing or not), entered into before *1st January 1938*, shall be *disregarded* by the Court if either: (*a*) the Respondent *had already deserted* the Petitioner, or (*b*) the Court is satisfied that the *circumstances* in which the agreement was made would have amounted to desertion (*without cause*) by the Respondent but for the Petitioner's apparent consent, in the agreement, to a separation.

(*Note.* Desertion did not become a ground for divorce until *1st January 1938.* Some deserted spouses may have entered into separation agreements, inadvertently, *before* that date, and this provision is intended to mitigate hardship where there was (at that time) a genuine case of desertion but the case was ruined by the signature of a written agreement to live apart, or by some form of spoken words or conduct, on the part of the deserted party, appearing to signify consent to the separation.)

C. By the Maintenance Orders Act, 1958

1. Maintenance Orders *made by the High Court* (or a County Court) may be *registered in a Magistrate's Court*, which is given power to *vary* and to *enforce* such Orders. Maintenance Orders *made by a Magistrates' Court* may be *registered in the High Court*, which is given power to *enforce* such Orders. (The purpose of such registration is to make enforcement more easily effective; in some cases it may be more convenient for the wife to resort to High Court procedure; in others to procedure in the Magistrates' Courts.)

2. If the spouse (usually the husband) liable for payments under a Maintenance Order is a person *in employment*, and if his maintenance payments are at least four weeks *in arrear*, then the Court may make an *Attachment of Earnings Order*. This Order will *authorise and direct his employer to deduct from his earnings* certain sums (which the Court will specify), to be handed over *by the employer* to an official of the Court, who will pass them on to the wife as instalments towards the payment of: (*a*) the arrears, and (*b*) the amounts currently falling due under the original Maintenance Order. (*Note.* Hitherto the Courts have had no power to compel employers to collect such payments out of the defaulting husband's earnings; the wife's only remedy has been to ask for an order committing the defaulting husband to prison—a procedure which gave her *no financial redress* or assistance.)

The *Attachment of Earnings Order* will also specify the "protected earnings rate"—*i.e.*, the rate below which the Court thinks the defaulting husband's earnings should *not* be reduced by virtue of the authorised deductions. (*Note.* In other words, the Court will see that the defaulter is left with a reasonable part of his earnings to live on.)

D. By the Matrimonial Causes (Property and Maintenance) Act, 1958

1. The Court is given power to make an order against the Respondent (D27 (1)) for financial provision (D30 (1)) in favour of the Petitioner (D27 (1)) or the children, *either* at the time of the decree *nisi* (D29 (1)) *or* at any subsequent date; but the Court is not to disregard any delay on the part of the Petitioner in applying for such financial provision.

2. The Court is given power to set aside (*i.e.*, cancel the effect of) any disposition of property by a Respondent husband (or former husband) in favour of some third party, if that disposition of property has been made within the past three years (preceding the Petitioner's application for financial provision), and seems to have been made with the intention of defeating or frustrating the Petitioner's application. But no such disposition of property is to be set aside if it was made *for valuable consideration* in favour of a *person who acted in good faith* and without knowing of the Respondent's intention to defeat or frustrate the Petitioner's application. (*Note.* This will enable the Court to protect a wife, in certain circumstances, if the Respondent husband (or former husband) has (for example) transferred part of his property to his mistress, with the intention of defeating his wife's claim to maintenance, alimony, *etc.* Up to now the Court has had no power to remedy such action by a husband who has made a transfer of the kind *prior to* a Court Order for maintenance, *etc.*)

3. The power of the Court to order "reasonable provision for maintenance" out of the estate of a deceased person (D16 (2)), in a case where his will or intestacy does not leave his wife "reasonably" provided for, is now extended to benefit a *former wife* (*i.e.*, "a woman whose marriage with him was during his lifetime dissolved or annulled.") (*Note.* This definition is not limited to a former wife who was the "innocent" party in divorce proceedings; but the Court has a discretion to make or refuse the order, taking all the circumstances into account.) Such an order may be discharged, varied, suspended or revised at the suit of various interested parties.

4. The Court's powers under paras. 2 and 3 (above) are extended to protect: (*a*) a *former husband* whose former wife has divorced him, or obtained a judicial separation against him, on the ground of *his insanity* (D27 (1)), or (*b*) where the Court has ordered a settlement of the wife's property, or "periodical payments" out of her income, where there has been a decree for restitution of conjugal rights (D28 (1)).

5. The executors or administrators (D18 (2)) of the deceased spouse are not to be liable if, when a claim under para. 3 is made, they have already distributed the deceased's estate (provided they waited for 6 month after the Grant of Probate or Letters of Administration (D18 (2)); but the claimant under para. 3 can follow the property into the hands of a beneficiary and recover it (if it is still available) by means of an order under para. 3 (above).

6. Under the Married Women's Property Act, 1882, the Court was given power to decide in a *summary manner* (*i.e.*, by a rapid and simple procedure) disputes between any husband and wife about the *ownership of any property.* That power is now extended to cases where the respondent spouse *has been, but no longer* is, in control of the property, or the *claimant does not know* whether it is still in the respondent's control or not. The Court may order the necessary enquiries to be made; in appropriate cases it may also order property in the hands of the respondent, or of a third party, *to be sold*, so that the claimant may have his or her share paid out of the proceeds.

Education and Careers

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Education and Careers

INTRODUCTION.

AUNTS and uncles can be infuriating when they insist on asking what their nephews and nieces intend being when they grow up. The fact is that very few boys and girls do know, while they are still at school, what they want to be when they leave.

The following pages are written in an attempt to be helpful to nieces and nephews and to their parents, whether or not the great decision has yet been made. For those still undecided there are some hints about coming to a decision, and for those who are already inclining towards some job or career, there is practical advice not only about how to prepare for entry, what sort of examinations have to be passed but also what sort of studying may be required even after starting on the job.

The need to take great pains about selecting a job for boys and girls leaving schools in the 1960s is underlined by the lesson to be learned from the chart printed below.

NOTE ON GRAPH.—Taking 1956 as the base level, this graph shows the percentage increase in the numbers reaching the age of 15 in each year, up to 1973 in Great Britain.
The actual number for the year 1956 was 613,000; for 1962 (the top of the bulge) 929,000 is estimated, and for 1973, the figure is 805,000.

The lesson, of course, is that there may be too many children chasing too few jobs during the coming years, and each of those children would do well to realise that the ones with the higher qualifications, the ones who are better schooled or better trained for making themselves useful in a job, will be those to be selected for the job of their choice.

Once upon a time the only jobs for which the candidates needed training and testing by written examination were the Church, the Law, Medicine, and Teaching, and for all these the candidates had to go to University. Today there is hardly a trade and there is no profession which does not demand, not only a form of training, but a training which has to be tested by written examinations. These examinations may be taken while at school, but also they are often taken after leaving school, the candidate working either full-time, at a University or a Technical College, or part-time, while earning. It is particularly with this sort of job that this section will deal.

CHOOSING A CAREER

Some Personal Advice.—Before starting to deal with the groups of possible jobs, it would perhaps be helpful to say a word about how to decide what sort of work to go for. An old trick is to think of the answer to this kind of question:—

Likes

E.g., "Do I like working with people?"
"Do I like working for people?"
"Do I like working with animals or plants?"
"Do I like working with things?"
"Do I like 'Paper Work'?"

Attainments

E.g., "What standard will I reach at School?":—

Local Leaving Certificate.
U.E.I. or R.S.A. Examinations.
G.C.E. Ordinary levels in the subjects usually regarded as less difficult, *e.g.*, Geography, Art, Woodwork, English, General Science, Elementary Mathematics.
G.C.E. Ordinary levels in the more difficult subjects, *e.g.*, Additional Mathematics, French, Latin, German, Physics, Chemistry.
G.C.E. Advanced levels.
G.C.E. Scholarship levels.

Talents

E.g., "Have I any special talents for figures, for writing good English, for languages, for science, for drawing, for mending things, for making things with my hands?"

Disposition

E.g., "Would I be prepared to give up some of my leisure time to working for examinations?"

Some Suggestions.

Having thought about the answers to these questions, it is now time to make a rough survey of the jobs which exist today. These are given below under three main headings, and examples are given of jobs, each of which will probably require time to be spent, after leaving school, on working for exams.

Group One. Office Work.

Largely concerned with problems expressed in words or in figures.

Examples:

Accountancy.

Banks and Insurance Offices.

Solicitors' Offices.

Civil Service and Local Government Service.

Building Societies.

Librarianship.

Group Two. Practical Work.

Largely concerned with studying, designing, making, and repairing things.

Examples.

Mechanical, Electrical, Civil Engineering.

Surveying and Architecture.

Draughtsmanship.

Agriculture and Forestry and Horticulture.

Dentistry or Surgery or Medical Services, *e.g.*, Physiotherapy.

Laboratory Work.

Group Three. Social Work.

Largely concerned with contacts with other people, teaching them, advising them, observing them, persuading them.

Examples:

Salesmanship and Purchasing.

Teaching.

The Church.

General Medical Practice, *i.e.*, ordinary doctor.

Journalism.

The Armed Services.

The Police.

Hotel Management.

Nursing and Welfare Work, *e.g.*, Almoner or Probation Service.

The list of examples could, of course, quite easily be multiplied by ten, but those given are enough for the moment. Here is some advice to a boy or girl as to how to use them:

Having answered the questions and studied the lists, make a list of your own, of all the occupations which you think might attract you, and then read the passage about them later in this section.

Having done this, and having read some of the recommended books or pamphlets on them, then you *must* go and get some advice. This is most important; you really cannot afford to rely merely on written advice for something so important as your future. You ought to be able to get advice from your school—from the Head, or from your House Master or House Mistress, or from the member of staff in charge of Careers—but it has to be admitted that not all schools are very up to date about these things, and not all children feel the confidence they ought to feel about the advice given them by teachers; if this is so, there is always the expert available for every young person in Great Britain, and that is the *Youth Employment Officer*. In nearly all areas the Y.E.O. serves under the Education Committee, and he can be contacted therefore by writing to the Chief Education Officer for your area, whose address will be in your local Public Library. Of course, you can often contact the Y.E.O. through your school, and this is preferable, but not absolutely necessary. The great thing is to get his or her advice; it won't cost you anything, and it won't be biased, and you can be sure that he will do all he can, after a good long interview, to put you on the right track to your future. Of course you may feel, and some parents may feel, that even this is not enough, and if so there is always the National Institute of Industrial Psychology, 14 Welbeck Street, London W.1, whose Vocational Guidance Secretary will be able to help you choose your occupation. The fee for a lengthy consultation is twelve guineas.

EXAMINATIONS AND COURSES.

Examinations.—Before starting on any of the detailed requirements for those who are hoping for particular jobs, a general picture of the Examination Field may be helpful. The first important point to make clear is that a boy or girl does not have to have been at a Grammar School or at an Independent School in order to enter the Examination Field. A growing number of Secondary Modern Schools are offering examination courses which will be useful for those who want qualifications before leaving school, but even those who are not able to benefit by these while still at school, who may be in a Secondary Modern School where no external examinations are taken, or who may not be regarded by the school authorities as "up to taking" an examination, need not feel cut off from their opportunities. There is often the chance of continuing full-time education at a College of Further Education. If it is important to earn some money, there are plenty of jobs waiting for them in which, if they are prepared to work, perhaps in the evenings, perhaps on the one day per week, they are released by their employers (this system is known as the day-release scheme). By this means there are valuable qualifications they can get, and for which they can compete with those who have been to schools where examinations are the normal end to a school career.

It is important, too, not to be discouraged by an unsuccessful career at school; often boys or girls who have been hopeless in class will suddenly, after leaving school, begin to do work, perhaps in mathematics, which was quite beyond them at school, because they suddenly see the sense in learning the subject which only then they realise is connected with the work they want to do.

Some examinations are normally taken while at school; others, normally only after leaving. The commonest In-school examination is of course the *General Certificate of Education*, though it can also be taken by those who have left school, particularly in Technical or Further Education Colleges, but also through Correspondence Colleges (*see* E4).

Apart from the G.C.E. there are certain other examinations and certificates which are often prepared for through following correspondence courses; among these there are:—

Certificates of the City and Guilds Institute. The courses available through the Institute can be taken at Technical Colleges and are sometimes begun at school. More than three hundred subjects, mainly technical subjects, are available. The corresponding body (mainly for non-technical subjects) is the *Royal Society of Arts*; often their courses can be followed through Correspondence Colleges.

It will be noticed that many of these colleges prepare students to take examinations of various Professional Institutions; these examinations vary with each profession, and almost all of them have separate stages. Often it will be found that if a candidate has passed the G.C.E. at Ordinary level in certain subjects he can start the professional course farther on, that is to say he is "exempted" from one of the early stages of the course. With Advanced level still further "exemption" is often allowed.

University Degree.

The General Certificate of Education is also essential for anyone wishing to take a degree at a British University, and the details for qualifying for University entry are uniform, except that Oxford and Cambridge are a law unto themselves, and every Faculty of each University has its own special requirements concerning particular subjects passed at Advanced and Ordinary level, which is only to be expected. The minimum entrance qualifications are given below, but it is important to check with the Registrar of the University whether there are any special requirements. You need no "Street Address" for a University; simply write to the Registrar, The University, and then the name of the town or city.

SOME CORRESPONDENCE COLLEGES

The Bennett College Ltd., Sheffield.
British College of Accountancy, 20 Milton Road, Harpenden, Herts.
British Institute of Engineering Technology, College House, 29 Wrights Lane, W.8.
Civil Service Correspondence School, 10 Station Parade, High Street, S.W.12.
College of Estate Management, St. Alban's Grove, Kensington, W.8.
E.M.I. Institute, 43 Grove Park, W.4.
International Correspondence Schools, Kingsway, W.C.2.
Metropolitan College, St. Albans, Herts.
Nalgo Correspondence Institute, 1 York Gate, N.W.1.
National Institute of Engineering, 148 High Holborn, E.C.1.
Pitman Correspondence College, 20 Russell Square, W.C.1.
Rapid Results College, Tuition House, S.W.19.
The School of Accountancy, 2 West Regent Street, Glasgow, C.2.
School of Careers, College House, 29 Wrights Lane, Kensington, W.8.
University Correspondence College, Burlington House, Cambridge.
Wolsey Hall, Oxford.

Minimum Entrance Requirements for University and for Colleges of Advanced Technology:—

1. The candidate must have passed in English Language and in either four, or five other subjects.

2. The subjects must include:—
   (*a*) a language other than English;
   (*b*) either mathematics or an approved science (ask the Registrar about this if in doubt).

3. At least two of the subjects must be passed at Advanced level.

4. Candidates who offer only *four* subjects in addition to English language must pass at one and the same sitting in two subjects at the Advanced level and in one other subject at Ordinary level not related to the subjects offered at Advanced level.

A University degree is, of course, essential for doctors, dentists, surgeons; for almost all teachers of Grammar School standard; and in nearly all cases for those who hope to go into the Church of England. In nearly all other professions a degree is an advantage, and this is so even in the technical world.

Diploma in Technology. However, for those who are technically minded, and who are not attracted by study which has not much connection with the practical applications of their chosen field, there has recently been instituted a special *Diploma in Technology*, which has equivalent status to a degree. This entails four or five years' full-time study sandwiched in between long periods of working in the related industry. The "Dip. Tech." can be taken only at the *Colleges of Advanced Technology*, known familiarly as CATS. Here is a list of them:

Birmingham College of Technology.
Bradford College of Technology.
London:
  Chelsea College of Science and Technology.
  Battersea College of Technology.
Northampton College of Advanced Technology.
Loughborough College of Technology.
Salford Royal Technical College.
Cardiff: Welsh College of Advanced Technology.

In order to qualify for acceptance on a Dip. Tech. course, it is necessary to have almost the equivalent qualifications as for minimum University entrance: Advanced levels in mathematics and physics, and/or chemistry will probably be essential, though there will not be so much rigidity about the Ordinary levels.

National Certificate and National Diploma. There is also a means of entrance through the *National Certificate* and *National Diploma*, but it is safest to make enquiries concerning this mode of entry.

The National Diploma is awarded at the Ordinary level to students who have successfully completed full-time courses for two years from age 16; the *Higher National Diploma* is awarded after a three-year full-time course, starting at 18. These diplomas are usually worked for at Polytechnics or Technical Colleges, and are related to some technical career. The same is true of the *Higher and Ordinary National Certificates.* The O.N.C. is awarded to students who successfully complete three years' part-time day-release or evening courses while in employment; the H.N.C. requires at least a further two years' study under the same conditions.

The Higher National Diploma and Higher National Certificate can normally be taken at a *Regional College of Technology* or at a CAT; the Ordinary National Certificates and Diplomas, City and Guilds Examinations, and the courses run by various professional bodies are usually provided for in *Area Colleges.* In some places *Colleges of Further Education* provide courses which lead on to those taken in the *Area* or even the *Regional College.* *See* Chart (E5).

SCHOOL SUBJECTS AND CHOICE OF CAREER.

The courses available at various schools tend to become narrower after the pupil has reached the early teens, and narrower still after O level has been taken. There are some careers for which it is important to begin and to keep on with certain subjects at this stage. This does not mean that all other subjects should be dropped (on the contrary), nor does it mean that there are not a very large number of careers for which no particular specialisation is necessary, but it may be helpful to indicate the careers which are listed in this section, for which certain subjects ought to be studied seriously while at school.

Accountancy—Mathematics.
Actuarial work—Mathematics to a high level.
Agriculture—Biology.
Air Hostess—A foreign language.
Architecture—Mathematics and Art.
Army and R.A.F.—Mathematics.
Navy—Mathematics and Physics.
Banking—Mathematics.
Church—Latin and possibly Greek.
Dentistry—Mathematics, Biology, Physics, Chemistry.
Draughtsman—Mathematics and (if possible) Technical Drawing and Physics.
Engineering—Mathematics and Physics and (if possible) Technical Drawing.
Forestry—Biology.
Law (Barrister)—Latin.
Medicine—Biology, Physics, and Chemistry.
Merchant Navy—Mathematics.
Nursing—Biology.
Optician—Physics and Mathematics.
Pharmacy—Biology, Physics and Chemistry.
Photography—Mathematics and Physics.
Surveying—Mathematics.

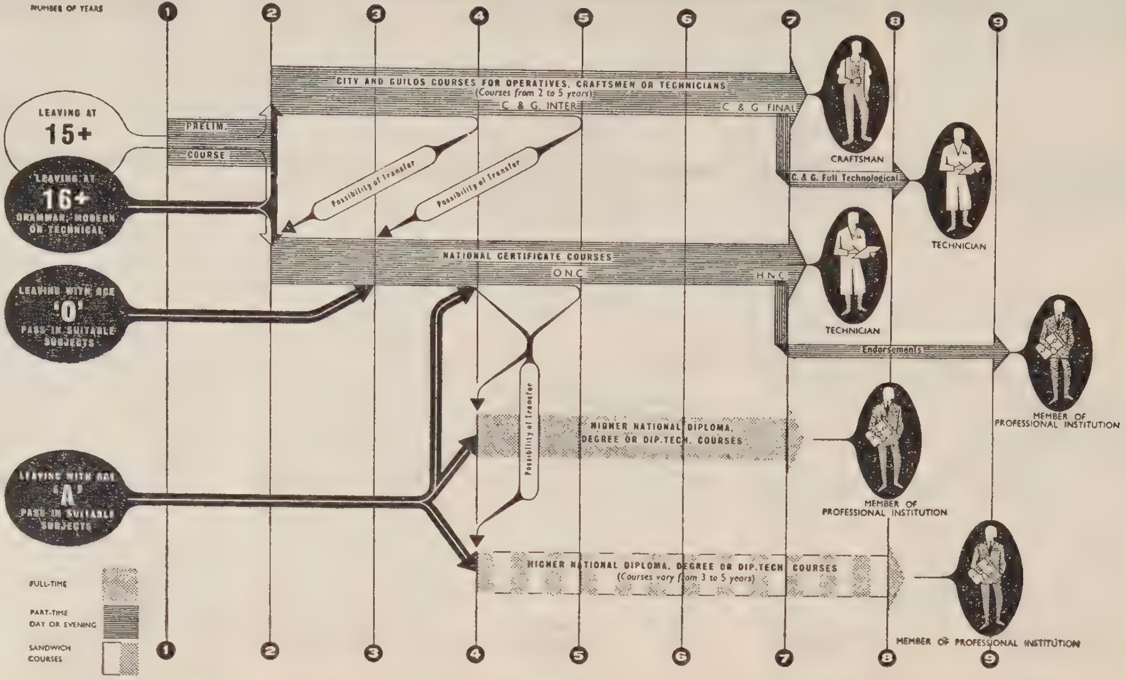
It will be noticed that there is a large number of careers which are described later on in this section which do not figure in the above list; this does not mean that they do not require special subjects to be studied at school. (For instance, very few professions allow entry without a pass in mathematics and English language at O level.)

It will be noticed too that, in the main, the subjects listed as essential above are mathematics and/or science.

In addition to the growing importance of mathematics or science, it should be noted that there is still a very large number of careers where, even if mathematics is necessary, no knowledge of science is required. Finally, even for those careers where a good knowledge of science and mathematics is required, as well as for those where it is not, ease of expression in written and spoken English, an understanding and knowledge of history and geography, acquaintance with a foreign language, are always important and useful, appreciated, and sometimes well rewarded by employers.

THE WAY TO TECHNICAL QUALIFICATIONS: A ROUTE CHART

THE ROUTES FROM SCHOOL TO TECHNICAL QUALIFICATIONS



This chart shows the broad pattern of courses and applies mainly to engineering subjects. It does not show all possible variations in the arrangement of courses in these and other subjects. (***Reproduced by permission of the Controller of H.M. Stationery Office.***)

TYPICAL APPRENTICESHIP SCHEMES IN ENGINEERING

SCHEME	AGE AND EDUCATIONAL STANDARD ON ENTRY	PRACTICAL TRAINING	FURTHER EDUCATION	CAREERS AFTER APPRENTICESHIPS
PROFESSIONAL SCHEMES: **GRADUATE**	21 - 25 DEGREE	BROAD EXPERIENCE IN WORKSHOPS, IN OFFICE DEPARTMENT AND IN CHOSEN FIELD OF ACTIVITY	POST GRADUATE LECTURES	RESEARCH or DESIGN or DEVELOPMENT, or PRODUCTION, or TECHNICAL SALES
PROFESSIONAL SCHEMES: **STUDENT**	18 - 19 G.C.E. 'A' LEVEL		COURSES FOR HIGHER NATIONAL CERTIFICATE or DIPLOMA IN TECHNOLOGY or UNIVERSITY DEGREE	
TECHNICIAN	16 - 17 G.C.E. 'O' LEVEL	BROAD EXPERIENCE IN WORKSHOPS AND OFFICES: SPECIALISED TRAINING IN SELECTED TECHNICAL DEPARTMENT	COURSES FOR ORDINARY NATIONAL CERTIFICATE or CITY AND GUILDS TECHNICIAN'S CERTIFICATE	LABORATORIES, or DRAWING OFFICE, or PRODUCTION, or TEST
CRAFT or TRADE	16 yr. (15 - 16 on probation) MODERN or TECHNICAL SCHOOL	GENERAL WORKSHOP EXPERIENCE: SPECIALISED TRAINING IN SELECTED TRADE	COURSES FOR CITY AND GUILDS CRAFT CERTIFICATE	SKILLED CRAFTSMEN e.g. TURNER, or FITTER, or FOUNDRY MOULDER, or ELECTRICIAN

[By courtesy of J. P. Freyne, Senior Lecturer, Battersea College of Technology.]

APPRENTICESHIPS.

An apprentice learns his trade while working at it; after a set period of years the apprentice becomes a skilled or a qualified person. Engineering is today the career where there are more apprenticeships than in any other trade, so the examples given below are taken mainly from engineering, but it should be remembered that many other trades now run apprenticeship schemes, but they are based on a similar system to that described here. *See* Chart (E6).

First comes the *Craft Apprenticeship*, taken up by a boy who has done well at a Secondary Modern or perhaps less well at a Technical School, and apprenticeship usually begins between the ages of 15 and 16; after a probationary period an apprentice is set to a particular trade, such as glass-blowing, tool-making, printing, or plumbing, and he is expected to study the theoretical background to his craft at the Technical College, working in most cases towards a City and Guilds or an Ordinary National Certificate.

Next in importance comes the *Technical Apprenticeship*, started at 16–17, which is sometimes known as the Student Apprenticeship; the standard of entry for this would be G.C.E. Ordinary levels in a number of subjects, including mathematics and preferably physics. These apprenticeships will lead to jobs as Draughtsman or Laboratory Assistant. Like the Craft Apprentices, the Technical Apprentices will study usually for one day per week at the Technical College, but they will hope for and expect a Higher Examination, such as Higher National Certificate.

Next comes the proper *Student Apprenticeship*, for which G.C.E. Advanced levels are essential, at least in mathematics and physics. Ultimately the aim of the student apprentices should be to qualify for the membership of a Professional Institution, such as the Electrical or Mechanical or Civil Engineers. The course may be followed through a day-release scheme, but more often today a sandwich course is arranged by which anything from three to six months is spent full-time at the college, and a corresponding time (full-time) at work. Higher National Certificate will be the first aim, followed by further work and study to obtain the full professional status.

Alternatively, and this is becoming more and more common, the student apprentice will start directly on a Dip. Tech. course, at the end of which only a certain amount of further industrial experience is necessary to achieve professional status.

Finally, there is the *Graduate Apprenticeship*, which is entered after the University and which serves as an introduction for the graduate to the practical side of Industry.

FINANCIAL AID TO STUDENTS.

Nowadays no one who is able to continue studying either at school or after leaving school should be put off by fear of financial difficulties. It may, of course, be frustrating for the fifteen-year-olds, or for the Sixth Formers or for the Evening Class Students, to see their contemporaries earning good money or having a good time while they are studying, but frustration turns to jubilation when the last exams are finished with, and when the much-desired and valued qualifications are leading the former victims not only to better paid but to more interesting work.

School Maintenance Grants.—It may be a question of staying on at school to take Ordinary or Advanced level examinations; students are not yet paid for this, but in some cases parents are; widows and those whose income is equally low are often eligible for maintenance grants (to maintain a child at school), which for a sixteen-year-old may be as much as £80 per annum. Application for such grants should be made to the local Education Officer. It should not be forgotten either that an income-tax allowance of £150 is granted for each child over 16 who is in full-time education.

University Grants.—After school, university grants are available from the County, or County Borough, Education Authority for most students who are good enough to be accepted by a University (*see* E4 (1)). They are normally quite sufficient to keep a student at University without relying seriously on their parents for help. Applications should be made normally in the final school year, and the Head of the School should be seen about these. State scholarships for University study are granted to those who do particularly well at the Advanced and Scholarship levels of the G.C.E., but, generally speaking, the holders of State scholarships are no better off, financially, than the holders of County Awards. Those who are good enough to get open Scholarships at either Oxford or Cambridge can be sure of automatically being given a State Scholarship without reference to other examinations.

Local Authority Grants.—There are other forms of further full-time study for which grants are available from or through Local Education Authorities, and these include grants for Teacher Training Colleges, and for study in Technical Colleges for qualifications in Architecture, Surveying, Librarianship; or in special training schools such as for Merchant Navy Cadets. Sometimes, however, study for some of these types of career is carried out on a part-time or sandwich basis, and the student is paid wages by his employer for the time he is studying as well as for the time he is working. As a general rule, if there is a choice between full-time or part-time study, full-time is the more advisable.

The Armed Services.—The Armed Services are very keen for study to be continued for as long as possible after school, and each branch of the Services runs its own Apprentice Schools (*see* E11, 12). The Army runs its own scientifically-biased University at Shrivenham, where students work for London University Degrees, and its own Sixth Form College at Welbeck. The Navy and Air Force offer valuable scholarships to future Sixth Formers to encourage them to stay on at school before going on to Dartmouth or Cranwell or Henlow; these are establishments for training officers, where cadets get well paid, and tuition is free. All enquiries about Services should be made to the Director of Recruitment of the branch concerned, the particulars of which are given under the heading *Armed Services* below.

Where to apply for Grants.—The sources to which parents should apply for grants are varied, and to compile a list of all the available awards and allowances would obviously require a junior encyclopædia to itself, and these remarks are meant only to give an indication of what may be done. Full details from any particular body should be obtained as follows:—

(*a*) County Authority—The Chief Education Officer.
(*b*) Large Firm—The Personnel Manager.
(*c*) Arm of Service—Director of Recruitment of the Arm concerned.
(*d*) University—The Registrar.

G.C.E. AND THE PROFESSIONAL BODIES.

Mention has already been made of the advisability of staying at school as long as possible and, in view of the remarks above indicating the possibilities of financial help for those who need it to continue their full-time education, it may be of interest to note some of the professional bodies which either *accept* the O level of the G.C.E. as providing exemption from their preliminary examinations or *require* the O level as evidence of preliminary education.

The number of subjects required varies slightly according to the professional body—but it is usually four or five, and in nearly every case English Language is an essential.

The professional bodies concerned are:—

The Association of Certified and Corporate Accountants.
The Institute of Chartered Accountants.
The Institute of Company Accountants.
The Institute of Actuaries.
The Advertising Association.
The Royal Institute of British Architects.

The Incorporated Association of Architects and Surveyors.
The Chartered Auctioneers and Estate Agents Institute.
The Institute of Builders.
The Building Societies' Institute.
The Royal Institute of Chemistry.
The Institute of Cost and Works Accountants.
The British Electrical and Allied Manufacturers Association.
The Forestry Commission.
The Royal Horticultural Society.
The Chartered Insurance Institute.
The Corporation of Insurance Brokers.
The Law Society.
The Library Association.
The Institution of Mining and Metallurgy.
The Institute of Municipal Treasurers and Accountants.
The Association of Occupational Therapists.
The Institute of Quantity Surveyors.
The Society of Radiographers.
The Rating and Valuation Association.
The Chartered Institute of Secretaries.
The Corporation of Secretaries.
The Royal Institution of Chartered Surveyors.

This is by no means a complete list, and full details about the detailed requirements for any particular professional body are set out in the Ministry of Education Circular No. 338, which also gives the addresses.

CAREERS FOR GIRLS.

Girls are difficult. They often don't like to show too much interest in their future careers, because this might make people think that they were not expecting to get married. Nothing could be more ridiculous. The girl who has a career, especially a career for which training is needed, is probably far more likely to make a good marriage, than the one who just drifts out of school into the first available job. Here are four reasons why this is so:

(1) The girl with a training will probably attract the better-educated man.

(2) If a girl has a job which holds her interest she may well find a husband who also works in the same field—a shared interest is a good basis for a marriage.

(3) The girl with a training will have something extra to give her children as they grow up, and so be a more satisfactory mother.

(4) The mother who has training qualifications can go back to her profession after her children have grown up; this not only has the advantage of adding to the family income, but means that an escape from the home to an outside interest is always available should the desire, or indeed the need, arise.

Giving advice to girls is a specialist task, and often the Youth Employment Officer either is a woman or has a qualified woman assistant who can help girls who are still at school. Further advice may be had from the Women's Employment Federation, 251 Brompton Road, S.W.3.

Careers open to girls today are no longer restricted to teaching, nursing and "secretarial," interesting and rewarding as these can be. Women can easily find jobs after being trained as accountants, engineers, and architects and, although most of us have yet to see a woman Bank Manager (there is one in the West End of London), the banks are more and more turning to women to take on responsible positions behind the counter, and often a specialist training in one profession or another, capped by a short secretarial course, can lead to some very interesting and rewarding positions as personal secretaries.

Finally, the advantages of a University degree to a girl who can and wants to continue her Sixth Form studies should be obvious, and no girl should be denied a University course just because it does not seem to lead to a job.

To avoid fruitless thumbing through jobs for boys only, here is a list of the jobs for girls, which are included in the next part of the section:

Accountancy, Advertising, Agriculture, Air Hostess, Almoner, Architect, Banking, Beauty Culture, Catering and Hotel Management, Child Care, Chiropody, Civil Service, Dentistry, Dietetics, Dressmaking, Engineering, Floristry, Hairdressing, Hospital Administration, Hotel keeping, Insurance, Journalism, Laboratory Assistant, Laundry Management, Law, Librarianship, Local Government, Medicine, Meteorology, Midwifery and Maternity Services, Museums, Music, Nursing, Occupational Therapy, Orthoptics, Personnel Management, Pharmacy, Photography, Physiotherapy, Police, Probation Service, Radiography, Secretarial work, The Services, Speech Therapy, Singing, Surveying, Teaching, Veterinary Surgery.

LIST OF CAREERS AND ESSENTIAL DETAILS.

How to Use this List.

1. The careers are listed in alphabetical order. those which are available both to girls and to boys have the letters **B. G.** beside them; if only boys are eligible, **B.**, if only girls, **G.**

2. Opposite the heading "Qualifications," initials have been used to indicate the following:—

Ordinary level of the G.C.E.	**O**
Advanced level of the G.C.E.	**A**
Ordinary National Certificate	**O.N.C.**
Higher National Certificate	**H.N.C.**

3. The indications of salary given are meant as a rough indication of what a young person may expect to start earning after qualification in the career concerned. In the rare cases where no qualification is required the starting salary is given. The upper levels of salary vary from job to job in many cases, and therefore often the upper end of the salary bracket has been omitted.

ACCOUNTANCY.

B. G.

Age of Entry. 16–18 or Graduate.

Qualifications. O or A or Degree.

Pay. £600 on qualification (£700–£800 in London Area).

Aptitudes. Ability in use of figures; capacity for prolonged attention to detail and clear expression.

Method of Entry.

1. Junior employment in Accountancy in either public service (*e.g.*, in local government) or industry.
2. As articled clerk (either in a firm of Accountants or in the Treasurer's Department of a Local Authority).
3. As a graduate in any of the above.

Further Study.

Intermediate Exam. of the Professional Body (after 2½ years).
Final Exam. of the Professional Body (after 5 years).

As the name implies, the accountant is the professional concerned with accounts of all descriptions in commerce, industry, and public affairs. The young person who starts on a five-year course of part-time study combined with daytime work as an articled or non-articled clerk must be prepared for a lot of hard work with comparatively little money at the beginning. During five years of training he or she will be expected to acquire a sound knowledge of the theory and practice of

Bookkeeping and Accounts, Auditing, Company Law, Law of Contract, Sales, Bankruptcy, Trusts, and related subjects.

The theoretical training is usually acquired from a correspondence course, although facilities are available in some areas at Local Technical Colleges. The cost of a complete course (including examination fees) is about £65, although this may be lower if Technical College courses are available.

Graduates entering the profession have three years only to serve under articles. Universities offering approved degree courses in Accountancy are Birmingham, Bristol, Cardiff, Durham (Newcastle Division), Hull, Leeds, Liverpool, London, Manchester, Nottingham, Sheffield, Southampton.

Once an accountant is qualified, advancement is very much a matter of his own initiative, record, and personality.

Note: Before starting on a course of study, it is essential to find out from the professional body concerned the exact nature of their requirements, as the details vary considerably.

Addresses of Professional Bodies.

The Institute of Chartered Accountants in England and Wales, Moorgate Place, E.C.2.

The Institute of Chartered Accountants of Scotland, 27 Queen Street, Edinburgh, 2.

The Institute of Chartered Accountants in Ireland, 7 Fitzwilliam Place, Dublin.

The Society of Incorporated Accountants, Victoria Embankment, W.C.2.

The Association of Certified and Corporate Accountants, 22 Bedford Square, W.C.1.

The Institute of Municipal Treasurers and Accountants, 1 Buckingham Place, S.W.1.

Institute of Cost and Works Accounts, 63 Portland Place, W.1.

Pamphlets.

Universities and the Accountancy Profession. Available from the Institute of Chartered Accountants.

Choice of Careers, No. 59 (H.M.S.O.), 9*d.*

ACTUARIAL WORK.

B. G.

Age of Entry. 16–18 or Graduate.

Qualifications. O or A or Degree.

Pay. £900–£1,250 on qualification.

Aptitudes. Ability in Mathematics. Must be able to develop powers of analysis and clear expression.

Method of Entry. Through Life Assurance Offices or Government Actuary's Department, either straight from school or as Mathematics or Economics Graduate.

Further Study. The professional examinations of the Institute of Actuaries, *i.e.*,

- Entrance Examination (Good A level G.C.E. exempts).
- Parts I, II, III leading to status of Associate.
- Part IV (combined with the above) leading to the status of "Fellow."

The Actuary is the expert on whom Insurance Companies rely for the calculations of insurance risks and the fixing of premiums. The would-be Actuary must be interested in and proficient at mathematics, which is going to provide him with the tools of the job. He (or she) must be prepared to continue part-time study in such subjects as Probability, Statistics, Finance, and Investment. For the qualified person there are plenty of openings at home and increasingly so overseas.

The Institute of Actuaries and their Scottish equivalent, the Faculty of Actuaries, run an Actuarial Tuition Service, which provides correspondence courses leading to the Associateship examinations of the bodies concerned. The cost of the tuition service amounts to between £35 and £40.

Addresses of Professional Bodies.

The Institute of Actuaries, Staple Inn Hall, High Holborn, W.C.1.

The Faculty of Actuaries, 23 St. Andrew Square, Edinburgh.

Pamphlets.

The Actuarial Profession. Available from the Institute of Actuaries.

The Actuarial Profession as a Career. Available from The Faculty of Actuaries.

Careers for Men and Women, No. 2 (H.M.S.O.), 6*d.*

ADVERTISING.

B. G.

Age of Entry. 16–18 or Graduate.

Qualifications. O or A or Degree.

Pay.

Juniors, £200–£250.
Trainees, £400.
Junior Copy Writers, £400.
Graduates, £650.

Aptitudes. Imagination; ability to mix and to express ideas briefly and to the point.

Method of Entry. By direct application to firm or agency on leaving school (or University).

Further Study. Study for the Intermediate and Final examinations of one of the professional bodies.

There is a great deal of competition for entry into this career, and the young man or woman wishing to go far will have to be prepared to learn while working and to develop a critical and independent mind. Nowadays much advertising work is carried out by advertising agencies, and it is by and large only the biggest organisations which carry their own advertising departments.

Agencies, in particular, have openings for specialists in the many activities connected with selling, *e.g.*, statistics, market research, commercial art, photography, technical production, and specialised overseas work. These specialists are often brought into the business after qualifying or training in another field (graduates for statistics, printers for space-salesmanship.) The potential recruit would therefore be well advised to think carefully whether or not it would pay to gain specialist experience elsewhere first. There is no truth in the idea that one can afford to run an expensive car in this career by virtue of the ability to think of a new catch-phrase every morning.

Although the examinations of the two Associations are not essential, the courses are a very good supplement to practical experience. The Associations have a Joint Intermediate examination, but run separate Membership examinations. In addition, the Institute of Practitioners in Advertising have an Associate Membership final examination designed for the "specialists" mentioned above.

Addresses of Professional Bodies.

The Advertising Association, 1 Bell Yard, W.C.2.

The Institute of Practitioners in Advertising, 44 Belgrave Square, S.W.1.

Advertising Appointments Bureau, Victoria House, Bloomsbury Square, W.C.1.

Pamphlets.

A Career in an Advertising Agency. Available from The Institute of Practitioners in Advertising.

Careers in Advertising. Available from The Advertising Association.

Choice of Careers Series, No. 44 (H.M.S.O.), 9*d.*

ALMONER.

B. G.

Age of Entry. 21+.

Qualifications. Diploma in Social Studies or Degree in Social Studies.

Pay. £525–£950.

Aptitudes. Tact, patience, interest in people, ability to express oneself concisely in writing.

Method of Entry. Acceptance by Institute of Almoners (as a result of personal interview).

Further Study. One year study—partly theoretical at Institute of Almoners—partly practical in hospitals throughout country.

The Almoner is usually a woman, although some men are nowadays taking up this work.

The work involves dealing with all the social problems that arise in connection with the sick. For example, worry about loss of income and care of children during sickness can seriously retard a patient's recovery. The Almoner is the person who gives advice on a score of problems. She must, for example, know where to go to find a home for a crippled lady whose sick daughter can no longer look after her; make arrangements for convalescence if required to do so; be able to give advice on finding financial assistance when a family's breadwinner can no longer work.

To carry out the duties properly, she must be able to size up and deal with people tactfully and patiently. It is the reports made by the Almoner which give the doctor a picture of the patient as a human being, which may be essential to the understanding of some cases and, anyway, is desirable in all.

This is by no means an overcrowded profession, perhaps because the pay is not outstanding when one considers the amount of training involved, but it is certainly one which can give deep satisfaction to those anxious to be of service to their fellows.

Address of Professional Body.

The Institute of Almoners, 42 Bedford Square, W.C.1.

Pamphlets.

Medical Social Work. Available from The Institute of Almoners.

The Almoner. Available from The Institute of Almoners.

Careers for Men and Women, No. 39, (H.M.S.O.), 1*s.* 9*d.*

AIR PILOT (CIVIL).

B.

Age of Entry. 18–20 (23 for Graduates).

Qualifications. A.

Pay. £1,100+ on completion of training (+ allowances).

Aptitudes. Highest standards of reliability, outlook, and physical fitness essential.

Method of Entry. Acceptance by the College of Air Training, Hamble, Hants.

Further Study. 2 years at College of Air Training.

The very high cost of becoming a Civil Airline Pilot privately has, until recently, made this an impossible career for nearly all except those who have been trained by the R.A.F.

Changes in the organisation of the R.A.F. and the end of National Service have meant that the Civil Airlines have been gradually losing their main source of recruits and there are now brilliant prospects for the young man who is good enough to secure a place at the new College of Air Training. The cadet will have a two-year residential course covering all aspects of flying, as well as general education.

Those chosen will be sponsored by one or another of the Airlines, and the cost to the student's parents will be no more than what they would pay if he were attending a normal University course with Local Authority assistance.

There is no need for any air-minded young man considering this career to fear that he may be left "grounded" at a comparatively early age, as the tendency is for the ceiling age for active pilots to rise. Given physical fitness, pilots may expect to fly well on into their fifties.

It must be emphasised, however, that competition for places is very keen, and only the very best type of candidate can hope to be accepted. The cost of training one cadet is between £4,000 and £5,000, and it is only to be expected that the Government and the Airlines, who between them provide the money, should take the utmost care to ensure that the number of cadets failing the course is reduced to the absolute minimum.

Addresses.

The Chief Personnel Officer, British Overseas Airways Corporation, H.Q. Building, London Airport, Hounslow, Middlesex.

The Personnel Manager, British European Airways, Keyline House, Ruislip, Middlesex.

The Ministry of Transport and Civil Aviation, Ariel House, Theobalds Road, W.C.1.

AIR HOSTESS (AIR STEWARDESS).

G.

Age of Entry. 21–28.

Qualifications. At least one foreign language.

Pay. £7 15*s.* per week (training) + £2 per week flying pay when trained. £570 p.a. after one year.

Aptitudes. Language ability, good diction, tact, and patience.

Method of Entry. Posts are advertised in National Press.

Further Study. Up to 13 weeks' preparatory training.

The girl who wishes to be an Air Hostess must be prepared to face very stiff competition. The competition is, in fact, so great that the Airlines are able to demand very high standards of turnout, poise, and personality.

The Air Hostess's work could be described as social work, as it involves not only the congenial task of handing round drinks and the food which has been prepared by the Air Steward but also catering for the many needs of the infinite variety of passengers, from babes in arms, sometimes unaccompanied, to worried old ladies who have mislaid their passports, or simply people who are feeling or being sick.

It is a great advantage to have had nursing and catering experience when applying for these posts. There is traditionally a high "wastage rate" of hostesses through marriage, but it should not be overlooked that for those who wish to make a long career with an Airline, promotion possibilities are good—Flight Stewardesses and Senior Catering Officers are recruited from the ranks.

ARCHITECTURE.

B. G.

Age of Entry. 18+.

Qualifications. A. Otherwise Intermediate or Final exam. of R.I.B.A. or equivalent or Degree.

Pay.

1. With Intermediate qualifications, about £600.
2. With Final qualifications, £800.

Aptitudes. Artistic ability, neatness and reasonable facility in mathematics.

Method of Entry.

1. As articled pupil or junior assistant to Architect.
2. 3-year full-time course at Technical College of School of Architecture, entering profession as assistant with Intermediate Exam. of R.I.B.A. or equivalent.
3. 5-year full-time course at School of Architecture, entering profession with Final Exam. of R.I.B.A. or equivalent.

Further Study.

1. If entering as articled pupil or junior assistant: about 7 years' part-time study, leading to Final Exam. of R.I.B.A.
2. If entering after 3-year full-time course: about 3 years' part-time study, leading to Final Exam. of the R.I.B.A.

Young people who do not feel an almost compelling desire to become architects, and who have little in the way of artistic gifts, are well advised not to consider architecture as a career. The student, however conscientious, who does not have an artistic flair, is unlikely to be particularly happy or successful. This is not meant to imply that the qualified architect has an exciting career of cathedral designing to look forward to. This there might possibly be at some time or another, but much of the time—especially at the beginning of a career—will be spent in routine work. Even the qualified person starts, almost without exception, in the office of an established architect or in the Architect's Department of a Local Authority. This is partly because the newly qualified have to gain 12 months' practical experience and take a final examination in order to secure registration with the Architects' Registration Council. Another reason is that Architects—like Solicitors—are not allowed to advertise, and so the young free lance would find the odds heavily against him in his initial attempts to find work.

Address of Professional Body.

Royal Institute of British Architects, 66 Portland Place, W.1.

Pamphlet.

Choice of Careers Series, No. 16 (H.M.S.O.), 1*s.*

AGRICULTURE.

B. G.

Age of Entry. 17+.

Qualifications.

1. For Farm Institute Course—none.
2. For Agricultural College Course—O.
3. For teaching and advisory service—Graduate.

Pay.

1. For Farm Managers £350+.
2. For Commercial Agricultural Representatives—about £300+ and commission.
3. For Technical Officers of Ministry—£545+.

Aptitudes. Genuine interest in the country and in farming. Ability to use one's hands.

Method of Entry. Normally one year on farm, followed by:—

1 year at Farm Institute, or
2 years at Agricultural College, or
3 years at University.

Further Study. Diploma Course (at Agritural College) or Degree Course (at University).

The young person who wishes to take up Agriculture as a career has normally to choose one of three ways of gaining the necessary knowledge and experience. Whichever way is chosen, it is highly advisable to spend a year on a farm gaining practical experience and making quite sure that this *is* the life one wishes to lead.

Then for those who are interested chiefly in the practical side and who do not wish to pursue theoretical studies too far, the best choice is the 1-year course at a Farm Institute. This will fit them to become a skilled farm worker or smallholder.

Those who intend to become farm managers or bailiffs do better to follow the 2-year course at an Agricultural College. These are both residential and non-residential, and the course leads to the National Diploma.

The last group are those who intend to become teachers or advisers in the service of the Ministry of Agriculture, Fisheries, and Food, or of County Councils. These are the ones who attend University and attain the B.Sc.(Agric.) degree.

There are, in addition to the three main methods of entry indicated above, the Agricultural Apprentice Scheme, and the "British Boys for British Farms" Scheme, which is sponsored by the Y.M.C.A. The Y.M.C.A. also arranges for boys to contact farmers for their year's practical experience.

The Apprenticeship lasts for three years. Apprentices are allotted to selected farms and, where necessary, arrangements are made for training to be carried on at more than one farm. The Y.M.C.A. scheme caters more for boys with a *town* background and has been operating successfully for more than 25 years.

For those wishing to do research a degree is almost essential.

Addresses.

The Agricultural Research Council, Cunard Buildings, Lower Regent Street, S.W.1.

Ministry of Agriculture, Fisheries and Food (Education Branch), Great Westminster House, Horseferry Road, S.W.1.

The Secretary, Y.M.C.A., "British Boys for British Farms," 4 Great Russell Street, W.C.1.

Pamphlets.

Choice of Careers Series:

No. 85, *Agriculture and Horticulture: Managerial and Technical Posts* (H.M.S.O.), 1*s.* 3*d.*

No. 86, *Farm and Horticultural Workers* (H.M.S.O.), 1*s.* 9*d.*

THE ARMED SERVICES.

All three Services today offer exceptional opportunities to those who enjoy community life, who wish to travel, and who have a sense of adventure. Space does not permit the giving of full details for each branch, and the following should be regarded as the barest of outlines only. Dealing first with entry through Non-Commissioned Ranks:

(*a*) **The Army.**

Men and Boys.

Age of Entry. 15–30.

Qualifications. Ability to pass selection test.

Pay. From 31*s.* 6*d.* per week (boy entrant) to £12–£16 per week (all found), depending on rank, service, and married status.

Aptitudes. In general, interest in outdoor life and sense of adventure.

Method of Entry.

1. Boys at 15+:—to Army Apprentice School.
2. Men:—Apply Army Recruiting Office.

Further Study. Great variety of courses available. Type and degree of specialisation largely dependent on individual's ability.

There are three Army Apprentice Schools—at Arborfield, Chepstow, and Harrogate, which give boys of school-leaving age thorough courses of technical training (including general education) lasting 3 years.

When these boys join the colours they stand an excellent chance of early promotion to Warrant

Officer or even commissioned rank. Their specialised training, which is developed and widened during their subsequent service, is also a very good preparation for skilled work in the civilian world when they are released.

Men under 30 (in exceptional cases 33) have similar opportunities during service of up to 22 years. Great emphasis is laid on sport and recreational facilities are available wherever the Army is, at next to no cost. The grim barrack blocks and needlessly restrictive regulations are becoming increasingly a thing of the past.

(*b*) **The R.A.F.**

Men and Boys.

Age of Entry. 15–40.

Qualifications. Selection and Aptitude tests to be passed.

Pay. 31*s*. 6*d*. per week (boy entrant) to about £16 per week (all found), depending on rank and married status.

Aptitudes. As for Army—perhaps greater need for potential skills.

Method of Entry.

1. Boys at 15+:—Aircraft Administrative Apprenticeship or Boy Entrant Training Scheme.
2. Men:—Apply R.A.F. Recruiting Office.

Further Study: Unlimited opportunities for those who are able, and want, to continue specialised training.

Boys who enter the Service on Aircraft and Administrative Apprenticeships or the Boy Entrant Training Scheme are trained according to ability and aptitude in a variety of trades covering all branches of R.A.F. activity. Examples are: aircraft engineering, radio, electrical, instrument and general engineering, telegraphist, photographer. They are thoroughly prepared for their subsequent career in the R.A.F., and have every chance of early promotion to Senior N.C.O. and even commissioned rank. There are three R.A.F. Apprentice Schools at Halton, Hereford, and Locking.

Men who enter from the age of 17½ receive a thorough training in one of the twenty-two trade groups, and here again there is every opportunity of promotion for those who show intelligence and initiative.

As with the Army, sport and recreational facilities are outstanding, and the airman can leave the service after 22 years with a pension and a thorough knowledge of a trade which he can turn to good account in civilian life.

(*c*) **Royal Navy.**

Men and Boys.

Age of Entry. 15–28.

Qualifications. Ability to pass Selection Test (Artificer Apprentice—O).

Pay. 31*s*. 6*d*. per week (boy entrant) to £12–£16 (all found), depending on rank, service, and married status.

Aptitudes. As for Army and R.A.F.

Method of Entry.

1. Boys:—
   (i) As Junior Entry.
   (ii) As Artificer Apprentice.
2. Men (17½+):—
   (i) Apply Naval Recruiting Office.
   (ii) Direct entry as Artificer—apply Naval Recruiting Office.

Further Study. Within the framework of the Service, the new entrant is encouraged to study to as high a standard as his capabilities allow.

Although all men and boy entrants into the Royal Navy receive wide and thorough training to suit them for their eventual jobs, there is one particular type of entry requiring higher initial qualifications and larger specialist training. This is for those who become Artificers. The boy entrant serves a trade apprenticeship for 4 years in the course of which he is chosen for one of the Technical Branches. Direct Entry as an Artificer (for men) is available for those who have done 4 years' civilian apprenticeship, and can pass a trade test, to become an Engine Room, Aircraft, Electrical Ordnance, or Shipwright Artificer.

As with the other Services, promotion prospects up to and including command rank are good for those with keenness and determination, and many of the specialist skills acquired during service are of great use in later civilian life.

General Note on Terms of Service.

It must not be forgotten that the Forces expect a fair amount of service in return for the very expensive training they provide, and the following is an indication of how each branch of the Services arranges its terms:—

1. **Army.** Apprentices undertake to serve until 26 years of age + 4 years in Royal Army Reserve. Service may be extended to 22 years, when there is a pension.
2. **R.A.F.** Apprentices undertake to serve until 30 years old (boy entrants until 28 years + 2 in Reserve). At any time after the age of 22 an airman may be re-engaged until he is 55, but he keeps the right to leave at 40 with a pension.
3. **Royal Navy.** All recruits except Artificer Apprentices have to serve 9 years (reckoned from the age of 18). Artificer Apprentices are required to serve 12 years (reckoned from the age of 18), as their training lasts so much longer.

Addresses from which detailed information about all three Services can be obtained:—

1. *Army.* The Under Secretary of State, War Office (M.P.6), S.W.1.
2. *R.A.F.* The Central Recruiting Office, Royal Air Force, Victory House, Kingsway, W.C.2.
3. *Royal Navy.* The Director of Naval Recruiting, Admiralty, S.W.1.

Pamphlets.

H.M. Forces: Openings for Boys in the Ranks:—

No. 50, *Her Majesty's Forces* (H.M.S.O.), 1*s*. 6*d*.

No. 55, *Army* (H.M.S.O.), 1*s*. 6*d*.

No. 56, *Royal Air Force* (H.M.S.O.), 1*s*. 3*d*.

No. 54, *Royal Navy* (H.M.S.O.), 1*s*. 6*d*.

Commissioned Service (All Arms).

B.

Age of Entry. 17–19.

Qualifications. Generally A, exceptionally O.

Pay.

1. *Army.* £383 p.a. + on commissioning as a 2nd/Lieut.
2. *R.A.F.* £456 p.a. + on commissioning as a P/Officer.
3. *Royal Navy.* £365 p.a. + on commissioning as a A/Sub/Lieut.

Given efficient service, promotion is automatic to ranks of Major, Wing Commander, and Lieut. Commander in the respective Services. Pay in these ranks is around £1,300 p.a. + considerable allowances, *e.g.*, Marriage Allowance, or flying Allowance.

Aptitudes. All three Services demand the highest standards of personality and integrity. Initiative, leadership, and self-reliance are essential qualities.

Method of Entry.

1. *Army*:—
   (i) To Welbeck College (the Army's 6th Form Public School); thence

to Sandhurst after good O level results in science and mathematics.
(ii) To Sandhurst direct.

2. *R.A.F.*:—
   (i) To R.A.F. College, Cranwell.
   (ii) To R.A.F. Technical College, Henlow.

3. *Royal Navy*:—
   (i) To Britannia Royal Naval College, Dartmouth.
   (ii) Suitably qualified candidates by interview for training and 12-year Commission in Fleet Air Arm.

Further Training. The Officer training of the Service concerned; then study for promotion examinations and a great variety of specialist courses throughout Service career.

Space does not allow the giving of detailed requirements and conditions of service. Broadly speaking, a candidate for a commission in any of the Armed Services must be of reasonable academic attainment (at least A level of the G.C.E.); must satisfy the Service Selection Board as to his suitability, and must be physically fit.

Permanent Commissions are available in the Army and the R.A.F., for graduates wishing to enter the Service. There is an ever-growing demand for entrants with scientific qualifications as the Services grow yearly more technical.

Short Service commissions for varying periods of years are also available in all three arms. They are non-pensionable, but carry a handsome gratuity at the end of the contract, and opportunities exist for converting these commissions into permanent commissions carrying the normal opportunities of advancement and pension entitlements.

No interested boy should be put off this career because of stories of the need for a private income. The vast majority of serving officers nowadays live successfully on their pay. Marriage, education, and disturbance allowances are generous, and make a great difference to the apparently modest basic scale.

Pamphlet.

No. 68, *H.M. Forces: Commissioned Service* (H.M.S.O.), 1*s*. 6*d*.

THE WOMEN'S SERVICES (The Women's Royal Army Corps, The Women's Royal Air Force, The Women's Royal Naval Service).

G.

Age. 17½+.

Qualifications. None laid down.

Pay. From £2 9*s*. per week on entry, all found.

Aptitudes. Liking for community life, willingness to travel, and ability to become proficient in a trade.

Further Study. In all cases, to acquire proficiency in a trade. In some cases, for promotion examinations.

The Women's Services are designed to relieve pressure on the available man-power, and there is, therefore, a variety of interesting careers within the framework of each Service. The following are examples of the main trades which can be studied and practised in each arm of the Services:—

W.R.A.C. Catering, Clerical work, Electrical work, Motor Transport, Signals, Storekeeping.

W.R.A.F. Aircraft Engineering, Radio work, Electrical work, Motor Transport, Air Traffic Control, General Engineering, Police, Radar Operating, Photography, Medical, Accounting, Supply.

W.R.N.S. Radio work, Air Mechanic, Radar, Telegraphist, Cinema Operator, Clerical, Supply, Catering, Medical.

Pay is at about three-quarters of the equivalent rating for men, and after 22 years' service women are entitled to a pension. At regular intervals they have the option of ending their Service, and can in any case withdraw on marriage if they wish.

Officers are recruited: (1) from the ranks, or (2) by direct entry.

Terms of service for officers are somewhat complicated, and vary from branch to branch, but in essence, an officer either serves for a period of 20 years to earn a pension or has a short-service commission, which usually carries a gratuity.

Addresses.

1. *W.R.A.C.* The Under Secretary of State, War Office (M.P.6), S.W.1.
2. *W.R.A.F.* The Central Recruiting Office, Royal Air Force, Victory House, Kingsway, W.C.2.
3. *W.R.N.S.* The Director, W.R.N.S., Queen Anne's Mansions, S.W.1.

Pamphlet.

No. 63, *H.M. Forces: Women's Services* (H.M.S.O.), 1*s*. 9*d*.

AUCTIONEERING OR ESTATE AGENCY.

B.

Age of Entry. 16–18.

Qualifications. O.

Pay. £500–£600 (on qualification as Junior Assistant).

Aptitudes. Ability to make clear judgments and master complicated detail.

Method of Entry.
1. As Junior Clerk.
2. As Articled pupil.
3. As Graduate in Estate Management.

Further Study. Part-time study for professional qualification.

There are two main branches of this profession, namely the urban and the rural. This is recognised in the examinations of the professional bodies, and the candidate is able to study in accordance with his own inclinations and background. Thus the young countryman will probably feel more at home studying Agricultural Science, and Husbandry and Farm Management, rather than Dilapidations and Fixtures and Domestic Sanitation.

This glimpse of a section of the candidate's studies may serve to dispel the idea that all a qualified Auctioneer and Estate Agent has to do is to earn money through exercising a big voice and a small hammer.

Indeed, through a combination of training, study, and experience, he has to become an expert in such matters as the money market, valuations, mortgages, construction and maintenance of buildings, and have more than a nodding acquaintance with the Law of Property and the Law of Contract.

The three ways into the profession are:

1. By service as a Junior Clerk combined with part-time study.
2. By taking articles, which may cost over £200 for the premium. This is a more satisfactory way than (1) above, and arrangements can often be made to pay the premium by instalments, or even to have it waived altogether.
3. By entry with a degree, which must be either the B.Sc. (Estate Management) of the University of London or the B.A. (Estate Management) of the University of Cambridge. Both these degrees provide exemption from the professional examinations.

There are no laid-down salary scales for the profession at present, but a qualified successful

man could expect to earn up to about £1,500 p.a. as Manager. There are also some openings in the Civil Service for suitably qualified people.

Addresses of Professional Bodies.

The Chartered Auctioneers' and Estate Agents' Institute, 29 Lincoln's Inn Fields, W.C.2.

The Incorporated Society of Auctioneers and Landed Property Agents, 34 Queen's Gate, S.W.7.

Pamphlet.

Careers for Men and Women, No. 6 (H.M.S.O.), 9*d.*

BANKING.

B. G.

Age of Entry. 16–18.

Qualifications. O (or ability to pass Entrance Exam).

Pay. £270–£900.

Aptitudes. Integrity and ability to mix.

Methods of Entry. By application to local or Staff Manager of Bank concerned.

Further Study. For Diploma Examinations of Institute of Bankers (either Banking Diploma or Trustee Diploma).

Nowadays there are many opportunities in the world of banking for the keen boy or girl who is prepared to study and take a real interest in the job. Although the starting salary is modest, some idea of the prospects may be gained from the fact that out of every three young men joining a bank one can expect to become a Manager or executive of similar status. The pre-war regulation whereby girls had to resign on marriage has now been largely withdrawn, and a keen, intelligent girl has good prospects of earning more than £1,000 p.a. The widespread belief that the promotion—if it comes at all—comes only late in a career is without foundation today, and in most banks those who are going to go ahead are noted for promotion within the first 10–12 years.

Banks are well known as good employers. Encouragement (often financial) is given to continuing study, pensions are usually two-thirds of the eventual salary, and often non-contributory. Assistance with house purchase is normally obtainable at rates which are far better than the man in the street can obtain from other sources. Girls who do leave on marriage can expect a "dowry" if they have completed a reasonable term of service.

Addresses of Professional Bodies.

The Institute of Bankers, 10 Lombard Street, E.C.3.

Institute of Bankers in Scotland, 62 George Street, Edinburgh.

Pamphlets.

Choice of Careers Series, No. 67 (H.M.S.O.), 1*s.*

BEAUTY CULTURE.

G.

Age. Possible at 16+, but reputable firms usually wait till 24.

Qualifications. —

Pay. £7–£8 after 2 years. (There are no fixed rates.)

Aptitudes. Ability to get on with women, tact, self-confidence, and good manner of speaking.

Method of Entry. Acceptance by private training organisation.

Further Study. 3–12 months' training.

The usual way of acquiring training is to attend a privately run school, fees for which vary, but which for a year's course are in the neighbourhood of £120 p.a. Local Authorities rarely give grants for training. The courses, which are theoretical as well as practical, lead to a diploma issued by the School, and this is, of course, useful in obtaining a post. For those who wish to run their own salons, there are often side courses in such things as Salesmanship, Display, and Management. Many firms expect candidates to have done a preliminary course in Hairdressing (*see* E22 (2)) first.

It must be emphasised that this is a tiring and often frustrating job, and the successful girls are the ones who can stand for long hours without showing strain, and who can keep even-tempered even when there is a long run of ill-mannered or inconsiderate clients.

Addresses.

Barrett St. Technical College, Oxford Street, W.1.

The Delia Collins School of Beauty Culture, 40 Sloane Street, Knightsbridge, S.W.1.

The Academy of Beauty Culture Ltd., 72 Park Mansions, Knightsbridge, S.W.1.

The Mary Wood Training School of Beauty Culture and Salesmanship, 42 Beauchamp Place, S.W.5.

The Mary Reid School of Beauty Culture, 8 Queen Street, Edinburgh.

CATERING AND HOTEL MANAGEMENT.

B. G.

Age. 15+. 16+ for Hotel Management Course.

Qualifications. Preferably O.

Pay. £400+.

Aptitudes. Interest in making other people happy and comfortable; practical efficiency; interest in food and drink extending beyond greediness.

Method of Entry. As student in Technical College which runs a Hotel and Catering Course. (Addresses of these from Hotel and Catering Institute, or from Careers Pamphlet No. 33.)

Further Training. One to four years' part- or full-time study in a Technical College leading to Diploma or Certificate.

Individual Colleges (*e.g.*, Battersea College of Technology and Westminster Technical College) give their own awards on satisfactory completion of their own courses; to an increasing extent Local Authority Technical Colleges are running courses in Hotel Work, including cookery, and students are prepared for the City and Guilds Institute Certificates. Courses vary in length, and often the training course includes practical experience in a hotel or restaurant; sometimes up to one year will be spent abroad. Jobs in hotels, either as chefs or as assistant managers are readily available to those who are well qualified; the pay is good and the prospects encouraging, but hotel work of all kinds is inevitably wearing, both physically and mentally, and good health and even temper are important pre-requisites.

Addresses.

Battersea College of Technology, S.W.1.

Westminster Technical College, Vincent Square, S.W.1.

Hotel and Catering Institute, 24 Portman Square, W.1.

Pamphlet.

Choice of Careers Series, No. 33 (H.M.S.O.)

CHILD CARE.

B. G.

Age. 21. Graduate or comparable qualification.

Pay. About £575 rising to about £750.

Aptitudes. Interest in and sympathy for children, ability to get on with people and create confidence.

Method of Entry. Selection by Central Training Council in Child Care.

Further Study. 1 year's University Course including practical vacation work.

The Child Care Officer works for a Local Authority or a voluntary organisation concerned with the welfare of children. He (or more usually she) is concerned with arranging the care of children who are not able to enjoy normal home life.

The following are some of the duties:—

1. Investigation of cases where children need to to be taken into the care of the Local Authority.
2. The finding of suitable foster parents and subsequent supervision of the foster-children's welfare.
3. Work to keep families together wherever possible, and to bring them together where they have been broken.
4. Representation of Local Authority or voluntary organisation in Court.
5. Arrangements for adoption.

The work is of absorbing human interest and, as so often in the case of the social services, the financial rewards are comparatively low. For those who rate service to others higher than personal reward, it provides, however, work of great responsibility which has its own satisfaction and for which there is a constant and growing need.

Address.

The Central Council in Child Care, Home Office, Horseferry House, Thorney Street, S.W.1.

CHIROPODY.

B. G.

Age. 17+.

Qualifications. O.

Pay. When qualified £435–£700 p.a. (approx.) (in public service).

Aptitudes. Interest in people, good eyesight, reassuring personality.

Method of Entry. Acceptance by School recognised by Board of Registration of Medical Auxiliaries.

Further Study. 3 years' full-time course leading to Final Professional Examination.

Chiropody—care of the feet—is becoming increasingly important nowadays. This is borne out by the growing number of posts available in public service (hospitals and clinics) and large firms. Probably the majority of qualified people still prefer, however, to go into private practice. When a practice is well established it can provide a very reasonable living, but there is always the difficult period when the new practitioner is getting himself known, and the beginner must be prepared for lean times at first.

Private practice is attractive partly because one can equip oneself for the job for little more than £100.

Address.

The Society of Chiropodists, 8 Wimpole Street, W.1.

Pamphlet.

Choice of Careers Series, No. 61 (H.M.S.O.), 6*d.*

THE CHURCHES.

B.

The Ministry or priesthood can hardly be considered a career in the same sense as most of the jobs in this section. Financial reward is limited, and the boy who wishes to become a minister must be prepared for a lifetime of service to others and be convinced of his own vocation. This applies to all the churches, and the first thing for any boy to do is to consult the minister of the church he attends. The following is intended, then, as an outline only of the procedure where four of the main churches are concerned. No reference has been made to salary or "promotion" prospects.

(*a*) **Church of England.**

Age. Normally 20.

Qualifications. Up to 25 years old, normally a Degree. After 25—A may suffice.

Method of Entry. Application through minister to Central Advisory Council of Training for the Ministry.

Further Study. Normally a full-time University Degree followed by 2 years at a Theological College. Modified arrangements are made for the training of those who wish to enter the Ministry later in life.

Address. The General Secretary, Central Advisory Council of Training for the Ministry, Church House, Westminster, S.W.1.

(*b*) **Roman Catholic Church.**

Age. Candidates for ordination must notify their intention from age of 13+.

Qualifications. Usually O or A before acceptance into Seminary.

Method of Entry. Via Parish Priest.

Further Study. 6 years or longer in a seminary at home or abroad.

(*c*) **The Methodist Church.**

Age. Preferably before 30.

Qualifications. Passing the Local Preacher's written examinations.

Method of Entry. Via the Superintendent Minister of the circuit in which he is a church member.

Further Study. 3 or 4 years at one of six Residential Colleges affiliated to a University Course, probably including a degree.

Address. The General Secretary, Ministerial Training Committee, 1 Central Buildings, Westminster, S.W.1.

(*d*) **The Baptist Church.**

Age. Under 40.

Qualifications. Usually O.

Method of Entry. Via the Association to which candidate's Church belongs.

Further Study.

1. 3 to 6 years at a Baptist College including perhaps a degree course at University to which College is affiliated.
2. Examinations prescribed by Baptist Union.

Address. The Baptist Union of Great Britain and Ireland, The Baptist Church House, 4 Southampton Row, W.C.1.

THE CIVIL SERVICE.

B. G.

There are three main classes of the Civil Service, which are dealt with separately below. The openings in the Foreign and in the Scientific Civil Service are listed at the end of this section.

(*a*) **The Clerical Class.**

Age. 16–20.

Qualifications. At least O or appropriate Civil Service examination.

Pay. £282–£789 p.a.

Aptitudes. Various, according to department involved, but in all cases a liking for general office duties.

Method of Entry.

1. By Clerical Class Examination.
2. By interview if holding O.

The Clerical Class makes up the largest group of Civil Servants, and the work varies according to the department concerned. Thus the Clerical Officer may have to compile statistics, prepare documents, check accounts, or to interview members of the public and deal with correspondence. Newcomers to departments are systematically trained in the work they will be doing.

Opportunities exist within the Service for promotion to the Executive Class, either by internal examination or, in the case of Civil Servants over the age of 28, on merit. Pensions are non-contributory (except in so far as dependents are concerned). There is usually a five-day week and holidays are generous. Juniors are often assisted with lunch vouchers, and even lodging allowances. Welfare and security of tenure are excellent.

(*b*) **The Executive Class.**

Age. 17½–24.

Qualifications. A or appropriate Civil Service Examination.

Pay. £447–£1,140 (basic grade).

Aptitudes. Sound judgment, initiative, sense of responsibility.

Method of Entry.

1. By Executive Class Examination.
2. By interview if holding A.

The work of the Executive Officer might be summed up as the detailed carrying out of policy that has been decided, and thus can carry a considerable amount of responsibility. As with the Clerical Class, training is given to new entrants to fit them for their duties, and some officers are chosen for specialist training in such fields as accountancy or statistics. Those who show great ability have opportunities of promotion to the Administrative Class, and many more reach the grades of Higher Executive Officer, Senior Executive Officer, and Chief Executive Officer, with correspondingly bigger salaries.

(*c*) **The Administrative Class.**

Age. 20½–24.

Qualifications. Normally a good degree, and/or appropriate Civil Service examination.

Pay. £655–£2,120 p.a.

Aptitudes. Creative approach, judgment of highest order, capacity for involved and protracted original work.

Method of Entry.

1. Administrative Class Examination and interviews.
2. 1st and 2nd Class Honours Degree followed by tests and interviews.

The Senior Civil Servants in this Class are the people responsible for formulation of national policy in accordance with the wishes of the Ministers. These posts are among the hardest to obtain, and any boy or girl going to University with the intention of becoming an Administrative Class Civil Servant should not be disappointed if the goal is not reached.

The work involves giving expert advice to Ministers of the Crown, planning new proposals, giving flesh and blood to the wishes of Parliament, and the organising of departmental work. For the very best are the rewards of a Permanent Under-Secretaryship, and the attendant heavy responsibilities.

The foregoing is an indication of the structure and possibilities of the three main classes of the Civil Service. There are in addition many ancillary and specialist departments which offer attractive careers, such as the following:—

1. (Parallel to Clerical Branch): Assistant Preventive Officers, Cartographical Draughtsmen, Assistants in Scientific Civil Service, Foreign Service (Grade 6, Branch B).
2. (Parallel to Executive Branch): Officers of Customs and Excise, Assistant Experimental Officers in the Scientific Civil Service, Foreign Service (Grade 5, Branch B).
3. (Parallel to Administrative): Statisticians, Patent Examiners, Inspectors of Taxes, Inspectors of Factories, Scientific Officers, engineering posts, Foreign Service (Senior Branch).

Address.

The Secretary, Civil Service Commission, 6 Burlington Gardens, W.1.

Pamphlets.

Choice of Careers Series

No. 31, *Civil Service Junior Posts* (H.M.S.O.).

No. 32, *The Civil Service, General, Scientific and Technical Posts* (H.M.S.O.).

DANCING.

B. G.

Age. 9–15 (for entry to a Ballet School). Otherwise not after age of 17.

Qualifications. —

Pay.

1. Corps de Ballet, £10 11*s*. per week.
2. Revue Chorus work, £11 13*s*. per week. (These are London rates. Television work, solo work, etc., may earn considerably more).

Aptitudes. Natural ability essential; determination; extremely good health.

Method of Entry. Acceptance by a School of dancing. Royal School of Ballet offers Scholarships for boys.

Further Training.

1. Ballet Schools: Dancing instruction combined with general education.
2. Other Schools of Dancing: 3–5 years leading to examinations of Royal Academy of Dancing and Imperial Society of Teachers of Dancing.
3. 3-year training course (for intending teachers), *e.g.*, at Royal Academy of Dancing.

There are two main divisions of dancing as a profession—theatrical and teaching. On the theatrical side many young people (girls especially) are attracted nowadays to ballet, and it must be emphasised that only those in the very highest flight can hope to win a position in a corps de ballet. It is worth noting that the Royal Ballet School itself provides 85 per cent of the ballet companies of the Royal Opera House and Sadler's Wells. There is a shortage of good male dancers, so prospects for boys are better than for girls.

Apart from ballet, revue work and television (increasingly) provide employment for those who are set on making dancing a career. Minimum pay is fixed by Actors' Equity. It is quite common for dancers to take up teaching when they retire from the stage. The teaching may be in private establishments, where the remuneration is by arrangement, or in State schools, where salary is in accordance with the terms of the Burnham Committee Report. Others prefer to go for teaching from the outset, and the Royal Academy of Dancing runs 3-year training courses.

While there are various scholarships available from the different schools, the fees are often quite stiff (for example, the Royal Ballet School fees are £153 p.a. for day pupils and £350 for boarders). Help may often be obtained, however, from the

local Education Authorities, subject to means of parents.

Addresses.

The Royal Ballet School, 45 Colet Gardens, W.14.

The Royal Academy of Dancing, 15 Holland Park Gardens, W. 14.

Book.

The Making of a Dancer, by Arnold Haskel (Pub. A. C. Black), 8*s.* 6*d.*

DENTISTRY.

B. G.

Age. 17.

Qualifications. A.

Pay.

1. In Public Service, £1,100–£1,750+.
2. In private practice—dependent on size of practice, but usually well over £1,000 p.a.

Aptitudes. Calmness of manner, ability to instil confidence, manual dexterity.

Method of Entry. By application to approved Dental School.

Further Study.

1. A Degree course.
2. Diploma Course at dental school.

There is a great need nowadays for trained dentists of both sexes, both in private practice and public service. The course of training is long (4½ years for those holding qualifications on entry as above in chemistry, physics, and biology, which enables them to gain exemption from Part I of the training course). It is also expensive for those who cannot get substantial assistance from Local Education Authorities or other sources (£400–£500 in addition to books and living expenses). But for those who are willing to make the initial sacrifices it offers an interesting and valuable career which, for once, is well rewarded, but the work is very demanding.

One word of warning. There is considerable competition for entry, and only very good candidates are accepted.

There are Dental Schools in, or attached to, the following Universities: St. Andrews, Queen's (Belfast), Birmingham, Bristol, Durham, Leeds, Manchester, and Sheffield. Teaching hospitals and schools are: The Edinburgh Dental Hospital and School, The School of Dental Surgery (Liverpool), Guy's Hospital Dental School, The Glasgow Dental Hospital and School, King's College Hospital Medical School, The London Hospital Dental School, The Turner Dental School and Dental Hospital (Manchester), The Royal Dental Hospital (London), and University College Hospital Medical School.

Address.

The General Dental Council, 44 Hallam Street, W.1.

Pamphlet.

Dentistry—A career and a future. Available from General Dental Council.

Choice of Careers Series, No. 96 (H.M.S.O.), 9*d.*

DENTAL NURSE.

G.

Age. 15–17.

Qualifications. None laid down.

Pay. £220–£595.

Aptitudes. Neatness and pleasant, reassuring personality.

Method of Entry.

1. By application to Dental Hospital for course.
2. By application to a dentist in private practice.

Further Training.

1. Full-time course (6 months–2 years, depending on Hospital).
2. By dentist in private practice during course of work.

The Dental Nurse (or Dental Surgery Assistant, to give her her correct title) has to be a girl who can adapt herself to a variety of jobs connected with dentistry. She may be expected to look after the clerical and reception work of a practice, reassure patients before treatment (and comfort them afterwards), process X-ray photographs, and prepare materials for use by the dentist. In a hospital with a Dental Department her work will naturally tend to be more specialized.

Full-time training can be had at the following institutions:—

Guy's Hospital Dental School, S.E.1.

Eastman Dental Hospital, Gray's Inn Road, W.C.1.

London Hospital, Whitechapel, E.1.

In the provinces at the Dental Hospitals of Bristol, Birmingham, Dundee, Manchester, Sheffield.

The details of these courses vary considerably from hospital to hospital, but in all cases, however, the students work for the Examination for Dental Nurses and Assistants, which is held annually in London.

The pay is not startlingly good, but for the girl who enjoys giving service to others and meeting different types of people Dental Nursing offers a satisfying and interesting career.

Address.

The British Dental Nurses and Assistants Society, 2 Summer Street, Leyland, Lancs.

Pamphlet.

Dental Surgery Assistants. Available from the British Dental Nurses and Assistants Society.

DENTAL TECHNICIAN.

B. G.

Age. Under 16.

Qualifications. —

Pay. £8 10*s.* to £10 2*s.* 6*d.* per week basic.

Aptitudes. Ability with hands and liking for delicate manual work.

Method of Entry. Acceptance by dentist, hospital, or firm, as apprentice.

Further Training. 5-year apprenticeship including 1 day part-time-release study per week.

The Dental Technician is the craftsman (or woman) who makes the various appliances used nowadays, such as dentures, bridges, and plates. There is one peculiarity about this career which is worth noting—namely, that a boy or girl cannot be accepted *after* the age of 16 as an apprentice. Apprenticeships are available with private dentists, hospitals and firms manufacturing the various appliances and, together with the practical experience they gain, apprentices have to prepare themselves for the Intermediate and Final examinations of the City and Guilds of London Institute, which are both practical and theoretical in their scope.

There is a constant demand for the services of Dental Technicians, and no skilled person need fear unemployment, but there may be difficulty in getting taken on as an apprentice.

Address.

Associated Dental Technicians Section of the Society of Goldsmiths, Jewellers, and Kindred Trades, 329–331 Gray's Inn Road, W.C.1.

DIETETICS.

B. G.

Age. 20–21.

Qualifications. One of the following:—

1. Degree in Household Science, Nutrition, Domestic Science, or Pure Science, plus at least 3 months' training in cookery.
2. State Registration in Nursing, plus at least 3 months' training in cookery.
3. Teacher's Diploma in Domestic Science, with perhaps additional qualifications in physiology and chemistry.
4. Institutional Management Certificate plus approved educational exam.
5. Associate Membership of Hotel and Catering Institute resulting from examination, plus approved 2-year course in catering.

Pay. About £465–£700 p.a. (in some cases to over £1,000).

Aptitudes. Interest in people, organising ability, ability to think clearly.

Method of Entry. Acceptance by one of the bodies running courses leading to one of the recognised Diplomas in Dietetics (see below).

Further Training. Usually 12–18 months full-time theoretical and practical study.

The dietician is concerned with the study of nutrition—the composition of food and how the body uses it. A lot of the work is in hospitals, where the dietician is of great value in the treatment of illness, and training therefore includes a period in a hospital kitchen (hence the need to be able to cook). In the course of the job the dietician meets all sorts and conditions of people, from doctors and food specialists to refractory patients, and so must be prepared to exercise tact and discretion and to mix easily.

The following hospitals are recognised for the training of Dieticians:—

Belfast:	Royal Victoria Hospital.
Birmingham:	Queen Elizabeth Hospital.
Cambridge:	Addenbrooke's Hospital.
Dublin:	St. Vincent's Hospital.
Edinburgh:	The Royal Infirmary.
Glasgow:	The Western Infirmary.
Leeds:	The General Infirmary.
London:	The London Hospital. The Middlesex Hospital. St. Thomas's Hospital. University College Hospital.

Address.

The British Dietetic Association, 251 Brompton Road, S.W.3.

Pamphlet.

Choice of Careers Series, No. 13 (H.M.S.O.), 1*s.*

DOMESTIC SCIENCE.

G.

Age. 16–18.

Qualifications.

1. For Institutional Management Association Course, O.
2. For Teachers Training College, O or A.
3. For University Course, A.

Pay.

1. Domestic Management, £6 per week (non-resident)—£750+ p.a. all found, depending on qualifications and type of post.
2. Teaching—Burnham Scales (see Teaching).

Aptitudes. Interest in people, sense of craftsmanship, organising ability, ability to get on with people.

Method of Entry. Acceptance by technical college, training college, or University for the appropriate course.

Domestic Science training is, of course, of great value to all girls at all times. In few other jobs can a girl feel that her training and experience are going to be of such obvious use to her when she leaves her work to get married and bring up a family.

Training falls into two main categories: (i) for Teachers; (ii) for those going into institutional, catering, and matron/housekeeper posts. Girls who wish to teach will seek acceptance at either a Training College or University which offers a course in Domestic Science (at the moment there are two—London (Queen Elizabeth College) and Bristol). For general remarks on Teaching as a career, see under the appropriate section.

Those who are most interested in the second category have a great variety of jobs open to them, depending on their skill and qualifications, jobs which range from junior ones in catering and domestic management to responsible posts in industrial organisations, colleges, and hospitals. Especially interesting for those wishing to combine Domestic Science with service to others and community life are the courses run by the Industrial Management Association for the Matron-Housekeepers Certificate. Girls are prepared to work as Matron-Housekeepers in communities of fifty to sixty children where the organisation is as home-like as possible.

Address.

The Institutional Management Association, Swinton House, Gray's Inn Road, W.C.1.

The Ministry of Education, Curzon Street, W.1. (For details of Teacher Training College Courses.)

Pamphlet.

Choice of Careers Series, No. 13 (H.M.S.O.), 1*s.*

DRAMATIC ART.

B. G.

Age. Normally 17–18 (18 for a teaching course).

Qualifications. Preferably O or A.

Pay.

1. £10–£12 per week minimum (in London).
2. As teacher—in accordance with Burnham scales.

Aptitudes. Acting ability, determination, good health.

Method of Entry. Usually acceptance by a school of drama.

Further Training. 2–3 years' full-time course at a school of drama.

The first thing to say about acting as a career is that it is a very insecure profession, offering great rewards to the few, but very often frustration and disappointment to the majority—especially to girls. At any one time up to half the qualified actors and actresses are unable to get work in the theatre.

For those who are nevertheless determined to make a career of the stage, by far the best way of getting training is to obtain a place at one of the schools of drama; the addresses of some of these are given below.

On completion of the course, the next step is to obtain a situation with a Repertory Company, if possible, and so enlarge the field of experience. Some lucky ones, of course, get recognition and "stardom" while training or even before, but this is very much the exception to the rule.

Some of the schools of drama mentioned above run courses for teachers of dramatic art. These courses are recognised as a teacher's qualification by the Ministry of Education, and on this side the prospects are much brighter, as there is a growing demand in educational establishments of all descriptions for dramatic work in and out of the classroom.

Addresses.

The British Actors' Equity Association, 8 Harley Street, W.1.

The Royal Academy of Dramatic Art, 62–4 Gower Street, W.C.1.

The Central School of Speech and Drama, The Embassy Theatre, Swiss Cottage, N.W.3.

The Guildhall School of Music and Drama, John Carpenter Street, Victoria Embankment, E.C.4.

The Rose Bruford Training College of Speech and Drama, Lamorbey Park, Sidcup, Kent.

Pamphlet.

Choice of Careers Series, No. 97 (H.M.S.O.), 1*s.*

DRAUGHTSMAN.

B.

Age. 15½–18.

Qualifications. Preferably O or first year of O.N.C.

Pay. About £9 (at age 21)—£14+ (at age 25).

Aptitudes. Capacity for attention to detail, sound maths., ability to think for himself.

Method of Entry. Apprenticeship with a firm.

Further Training. 5-year apprenticeship including day release study at a technical college leading to technical or professional examinations.

It is a common mistake to think that all a draughtsman needs to have in the way of natural talent is the ability to draw well. His job is the preparation of scale drawings from which the various parts of, for instance, a machine are made. He therefore needs to know enough engineering to be sure that the parts he is drawing will do their job and enough mathematics to calculate stresses by formula. Most firms insist that their apprentices should have a thorough grounding in general engineering practice in various departments before the real drawing-office training begins. The apprenticeship, including part-time theoretical study, usually leads to examinations such as the Ordinary and Higher National Certificate and those of the Institution of Engineering Designers, the Institution of Mechanical Engineers, the Institution of Electrical Engineers among others.

The work of a draughtsman is very satisfying for those who are interested in drawing and engineering, and it has very often proved a valuable stepping-stone to senior technical appointments in industry.

Address.

The Institution of Engineering Designers, 38 Portland Place, W.1.

DRESS DESIGNING.

Usually G.

Age. Usually 15½–18.

Qualifications. None laid down.

Pay. No scale: salary by arrangement.

Aptitudes. Practical needlework, perseverance, knowledge of and interest in French and Art.

Method of Entry.

1. Learning while working in factory or workroom.
2. Acceptance by Technical College or School of Art for full-time course.

Further Training.

1. Training in factory or work-room supplemented by part-time technical or art college study (about 4 years).
2. Full-time course in technical or art college (2–4 years).

Dress Designing is not a well-defined career in the sense that so many in this section are. Obviously all dresses have to be designed before they are made, but there are 3 fairly distinct classes of work:—

1. "Haute Couture"—the designing of models for the famous fashion houses. This is a "glamorous" job, and only very few really outstanding people achieve posts of this nature. Even for these, there is a great element of chance in the process of becoming recognised.
2. "Wholesale Couture"—the designing of models for restricted retail trade, usually based on the current fashion trends.
3. "Wholesale Manufacture"—the designing of cheaper dresses for production in large quantities.

There is no guarantee of employment for those who have successfully completed their training, and a great deal of luck is needed (being, for example, in the right place at the right time).

Mention must be made of an alternative method of training at the Faculty of Dress Design of the Royal College of Art. Candidates for the 3-year full-time course have to be between the ages of 17 and 25, and have to pass an entrance examination in five Parts. Part I is the submission of "testimonies of study" (*i.e.*, examples of candidate's original work), and Part II is a more general examination testing the candidate's interests, command of English, and critical approach to contemporary trends in fashion. There is also a practical test.

For those who are accepted, the 3-year course includes Life Drawing, History of Costume, Designing, Dressmaking, Tailoring, Millinery, Accessories, Pattern Cutting, Children's Clothing, Lingerie, Shoe Design, and Jersey Wear. Successful graduates are entitled to style themselves Designer of the Royal College of Art (Des.R.C.A.).

There is also a course of training at the Barrett Street Technical College, Oxford Street, which is very suitable for those interested in wholesale designing.

Address.

The Faculty of Fashion Design, The Royal College of Art, 20 Ennismore Gardens, S.W.7.

Pamphlets.

Choice of Careers Series:—

No. 9, *Dressmaking and Millinery* (H.M.S.O.), 1*s.* 3*d.*

No. 10, *Dress Designer* (H.M.S.O.), 6*d.*

ENGINEERING (GENERAL).

B. G.

Space does not allow full treatment of this extremely complex career in all its aspects. The following should therefore be regarded as the barest outline of the main branches of the profession and, before any decision is reached, advice and full details should be obtained from the Youth Employment Officer and professional bodies concerned. These are *examples* only of engineering careers available and, it is hoped, will serve to indicate the general pattern. *See* Charts (E5, 6).

Age. 15 (as an apprentice) and upwards, dependent on method of entry.

Qualifications. Dependent on method of training and branch concerned; most common are O.N.C. and (if possible) followed by H.N.C.

Pay. From 54*s.* per week (starting apprentice aged 16)—about £600–£800 p.a. on completion of apprenticeship. Thereafter depending on branch of profession, but in region of £1,000 p.a. at age 30. Further prospects depending on quality of individual.

Aptitudes. All branches demand character and intellectual ability from those who are

going to do well. All would-be engineers must possess qualities of patience and assiduity, and be interested as well in the special requirements of their particular field.

Method of Entry. Usually—1. Apprenticeship; 2. Sandwich Course; 3. As a graduate.

Further Training.

1. *Apprenticeship.* Usually 5 years supplemented by part-time study at technical college, leading to examination of professional body concerned.
2. *Sandwich Course.* Usually 4-year course leading to (for example) Diploma in Technology. The course is usually alternate six-monthly periods of full-time study at a technical college (or CAT) and full-time engineering practice with a firm.
3. *As a Graduate.* A further period of "graduate apprenticeship" (about 2 years) is usually required. One of these years may sometimes be served *before* beginning the graduate course.

1. Aeronautical Engineering.

This covers a very wide field and includes design and construction of engines, airframes, guided weapons, and secondary equipment.

(a) *Trade Apprenticeship* (5 years) leads to jobs of Fitter, Machinist, Tool-maker, Sheet-metal Worker, Electrician, Pattern-maker. There are good opportunities for further promotion.
(b) *Engineering Apprenticeship* (for those holding O or A or equivalent) leading to posts in Design, Stressing, Aerodynamics, Laboratory, or Maintenance. Promotion prospects to executive level are excellent.
(c) *Student Apprenticeship* (for graduates) leading to senior technological positions.

Address.

The Royal Aeronautical Society, 4 Hamilton Place, S.W.1.

2. Automobile Engineering.

A specialised branch of mechanical engineering, sub-divided into Chassis Engineering and Body Engineering.

(a) *Trade Apprenticeship* (4–5 years) leads to skilled craftsman status in one of the following trades: Body Engineering, Body Jig-making, Carpentry, Electrical Maintenance, Fitting and Turning, Foundry Work, Machine Tool Fitting, Laboratory Work, Pattern-making, Press-tool Making, Sheet-metal Work, Tool-making, Welding.
(b) *Engineering Apprenticeship* (for those holding O or A or equivalent). These apprenticeships lead to posts in the following departments: (1) Development, Experimental, or Research; (2) Drawing Office; (3) Production; (4) Costing; (5) Service (Technical); (6) Sales.

Address.

The Institution of Mechanical Engineers, (Automobile Division), 1 Bird Cage Walk, S.W.1.

3. Chemical Engineering.

The chemical engineer's main job is the design, construction, and operation of equipment in connection with manufacturing processes where there are chemical (and sometimes physical) changes.

(a) *Student Apprenticeship* with a suitable firm, combined with part-time study for O.N.C. and H.N.C. is a common method of entry for those who do not take a degree. Regional Gas Boards offer interesting openings in Chemical Engineering.

Alternatively:

(b) *Sandwich Course* at a Technical College or CAT, leading to Diploma in Chemical Engineering.

The two other main methods are:—

(c) *Degree Course* in Chemistry, followed by post-graduate course in Chemical Engineering.
(d) *Degree Course* in Chemical Engineering.

Universities offering Chemical Engineering Degrees are: Birmingham, Cambridge, Durham, Edinburgh, Glasgow, Leeds, London, Manchester, Sheffield, and Wales.

Technical Colleges or CATS offering Diploma Courses in Chemical Engineering are at: Birmingham, Glamorgan, Glasgow, London, Loughborough, Manchester, Neath, and Salford.

Address.

The Institution of Chemical Engineers, 16 Belgrave Square, S.W.1.

4. Civil Engineering.

The term covers the design, construction, and maintenance of railways, roads, waterways, bridges, dams, tunnels, airports, etc. Municipal Engineering is the field of Civil Engineering concerned with municipal services, such as public health, town planning, water supply, drainage, and surveying work.

(a) *Apprenticeship* is open to those with O (or who can pass the Common Preliminary Examination of the Engineering Joint Board); 3 years' practical and theoretical work, supplemented by part-time technical work to H.N.C. or a degree in engineering; 2 years' further practical experience is needed before qualifying for Associate Membership of the Institution of Civil Engineers.
(b) *Degree Course/Diploma in Civil Engineering Course.* These are available through Student Apprenticeships (*see* E7 (1)) or through full-time study at a CAT or University. Entrance qualification A level. The courses are followed by 3 years' work (usually as a graduate assistant to an approved firm of civil engineers) before full status is gained.

Address.

The Institution of Civil Engineers, Great George Street, S.W.1.

5. Electrical Engineering.

This is a "blanket" term covering a very wide range of occupations, ranging from fundamental research and design to routine maintenance of installations.

(a) *Craft Apprentices* usually enter a works on leaving school. Those who show ability are encouraged to continue part-time studies leading to the City and Guilds of London Institute Electrician's Certificate.
(b) *Electrical Technicians* follow a course of practical training supplemented by part-time study at a Technical College, or in some cases they follow a course based on the "block-release" system (*i.e.*, 4 weeks' full-time study alternating with approximately double the period work with the firm). The great variety of courses available and specialised training involved cannot be dealt with here, but mention may be made of the City and Guilds of London Institute Electrical Technician's Certificate, towards which the training of many technicians leads.
(c) *Professional Electrical Engineers* are trained either by following a full-time degree course at a University (or a full-time diploma course at a technical college or CAT), or by taking a Student Apprenticeship which involves a Sandwich Course and leads usually to H.N.C. after 4–5 years. In both cases further study and examinations are necessary before Associate Membership of the Institution of Electrical Engineers is obtained.

Address.

The Institution of Electrical Engineers, Savoy Place, W.C.2.

6. Mechanical Engineering.

Mechanical Engineering is concerned with the design, manufacture, and maintenance of machinery. There is a tremendous variety of work which comes within the scope of the Mechanical Engineer, and many of the other branches which are mentioned in this section need a good general grounding in mechanical engineering as a prerequisite of further training.

(a) *Trade Apprenticeship.* This is for youngsters leaving school who wish to make a career as skilled craftsmen. The apprenticeship lasts 5 years, and practical experience is supplemented by day part-time-release courses, evening courses, and, in some cases, Sandwich Courses. Apprentices prepare for City and Guilds or O.N.C. and H.N.C. and even higher qualifications. Those who do not follow their studies to this level are thoroughly trained as skilled workers in trades such as Milling, Turning, Fitting, Setting, Grinding, Foundry Moulding, Sheet-metal Working.

(b) *Student Apprenticeship.* This is a 4- to 5-year course for students who have passed O or A or equivalent examination. General background training is given, and the apprentice has the opportunity of specialising. Those who complete their training satisfactorily can expect to become responsible members of the staff of an engineering concern.

(c) *Graduate Apprenticeship.* This is designed to provide the practical background for those who hold degrees or diplomas in engineering. The course lasts about 2 years and is designed to fit graduate apprentices for posts in Research, Development, Design, Estimating, Contracting, Sales, and Production.

Address.

The Institution of Mechanical Engineers, 1 Bird Cage Walk, S.W.1.

7. Mining Engineering.

(a) *Coal Mining.* The National Coal Board runs its own system of training and apprenticeship schemes, full details of which can be obtained from the address below. Of special interest to Sixth Formers leaving school are the 100 University Scholarships offered each year by the National Coal Board for suitable boys who wish to take up mining engineering. These Scholarships are tenable at any University offering a mining-degree course, and the National Coal Board assumes entire responsibility for fees and maintenance—irrespective of parents' income. It should be noted that some scholarships are also available for degree courses in mechanical, electrical and chemical engineering.

Address.

The National Coal Board, Hobart House, Grosvenor Place, S.W.1.

(b) *Metalliferous Mining.* Young men who wish to qualify as mining engineers in this sense of the word usually study for a degree or equivalent qualification at either the Royal School of Mines (South Kensington) or the Camborne School of Metalliferous Mining (Cornwall). It is also possible to specialise in Metalliferous Mining at some of the Universities offering Mining Engineering courses.

The work of a Mining Engineer who has specialised in this department of mining usually takes him abroad. He may be involved in discovering mineral deposits, extracting the ore from the ground, or refining. There is a limited number of scholarships available, details of which may be had from the first address below. Candidates for courses must be aged 18 and hold A or equivalent.

Addresses.

British Overseas Mining Association, 8 Great Winchester Street, E.C.2.

Institution of Mining and Metallurgy, 44 Portland Place, W.1.

8. Production Engineering.

The Production Engineer is concerned with every aspect of manufacture where planning of output in the most economical way is concerned. He is the expert on works management, production management planning, plant layout, jig and tool design, estimating, time-study, rate-fixing, motion study, process study, production control, inspection, purchasing, and stores control. He must be a man who can mix easily and command confidence and respect.

There are three main ways of becoming a production engineer:

(a) *Production Engineering Apprenticeship.* A 5-year course supplemented by part-time study for O.N.C. and H.N.C. and then for the Associate Membership Examination of the Institution.

(b) *Sandwich Course* (3–5 years) leading to H.N.C. in production engineering or Dip.Tech.

(c) *Engineering Degree* (3–4 years), followed by 2 years' practical work with a firm.

Address.

Institution of Production Engineers, 10 Chesterfield Street, W.1.

As already stated, the foregoing is a selection only of the various careers available in engineering. The following is a list of the professional bodies associated with other branches of the profession, and full details of method of entry, training, and prospects can be obtained from them:—

1. *Gas Engineering.*

The Institution of Gas Engineers, 17 Grosvenor Crescent, S.W.1.

2. *Heating and Ventilating Engineering.*

The Institution of Heating and Ventilation Engineers, 49 Cadogan Square, S.W.1.

3. *Illuminating Engineering.*

The Illuminating Engineering Society, 32 Victoria Street, S.W.1.

4. *Marine Engineering.*

The Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, E.C.3.

5. *Radio and Electronic Engineering.*

The British Institution of Radio Engineers, 9 Bedford Square, W.C.1.

6. *Railway Engineering.*

The Director of Training and Education, British Transport Commission, 222 Marylebone Road, N.W.1.

7. *Structural Engineering.*

The Institution of Structural Engineers, 11 Upper Belgrave Street, S.W.1.

8. *Water Engineering.*

The Institution of Water Engineers, Parliament Mansions, Abbey Orchard Street, S.W.1.

9. *Welding Engineering.*

The Institute of Welding, 54 Princes Gate, Exhibition Road, S.W.7.

Pamphlets.

Choice of Careers Series:—

No. 78, *Engineering Work for Boys* (H.M.S.O.), 1*s.* 9*d.*

No. 77, *Engineering Work for Girls* (H.M.S.O.), 1*s.* 3*d.*

No. 92, *The Professional Engineer* (H.M.S.O.), 1*s.* 9*d.*

No. 60, *Engineering Draughtsman* (H.M.S.O.), 1*s.*

Training Opportunities for Women in Engineering, 3*s.* 6*d.* Available from Women's Engineering Society.

FIRE SERVICE.

B.

Age. 19–31 (35 for ex-regulars from the Forces).

Qualifications. Ability to pass simple education test.

Pay. From £9 10*s*. per week—over £1,000 p.a. in Divisional Office posts.

Aptitudes. Ability to serve as member of team, physical strength.

Method of Entry. By application to the Chief Officer of Fire Brigade in question.

Further Training. 2–3 months' course of training at a Brigade Training School.

There are certain minimum physical requirements for a Fireman. He must be not less than 5 ft. 7 in. tall and be able to pass a fairly strenuous medical examination. Promotion to the rank of leading fireman is by examination after 2 years' service, and to the rank of sub-officer after 4 years' service.

There are opportunities for further advanced training at the Fire Service College for chosen officers. Service is pensionable, and dependants are provided for in case of death.

Address.

The Institution of Fire Engineers, 94 Southwark Bridge Road, S.E.1.

FLORISTRY.

G.

Age. 15+

Qualifications. None laid down.

Pay. About £6 per week as an assistant.

Aptitudes. Sense of colour and arrangement. Pleasant manner and ability with hands.

Method of Entry.

1. Assistant in florist's or, if possible, apprenticeship to florist.
2. Course at a School of Floristry.

Further Training.

1. 3-year apprenticeship to florist in conjunction with day part-time study leading to examination of Society of Floristry (London Area only).
2. Diploma course at a School of Floristry (9 months–1 year).

A florist's work involves not only the selling of flowers in a shop, but the designing and preparation of bouquets, wreaths, display baskets, etc., for special occasions, and the floral decoration of hotels and halls for functions and exhibitions.

There are two schools in London offering full-time courses, and attendance at one of these is probably the better method of gaining a thorough grounding in all aspects of the work. They are:—

The Constance Spry Flower School, 29 Elm Tree Road, N.W.8.
The London School of Floristry, 1 Ravenscourt Park, Hammersmith, W.6.

Addresses.

The Society of Floristry, 7 Henrietta Street, W.C.2.

British Flower Industry Association, 35 Wellington Street, Covent Garden, W.C.2.

Book.

Making Floristry Your Business, by Angela Johnson (Southern Editorial Syndicate Ltd.), 6*s*.

FORESTRY.

B.

Age.

1. Forest Workers, 16+.
2. Foresters, 19–30 (38, if ex-regular servicemen).
3. Forest Officer 21+

Qualifications.

1. Forest Worker —.
2. Forester—O.
3. Forest Officer—Degree in Forestry.

Pay.

1. Forest Worker, £8 10*s*. per week.
2. Forester, £397–£898 p.a. (+ house or cash allowance).
3. Forest Officer, £765–£1,190 (minimum scale).

Aptitudes. High standard of fitness; liking for country life; self-reliance and ability to handle men, especially in Forester grades and above.

Method of Entry.

1. Forest Worker: By application to Youth Employment Officer or direct to a Forester.
2. Forester: By application to a Forester Training School (1 year's practical experience a prerequisite).
3. Forest Officer: Acceptance by Selection Board of Forestry Commission (for those holding degree).

Further Training.

1. Forest Worker, practical training while working.
2. Forester, 2-year course at Residential Forestry School. (There may be a waiting list for these schools; 2 years' delay is not uncommon.)

Work in Forestry is varied. Forest workers are those who do the practical work in the woods, involving the care of trees, thinning, felling, and sawmill work. Foresters are in charge of areas of woodland, and Forest Officers are in overall charge of whole regions and concerned with long-term plans for development and afforestation. There are also various openings overseas for the last category through the Overseas Civil Service.

In addition to the posts available with the Forestry Commission, attractive jobs are open to graduates in Forestry as managers of privately owned land, and in the timber trade.

Addresses.

The Forestry Commission, Education Branch, 1 Princes Gate, S.W.7.

Royal Forestry Society of England and Wales, 49 Russell Square, W.C.1.

Empire Forestry Association, Royal Empire Society, Northumberland Avenue, W.C.2.

Pamphlets.

Choice of Careers, No. 81 (H.M.S.O.), 1*s*. 9*d*.

Training as a Forester. Available from The Forestry Commission.

HAIRDRESSING.

B. G.

Age. 16+.

Qualifications. —

Pay. Apprentices: 34*s*. to £3 10*s*. per week.
Men: £7 12*s*. per week (minimum after 2 years).
Women: £6 11*s*. per week (minimum after 2 years).

Aptitudes. Pleasant manner, unruffled air, self-confidence, cleanliness.

Method of Entry.

1. Apprenticeship to Master Hairdresser.
2. Full-time course at School of Hairdressing under Local Education Authority auspices.
3. Full-time course at private school of hairdressing.

Further Training.

1. As apprentice, 3 years, supplemented by part-time study.
2. As student at School of Hairdressing sponsored by Local Education Authority, 2 years.
3. As student at private school. Usually 3–6 months. Some of these are not recognised by the trade, enquiries should always be made to the official bodies.

The hairdresser, whether man or woman, is nowadays a member of a highly skilled profession offering an attractive career to those who are prepared to study and have a flair for getting on with people. It is pointed out that the above are minimum rates, and take no account of tips, which are a traditional aspect of the business.

Apprentices and students at L.E.A.-directed Schools of Hairdressing study for the examinations of the City and Guilds of London Institute or the Entrance Examination of the Hairdressers' Registration Council. The courses at private schools are much more intensive and quite expensive (*e.g.*, £70 for a six-month course), but the period of study is, of course, much shorter. Grants are rarely allowed at private schools by Local Authorities.

L.E.A. establishments holding courses include:–

Barrett Street Technical College, Barrett Street, W.1.

Erith Technical College, Belvedere, Kent.

Full details of courses in private schools can be obtained from the associations named below.

Addresses.

The National Hairdressers' Federation, 20 Cranbourne Gardens, N.W.11.

The Incorporated Guild of Hairdressers, 33 Great Queen Street, W.C.2.

HEALTH VISITOR.

G.

Age. 21+.

Qualifications. Either (i) State Registered Nurse, or (ii) Registered Sick Children's Nurse. Holding in either case, Part I of the Certificate of the Central Midwives' Board.

Pay. £555–690 p.a.

Aptitudes. Initiative and good health. Interest in others and flexibility of temperament and tact.

Method of Entry. Acceptance on a Health Visitor Training Course at an institution recognised by Ministry of Health (see below).

Further Training. 9–12 months' Training Course leading to Health Visitors' Certificate.

The Health Visitor is concerned with the health of the entire family. She has to be able to advise mothers, expectant mothers, and foster mothers about their own and their family's health. She must be prepared to give advice on how to prevent the spread of infection (in, for example, T.B. cases where the sufferer is living at home), and to visit the very young and the very old. There is a serious shortage of Health Visitors, and a girl whose interest lies in nursing and who wishes to render personal service to the community would find this an absorbing and dedicated career.

The Women Public Health Officers' Association can supply a list of the recognised training centres or authorities.

Addresses.

Women Public Health Officers' Association, 36 Eccleston Square, S.W.1.

Royal Society for the Promotion of Health, 90 Buckingham Palace Road, S.W.1.

The Royal Sanitary Association of Scotland, 185 St. Vincent Street, Glasgow.

HOSPITAL ADMINISTRATION.

B. G.

Age. 16–20.

Qualification. Usually O.

Pay. About £4 per week at age 16—about £550 (on lowest grade).

Aptitudes. Initiative, good judgment, ability to mix.

Method of Entry.

1. As a Junior Clerk.
2. As a graduate (limited number only).

Further Training. Part-time study in preparation for professional qualifications (very often the examination of the Institute of Hospital Administrators).

Hospital Administration is a term covering the work of about 450 hospital management committees right down to the day-to-day administrative running of a particular department in a particular hospital. The clerk who gains qualifications as a result of part-time study and who is prepared to move from one part of the country to another has real opportunities for promotion.

There are two stages in the examinations of the Institute of Hospital Management:

1. *Intermediate* (Candidates must be at least 18 years of age):
   Part I comprises papers on Public Administration, Economics, and the Hospital and Health Services.
   Part II comprises papers on Secretarial Practice, Commercial Law, Book-keeping, Statistics (3 only to be taken).
2. *Final* (Candidates must be at least 21 and have completed at least 3 years in Hospital Administration):
   Part I comprises papers on Hospital Administration, Hospital Finance, General Law affecting Hospitals.
   Part II. 3 subjects must be offered from a comprehensive list covering many of the aspects of Hospital Administration, *e.g.*, Accountancy, Supplies, Personnel Management, Records.

All posts are pensionable, and holidays vary according to age and status.

Address.

The Institute of Hospital Administrators, 75 Portland Place, W.1.

Pamphlet.

Careers in Hospital Administration. Available from The Institute.

HOTEL RECEPTIONIST.

G.

Age. Usually 16–20.

Qualifications. Preferably O + knowledge of typewriting and book-keeping + 1 foreign language (if possible).

Pay. In accordance with Wages Council Order in operation at time (see below).

Aptitudes. Pleasant manner, patience, liking for people, and ability to get on with them. Accuracy and trustworthiness.

Method of Entry.

1. As a trainee-receptionist, *i.e.*, by application to the manager of a large hotel.
2. By training at a technical college.

Further Training. 1 year's full-time course at Technical College leading to the Hotel Book-keeping and Reception Examination of the Hotel and Catering Institute.

The Hotel Receptionist is usually the person who welcomes guests on their arrival, and she can often, therefore, create a good initial impression if she possesses a pleasant and sympathetic manner. She is also responsible in many cases for correspondence about accommodation, the keeping of records, and preparation of accounts for visitors.

It is difficult to give any reliable information about salaries, as these vary according to the facilities the Receptionist enjoys in her hotel. If, for example, she has a room in the hotel and full service, her salary will not be so high as that of someone who lives out.

The year's full-time course referred to above is available at the following Technical Colleges:

Acton Technical College, Woodlands Extention, Acton Hill, W.3.

Blackpool Technical College, Courtfield, Hornby Road, Blackpool.

North Gloucestershire Technical College, The Park, Cheltenham (minimum age of entry 18 years).

Cornwall Technical College, Trevenson, Pool, Redruth.

South Devon Technical College, Teignmouth Road, Torquay.

Address.

The Hotel and Catering Institute, 24 Portman Square, W.1.

Pamphlet.

Choice of Careers Series, No. 33 (H.M.S.O.), 1*s.* 6*d.*

INSURANCE.

B. G.

Age. 16–25.

Qualifications. Usually O but increasingly A.

Pay. About £300 at age 17. About £600 at age 25. Thereafter to about £800+.

Aptitudes. Ability with figures and ability to express oneself clearly in writing. Pleasant personality and wide interests.

Method of Entry. By application to secretary of company.

Further Training. Part-time study for the examinations of the Chartered Insurance Institute.

Insurance work falls into four main categories—Fire, Marine, Life, and Accident. Some insurance companies deal with all these branches, while others specialise in one only. Some companies run their own training scheme for new entrants, or allow time off for study during office hours. Others send trainees on full-time courses of several weeks' duration. All encourage their employees to study for the examinations of the Chartered Insurance Institute.

These are:—

1. Preliminary ("A" entitles the new entrant to exemption).
2. Associateship (in 3 parts).
3. Fellowship (in 3 sections).

Each individual will take the advice of his employers as to which branch of study to follow up.

After preliminary training, the young man has to decide whether he wishes to specialise in indoor or outdoor work. The former leads to promotion to the position of chief clerk or superintendent for those who show promise, and there is ample opportunity for specialisation. The latter, involving probably more contact with people, leads to posts such as Inspector or Fire Surveyor.

While it is true that girls can follow a similar indoor career in insurance and are eligible for the same examinations, the majority of jobs for girls are of a clerical or secretarial nature. Here the path of promotion is towards specialised clerical work, confidential secretarial posts, accountancy, or technical work.

Some companies have a limited number of vacancies for graduate entrants in administrative and foreign posts.

With most companies, welfare and pension arrangements are excellent and employees are encouraged to join the various sports and social clubs.

Address.

The Chartered Insurance Institute, The Hall, 20 Aldermanbury, E.C.2.

Pamphlets.

Careers for Men and Women, No. 7 (H.M.S.O.), 9*d.*

Insurance—a career for girls. Available from The Chartered Insurance Institute.

That's a Good Job. Available from the Chartered Insurance Institute.

JOURNALISM.

B. G.

Age. 16+.

Qualifications. Usually at least O + preferably a knowledge of shorthand and typing.

Pay. £3 3*s.* (at age 16) to £10 14*s.* 6*d.* (at age 23). These are minimum provincial scales.

Aptitudes. Ability to mix with all types of people, adaptability, initiative, and independence.

Method of Entry. Usually by application to provincial or surburban weekly.

Further Training. 5 years made up as follows:—

1. 6 months' probation.
2. 3 years' articled apprenticeship.
3. 18 months' course leading to National Diploma.

One of the most difficult things about Journalism as a career is actually getting started. Many young people at school who develop an interest in writing feel that they would like to take up this career, only to find that it is very hard to get a job. The best method is to write to the editor of as many provincial or local papers as possible, and of course be prepared to go where the work is. Addresses of all newspapers can be found in *Willing's Press Guide.*

While waiting for a vacancy it is a good thing to work up proficiency in shorthand and typing.

It is sometimes possible to obtain a post on some newspapers as a graduate, and for graduate entrants (aged 24 or over) there is a special 2-year course leading to a Certificate of Training of the National Council for the Training of Journalists. The more normal method is, however, that outlined in the Further Training paragraph above, where, during the 3-year apprenticeship, the new entrant is trained in all aspects of reporting. At the same time the apprentice follows a part-time course (either by correspondence or at a Technical College) in English, Central and Local Government, British Life and Institutions, a special Law Course, and an optional subject.

Full details of these courses and of the final 18-month course for the National Diploma are given in the *Handbook of Training* published by the National Council.

It should be emphasised that the salary details given above are the minimum provincial scale only, and for those who can really make their way in Journalism the rewards are considerable.

Addresses.

The Institute of Journalism, 2–4 Tudor Street, E.C.4.

The National Union of Journalists, 22 Great Windmill Street, W.1.

The National Council for the Training of Journalists, 88 Fleet Street, E.C.4.

Pamphlet.

Choice of Careers Series, No. 83 (H.M.S.O.), 1*s.* 6*d.*

LAUNDRY MANAGEMENT.

B. G.

Age. 15+.

Qualifications. Preferably O.

Pay. Depending on age, experience, and responsibility, but minimum rates are laid down in Orders of Laundry Wages Council.

Aptitudes. Ability to handle varying types of people.

Method of Entry.

1. By application to a firm.
2. Acceptance on 2-year full-time course (minimum age 18 years).

Further Training.

1. *Learnership Scheme.* Practical training and background instruction during work, supplemented by part-time study for appropriate examinations of City and Guilds of London Institute.
2. 3-year *Apprenticeship.* Available for boys only and in a few firms only, supplemented by part-time study as in (1) above.
3. *Trainee Manager/Manageress Scheme.* Available for suitable persons of 18 years and over.
4. *Full-time Laundry Management Course.* 2 years. Candidates must hold O and be 18 years or more.

There are over 4,000 laundries in the country, and there is considerable scope in this still-expanding industry for the ambitious boy or girl who is prepared to work hard. There are basically three processes in laundry work: sorting of articles with regard to treatment, washing or cleaning, and finishing (*i.e.*, ironing or pressing), and the would-be manager or manageress must become thoroughly acquainted with, and have practical experience of, all the processes involved. The apprentice or learner must also become familiar with business methods and management techniques. There is plenty of exacting work for an intelligent boy or girl who is prepared to study hard.

In addition to the usual Local Education Authority Grants, which may be available for many who wish to follow a full-time course, the Laundry Industry offers some scholarships. Full details can be obtained from the first address below.

Addresses.

The Laundry Industry Education Board, 16–17 Lancaster Gate, W.2.

The Institute of British Launderers Ltd., 16–17 Lancaster Gate, W.2.

Pamphlet.

Choice of Careers Series, No. 70 (H.M.S.O.), 1*s.* 3*d.*

LAW.

B. G.

(*a*) **Barrister.**

Age. No person may be called to the Bar before the age of 21.

Qualifications.

1. O minimum (for admittance to one of the Inns of Court).
2. The "keeping" of 12 terms (see below).
3. Success in Bar Examinations.

Pay.

1. In private practice, income depends on many factors, mention of which is made below.
2. In Civil Service and with private undertakings—about £900–£2,000, or even higher.

Aptitudes. Clarity of thought and language. Good health. Wide general knowledge.

Method of Entry. Acceptance by one of the Inns of Court as a student.

Further Training. At least 12 months as a pupil of a practising barrister. Then perhaps a further period of "devilling" (see below).

The Bar is the senior branch of the profession, and only a barrister can plead in the higher courts.

The profession of barrister (in private practice) while being one of the most respected is, initially, at least, one of the most precarious. First, admission to one of the Inns of Court has to be obtained and the fees have to be paid. The four Inns and the composite fees are as follows:—

The Inner Temple £56 17*s.* 6*d.*
The Middle Temple £56 16*s.* 0*d.*
Lincoln's Inn £56 16*s.* 0*d.* (+ £12 composition fee).
Gray's Inn £56 16*s.*

The student then has to "keep" 12 terms, *i.e.*, dine in Hall on any 6 days of each term. Students who are studying for a University degree at the same time are allowed to "keep term" by dining in 3 times a term only. The Bar Examination is divided into two parts, as follows:—

Part I. Roman Law; Constitutional Law and Legal History; the Law of Contract and Tort; the Law of Real Property; Criminal Law.

Part II. Criminal Procedure; General Principles of Equity; Company Law and either Practical Conveyancing or Divorce Law or Public International Law; Evidence and Civil Procedure; a special subject; a general paper.

The next step is to be "called," which is the slightly ritual acceptance of the student into the profession (providing the Call Fees have been paid).

At this point the young barrister has to decide whether there is enough money available to continue into private practice. This will entail a premium of up to 100 guineas for the privilege of working for an established barrister and so learning the practical side. Thereafter the new barrister *may* be lucky enough to be asked to "devil," *i.e.*, to carry on the more humdrum and routine tasks for a nominal salary. This devilling is an important period in the barrister's career, as it is at this time that he makes the necessary contacts for establishing his own practice. (It should be remembered that advertisement is not allowed.) When finally a private practice is set up several lean years must be anticipated before the newcomer is well known by the solicitors who are to provide him with briefs.

Many barristers prefer to take appointments either with the Civil Service or with large private firms which retain legal staffs. This is indeed often the only way of making a career for those who cannot afford the substantial outlay involved in embarking on private practice.

The Scottish system is entirely different, and information can be obtained about how to become an Advocate in Scottish Law by application to the Faculty of Advocates at the address given below.

Addresses.

The Inner Temple, E.C.4.

The Middle Temple, E.C.4.

Lincoln's Inn, W.C.2.

Gray's Inn, W.C.1.

The Faculty of Advocates, Parliament Square, Edinburgh.

(*b*) **Solicitor.**

Age. No person under the age of 21 may be admitted as a Solicitor.

Qualifications. At least O (to commence articles).

Pay.

1. About £600 p.a. as qualified salaried assistant in private practice. Thereafter according to ability and opportunity.
2. *Public Service*, about £900 (starting salary)—over £2,000 in some cases.

Aptitudes. Tact, patience, integrity, capacity for detail.

Method of Entry. As articled clerk to solicitor, in private practice or in public service, *e.g.*, Town Clerk.

Further Training. 5 years from taking of articles (3 years for a graduate) combined with part-time study for the Law Society's Intermediate and Final Examinations.

The solicitor comes into contact with the public chiefly when they need legal advice or representation, especially in connection with the purchase and sale of houses, the making of wills, matrimonial affairs, and general litigation. Not so well known is the whole aspect of Company work involving the flotation of companies, bankruptcy, and company law generally.

During articles, a clerk must attend at a recognised law school for legal instruction on either a full-time or part-time basis. Exemption is allowed for barristers, graduates in law, and clerks with 10 years' experience or more.

The Intermediate Examination of the Law Society is in two parts, which may be taken separately. Part I consists of Real Property Law, Law of Contract and Torts, Public Law, Constitutional Law, and Criminal Law. Part II is concerned with Accounts and Book-keeping.

The Final Examination consists of Real and Property Law, Law of Trusts and Succession, Tax Law, Contract, Tort, Company Law, and Partnership Law.

Once admitted, the new solicitor has the choice of aiming for a private practice or going into Public Service. In the former case the usual thing is to secure a post as a managing clerk with a firm of solicitors with the idea of eventual partnership in mind. For those who choose Public Service, prospects of promotion and increased responsibility are very good.

The Scottish system is slightly different, and information about how to become a solicitor in Scotland can be obtained from the second address below.

Addresses.

The Law Society, Law Society's Hall, Chancery Lane, W.C.2.

The Law Society of Scotland, Law Society's Hall, North Bank Street, Edinburgh.

Pamphlets.

Choice of Careers Series, No. 26 (H.M.S.O.), 1*s.*

Lawyers in the Government Service. Available from The Civil Service Commission, 6 Burlington Gardens, W.1.

LIBRARIANSHIP.

B.G.

Age. 17–20.

Qualification. O.

Pay. £260 p.a. (Girls £244)–£560. After qualification, £575+, depending on status.

Aptitudes. Methodical mind, capacity for detail, good memory, friendly demeanour.

Method of Entry. By application to Librarian of a Public Library.

Further Training.

1. Part-time study for the First Professional Examination. Then—
2. 1 year's full-time or 3 years' part-time study for the Registration Examination.

Librarianship is a term covering not only the services of the Public Libraries but also the University and College libraries and those of the learned and professional bodies. Very often in the case of the latter, very high academic qualifications are demanded, and in this section we are chiefly concerned with the public-library system as a career. The Junior joining a staff will find that at first a lot of time is spent in routine matters—the arranging of books, filing and indexing, and counter duties. At the same time the beginner will be expected to study for the First Professional Examination. It is pointed out that "A" standard in one foreign language is an advisable qualification, as this is a compulsory requirement for the Registration Examination, which has to be passed before any real promotion can be expected in the service.

Study for this examination can be done either at a full-time course lasting one year at a School of Librarianship or by part-time study at a Technical or Commercial College (or, failing this, by following a correspondence course offered by the Association of Assistant Librarians). Those who wish to follow the full-time course can often obtain leave of absence from their library and are eligible, subject to individual circumstances, for financial assistance from Local Authorities.

Graduates who wish to acquire library qualifications can follow the Diploma Course of the London School of Librarianship and Archives (1-year, full-time).

The general salary pattern in the Library Service is that juniors and those who are not yet Chartered Librarians (*i.e.*, aged 23, with 3 years' service, having passed the Registration Examination) are not very highly paid, but for the qualified man or woman the range extends through seven grades to over £2,000 p.a. Promotion, however, is slow, and very often entails moving to another part of the country in order to take a higher post.

Address.

The Library Association, Chaucer House, Malet Street, W.C.1.

Pamphlets.

Choice of Careers Series, No. 4 (H.M.S.O.), 9*d.*

The Library Profession. Available from The Library Association.

LOCAL GOVERNMENT SERVICE.

B. G.

Age. Usually 16.

Qualification. O for entry into General Division.

Pay. £230–£560 (General). Other Divisions and grades correspondingly higher.

Aptitudes. Impartiality, sense of duty.

Method of Entry. By examination, interview, or in reply to advertisement, depending on Authority.

Further Training. Part-time study for the appropriate professional or technical examinations.

Local Government is a term covering the work of the following types of local authority: County, County Borough, Borough, Metropolitan Borough, Urban District, and Rural District. These authorities are responsible for the administering of a very wide range of public services: *e.g.*, education, public health, housing, road work, police, fire services, civil defence, welfare, libraries, swimming-pools, playing fields, etc.

There are about 180,000 Local Government Servants in England and Wales. They are divided into the following classes:—

(i) General.
(ii) Clerical.
(iii) Miscellaneous.
(iv) Administrative, Professional and Technical (known as A.P.T.) which is subdivided.

The school-leaver will normally enter the General Division, and his or her subsequent career

depends on record and the passing of the appropriate examinations.

It is important that one should start in a branch of Local Government in which one's own inclinations and preferences for a particular type of work can be developed.

The main departments are:—

1. **The Clerk's Department**, which looks after the legal side of Local Government. There is considerable variety of work, and it is often possible to arrange to serve under articles (*see* **Law**). Highest positions are increasingly reserved for graduates.
2. **The Treasurer's Department**, which is responsible for the finances of the authority. The ambitious beginner will study for accountancy qualifications (*see* **Accountancy**).
3. **The Housing Department**, which is in many authorities steadily increasing in importance. Architects, Surveyors, Engineers, Managers are all required, and facilities exist for acquiring professional status in many aspects of the work.
4. **The Engineer's Department.** A professional Engineering qualification, acquired either before or during service, is essential for those who seek promotion. The department is concerned with roads, drainage, sewerage, municipal buildings, and general development (*see* **Engineering**).
5. **The Public Health Department.** Under the control of the Medical Officer of Health, this is concerned with the general health of the public. School Medical and Dental Officers, Public Health Inspectors, Food Inspectors, Health Visitors, Midwives, etc., belong to this department.
6. **Education Department**, which is responsible for the administration of the Schools, Further Education Colleges, Youth Service, and Youth Employment Bureaux. The higher posts in this department offer an alternative career to those who have teaching experience (who are not themselves Local Government Officers) and indeed are usually reserved for former teachers.

All these departments, as well as the others which have been mentioned, require administrative and clerical employees in addition to the specially qualified technical people, such as doctors and engineers, and there is certainly no need for boys or girls to feel that by entering the Service at school-leaving age they are condemned to a humdrum life on a third-rate salary for the rest of their days. The interests of staff are looked after by the National and Local Government Officers Association, posts are pensionable (contributory), and welfare arrangements are good.

Addresses.

The National and Local Government Officers Association, 1 York Gate, Regents Park, N.W.1.

The Local Authorities Conditions of Service Advisory Board, 41 Belgrave Square, S.W.1.

Pamphlet.

Choice of Careers Series, No. 28 (H.M.S.O.), 1*s.* 3*d.*

MEDICAL LABORATORY TECHNOLOGY.

B. G.

Age. 16+.

Qualifications. Usually O.

Pay. £210 p.a. (at age 16)–£415 p.a. (at age 25); then (when qualified) £655 p.a., with possibility of higher appointments.

Aptitudes. Patience, interest in science, attention to detail, reliability.

Method of Entry. By application to the Area Pathologist of the Hospital Management Committee concerned.

Further Training. Part-time study for the examinations of the Institute of Medical Laboratory Technology.

Medical Laboratory Technology is the study and practice of the technical methods used in laboratory work to ascertain the nature of diseases, usually from specimens of body tissue, blood, etc. It is of great interest to the school-leaver who is interested in science and prepared to continue studies in spare time. The work is such that the pathologists under whom the technicians work must have absolute confidence in the reliability and accuracy of their juniors.

The beginner has to obtain a post as indicated above, and then apply for registration by the Institute as a student. Much of the practical instruction is by a Senior Technician in the course of duties. The Intermediate Examination of the Institute is taken after 3 years' experience and thereafter, having gained the status of a Junior Technician, the young man or woman has a further 2 years' part-time study for the Final Examination.

There is continuing development in the Health Services, and prospects for new entrants are reasonably good.

Address.

The Institute of Medical Laboratory Technology, 9 Harley Street, W.1.

Pamphlets.

M.L.T. as a Career. Available from the Institute.

Choice of Careers Series, No. 57 (H.M.S.O.), 1*s.* 6*d.*

MEDICINE.

B. G.

Age. 17 years 9 months (minimum).

Qualifications. A in chemistry, physics, biology. Sometimes O + Pre-Medical Examination (First M.B.).

Pay.

1. Hospital Service: about £500 p.a. to over £3,000 (Consultants).
2. General Practice, depending on size of practice. In the National Health Service there is a capitation fee for every patient on doctor's list up to £3,500+.
3. In Public Health, Industry, Armed Forces, Colonial Medical Service, about £1,000 to over £2,000.

Aptitudes. Patience, calmness of manner, interest in other people, capacity for hard work.

Method of Entry. Acceptance as a student by one of the Medical Schools.

Further Training. At least 5 years' full-time study for degree or diploma, followed by one year as a "house-surgeon" in a hospital.

It is important for the would-be doctor to ensure, while still at school, that the Sixth Form syllabus being followed is the best preparation for medical training. "A" level in chemistry, physics, and biology means exemption from the First or Pre-Medical Examination, which otherwise entails a whole year's study at a Technical College or Medical School. It must also be remembered that expenses may be even heavier than in other forms of training, and although help is available from Local Education Authorities and through Scholarships, this is bound to be an anxious time for parents of moderate means.

When the student has passed the Final Examinations of the course he is following, he or she has to spend 1 year as a house-surgeon in an approved hospital or institution before starting in a practice. Doctors in general practice need to have great reserves of physical strength, patience, and endurance. Unless they can come to some sort of "duty" arrangement with other doctors practising in the locality, or unless they work in

a partnership, they must expect to have little time they are certain to be able to call their own.

Many newly qualified doctors prefer to work for public authorities or in large industrial or commercial concerns, where at least work is usually in line with office hours. For those who like community life, the Armed Services offer a secure and well-paid career with the opportunity of seeing much of the world.

The following is a list of the Medical Schools which offer courses in Medicine:

Aberdeen University.
Belfast, Queen's University.
Birmingham University.
Bristol University.
*Cambridge University.
Cork, University College.
Durham University.
Dublin—
  Trinity College.
  University College.
  Royal College of Surgeons.
Edinburgh University.
Galway, University College.
Glasgow University.
Leeds University.
Liverpool University.
Manchester University.
*Oxford University.
St. Andrews University.
Sheffield University.
Welsh National School of Medicine, Cardiff.
London University—
  St. Bartholomew's Hospital.
  Charing Cross Hospital.
  Guy's Hospital.
  King's College Hospital.
  London Hospital.
  Middlesex Hospital.
  St. George's Hospital.
  St. Mary's Hospital.
  St. Thomas's Hospital.
  University College Hospital.
  Royal Free Hospital.
  Westminster Hospital.

* These universities offer only the pre-clinical 3-year course. Except in rare cases the clinical period of training, another 3 years, must be done elsewhere.

Addresses.

General Medical Council, 44 Hallam Street, W.1.

English Conjoint Board, 8 Queen Square, W.C.1.

Irish Conjoint Board, Royal College of Surgeons in Ireland, St. Stephen's Green, Dublin.

Scottish Conjoint Board, 18 Nicolson Street, Edinburgh, 8.

Pamphlet.

Careers for Men and Women, No. 32 (H.M.S.O.), 6*d*.

MERCHANT NAVY.

B.

Age.

Navigation Officers, 16–17½.
Engineer Officers, 16+.
Radio Officers, 16½+.

Qualifications.

1. Usually O to start training.
2. Ministry of Transport Eyesight Certificate.

Pay.

Navigation Officers, £50–£170 per month on completion of training.
Engineer Officers, £42–£156 per month on completion of training.
Radio Officers, £28 10*s*.–£71 per month on completion of training.

Aptitudes. Self-reliance, capacity for unstinted work, first class eye-sight, physical fitness, sense of adventure.

Method of Entry.

(a) *Navigation Officer.*
  1. By acceptance at Training School (see address below).
  2. By application to shipping line.

(b) *Engineer Officer.*
  1. By apprenticeship in marine works or shipbuilding yard.
  2. Acceptance by a shipping company on full-time Technical College course, combined with seagoing and workshop experience.

(c) *Radio Officer.* Acceptance in a school to train for Postmaster General's Certificate.

Further Training.

(a) *Navigation Officer.*
  1. Course of pre-sea training at approved training school plus shortened apprenticeship.
  2. 4 years' apprenticeship with shipping line.

(b) *Engineer Officer.*
  1. 4 years' marine engineering experience ashore plus 18 months' sea service.
  2. 4 years' apprenticeship with shipping company.

(c) *Radio Officer.* 12–16 months' training for the Postmaster General's Certificate.

As will be gathered from the above, careers in the Merchant Navy fall usually into the categories of Navigation, Engineer, and Radio. The future Navigation Officer has to study as an apprentice for the Certificate of Competency, which qualifies him as a Second Mate. After a further 12 months at sea he is able to sit for the First Mate's Certificate, and 2½ years later for the Master's Certificate. During this sea time he can pursue his studies by correspondence course.

The pattern for Engineer Officer is similar, except that the 4 years' apprenticeship is on land in a works preferably connected with the shipbuilding industry. On completion of his apprenticeship the young engineer spends 21 months at sea before taking the Second Engineer's Certificate and a further similar period before the Chief Engineer's Certificate. There is an alternative method for boys with "O" level or equivalent qualifications which comprises 2 years' full-time Technical College work followed by 18 months' practical engine-room experience at sea, and a further year in a shipyard or marine works.

The necessary qualifications for a Radio Officer have to be obtained before the beginning of service afloat, and it is a wise precaution to ensure that one has the necessary physical requirements before starting a course, in order to avoid possible disappointment later.

Radio Officers are employed by the Radio Companies, and not by the shipping companies, and application should be made to the former.

The life of a Merchant Navy Officer varies according to whether he is employed on "home" or "foreign" work (*i.e.*, short-range or long-range shipping) and according to the type of ship he is working. For example, an officer on a deep-sea oil-tanker may spend relatively long periods away from home, but this is compensated by longer home leave. The social demands on board a large passenger liner will, of course, be greater than if one is serving on a little cargo vessel. But the qualities required in every branch and on every type of ship are the same—trustworthiness, intelligence, ability to get on with others, and willingness to take responsibility. For those possessing these qualities, the sea offers a fine and interesting career.

Addresses.

The Shipping Federation Ltd., 52 Leadenhall Street, E.C.3.

For Radio Officers:—

International Marine Radio Co. Ltd., 29 Progress Way, Croydon.

The Marconi International Marine Communication Co. Ltd., Marconi House, Chelmsford, Essex.

Messrs Siemens Bros. & Co. Ltd., Woolwich, S.E.18.

For Eyesight Tests:—

Mercantile Marine Office, at any big port in the United Kingdom.

London County Council Training School for which grants from other Local Authorities also are usually awarded:—

The King Edward VII Nautical College, 680 Commercial Road, E.14.

Pamphlets.

How to Join the Merchant Navy. Available from the Ministry of Transport, Berkeley Square, W.1.

Why not? An Engineer Officer in the Merchant Navy. Available from the Shipping Federation.

Choice of Careers Series:—

No. 72, *Merchant Navy Officer* (H.M.S.O.), 2*s.*

No. 73, *Merchant Navy Ratings* (H.M.S.O.), 1*s.* 9*d.*

MIDWIFERY.

G.

Age. 20–50.

Qualifications. Usually O and often A.

Pay. £457–£568.

Aptitudes. Good health, interest in people, sense of vocation.

Method of Entry. Acceptance on a Nursing course at an approved hospital.

Further Training.

1. For State Registered General or Sick Children's Nurses, 1 year.
2. For all others, 2 years.

The career of midwife is an attractive one for the girl who is interested in people, and who feels a vocation for some form of service to others. Since the National Health Service came in, there has been an increasing demand for the midwifery services.

Midwives, with 3 years' experience or more, and who have assisted with the training of pupils, are eligible to enter for the Midwife Teacher's Diploma. Study for this can be either full or part-time, and the possession of the Diploma is indispensable for those who seek promotion to senior teaching and administrative posts.

Addresses.

Central Midwives' Board, 73 Great Peter Street, S.W.1.

Central Midwives Board for Scotland, 18 Nicolson Street, Edinburgh, 8.

MUSIC.

B. G.

Age. 16 (for professional training). 18 (for teacher training).

Qualifications. O, preferably A for teacher training.

Pay. As a teacher in State system—in accordance with Burnham scales. Otherwise—very varied.

Aptitudes. Natural talent and strong constitution.

Method of Entry. Acceptance by a school of music or University.

Further Training. 3–6 years at school of music, leading to a diploma or degree.

The person who studies music with a view to making a career has two courses open. He or she can study to become a professional performer or a teacher. In the former case it must be realised that competition is very great, and only those who are at the top of their "class" and able to stay there can hope for the "glamorous" solo work. There has been recently, however, an increased public demand for music, and prospects of getting an orchestral post are perhaps slightly better for the good performer than they were in the past. This growth (or revival) of interest in music in this country means that there is also more for the trained teacher to do.

The boy or girl who wishes to take up music professionally must be proficient enough to pass an entrance examination if he or she wishes to follow a full-time School of Music course. The addresses of the best known of these schools are given below.

These courses cater for both would-be performers and teachers, and for the latter there is the alternative of a University course leading to a degree in music. These degrees are offered by the Universities of Birmingham, Bristol, Cambridge, Dublin, Durham, Edinburgh, London, Manchester, Oxford, Sheffield, Wales and the National University of Ireland.

The profession of music is in many respects more of a vocation than a career, and only those who have a real determination to devote their lives to this branch of the arts and sufficient character to withstand the boredom of repeated rehearsals, and the often straitened circumstances of a musician's life, should embark on such a hazardous undertaking.

Addresses.

The Royal Academy of Music, Marylebone Road, N.W.1.

The Royal College of Music, Prince Consort Road, South Kensington, S.W.7.

The Guildhall School of Music and Drama, John Carpenter Street, E.C.4.

The Birmingham School of Music, Paradise Street, Birmingham, 1.

Trinity College of Music, Mandeville Place, Manchester Square, W.1.

The Royal Manchester College of Music, Ducie Street, Oxford Road, Manchester.

The London College of Music, Great Marlborough Street, W.1.

The Scottish Academy of Music, St. George's Place, Glasgow, C.2.

Book.

To be a Professional Musician (Methuen), 10*s.* 6*d.*

NURSING.

Usually G, but B, much in demand.

Age. 18–30 (for beginning of training).

Qualifications. Preferably O, but not essential, though increasingly A is required.

Pay. £440–£557 (for Staff Nurse).

Aptitudes. Interest in people, good health, even temper, tact.

Method of Entry. By application to Matron of approved hospital.

Further Training. At least 3 years until State Registration.

Nursing nowadays is a profession which appeals to many young women who wish to make a career in the service of others. Training for State Registration (S.R.N.) cannot begin until the age of 18, and girls who leave school at 15 are often at a loss as to what to do with the intervening 3 years. Those who have the opportunity of staying in a Sixth Form are well advised to do so, as Sixth Form work is a useful preparation for the further study the student must tackle.

There are the alternatives of the pre-nursing courses which are run by some schools and tech-

nical colleges, and the cadet schemes which are run by some hospitals.

Training (which is resident) lasts for 3–4 years (except for Fever Nursing, which is a 2-year course). Registration may be obtained in: (i) General Nursing; (ii) The Nursing of Sick Children; (iii) Fever Nursing; (iv) Mental Nursing; (v) The Nursing of Mental Defectives. It is considered advisable to qualify in General Nursing as a basic training, whichever branch is taken up later.

There is an alternative 1-year course run on simpler lines for girls who feel they cannot cope with the considerable amount of study involved in the S.R.N. course. This leads to the qualification of State Enrolled Assistant Nurse. The salary scale for the S.E.A.N. is slightly lower than the one indicated above.

There are no fees incurred during training, and indeed, an allowance is made in addition to full board and lodging.

The qualified nurse has many interesting openings available to her. Apart from the different branches of hospital work, there are: District Nursing, Midwifery, Private Nursing, Public Health Nursing (all of which allow the nurse a more independent and less communal life), the Nursing Services of the Crown, the Overseas Nursing Service, and the various Missionary Societies.

Male Nurses. These are nowadays quite often trained and employed under similar conditions. They work usually in the larger hospitals, and almost always live out (except in the case of Mental Hospitals). There are good prospects, particularly for Male Nurses, as "Sister Tutors," when both teaching and nursing qualifications are combined.

Address.

Nursing Recruitment Service, 21 Cavendish Square, W.1.

Pamphlet.

Choice of Careers Series:—

No. 82, *Nursing and Midwifery* (H.M.S.O.), 1*s.* 9*d.*

No. 89, *Nursing for Men* (H.M.S.O.), 2*s.* 6*d.*

OCCUPATIONAL THERAPY.

B. G.

Age. 18+.

Qualifications. O.

Pay. About £500–£850+.

Aptitudes. Interest in people, initiative, tact, practical and/or artistic ability.

Method of Entry. Acceptance for course by approved Training School.

Further Training. Usually 3 years leading to the Diploma of the Association of Occupational Therapy.

The Occupational Therapist is concerned with helping the patient to recover and regain his self-confidence by guiding him into a suitable form of work, activity, or recreation. The therapy is therefore partly psychological and partly physical, and the therapist is the person who sees that the doctor's wishes in this respect are carried out and who can prescribe the necessary activities and encourage the patient to co-operate.

During training the student works for part of the time in a hospital learning how to become a member of the team concerned with the recovery of the patient. He or she also studies Anatomy, Physiology, Psychology, Medicine and Surgery, Psychiatry, and the Theory of Occupational Therapy, as well as a series of remedial techniques.

A list of the approved training schools can be had from the address below. Fees are payable, but maintenance and other grants are often available from the Local Education Authority, subject to the usual conditions.

Address.

The Association of Occupational Therapists, 251 Brompton Road, S.W.3.

Pamphlets.

Choice of Careers Series, No. 53 (H.M.S.O.), 6*d.*

Occupational Therapy. Available from the Association.

OPHTHALMIC OPTICIAN.

B. G.

Age. 16+.

Qualifications. A.

Pay. On qualification:—

1. £575–£875 minimum scale in Hospital Eye Service.
2. In Private Practice by arrangement.

Aptitudes. Neatness, manual dexterity, interest in people, attention to detail.

Method of Entry. Acceptance by Training College (usually a CAT) for full-time course.

Further Training. 3-year Training Course followed by 1 year of practical work with a qualified optician.

The Ophthalmic Optician, who must not be confused with the Dispensing Optician (see below), is the person who is responsible for the examination of eyes and the prescription of spectacles, contact lenses, etc. After the 3 years' course the student has to spend a year gaining clinical experience with an established optician or in a hospital. During this final year the student may expect between £350 and £400 salary, whether he chooses to work in a hospital or with an optician. He or she is then entitled to practise in the National Health Service, and can follow one of two courses:—

1. Join the Hospital Eye Service (which carries a progressive salary and pension rights).
2. Enter an established practice with the idea of later going into partnership or working alone.

Note: The **Dispensing Optician** is the person concerned with the dispensing of the lenses prescribed by the Ophthalmic Optician. From the age of 16 the student can be trained either by following a full-time course for 2 years at an approved centre or by working under an approved optician and supplementing the practical work by part-time study for the examinations of the Association of Dispensing Opticians. The latter method takes about 4 years.

Addresses.

The Association of Optical Practitioners, Dept. 11, 65 Brook Street, W.1.

The Association of Dispensing Opticians, 50 Nottingham Place, W.1.

Pamphlets.

Choice of Careers Series, No. 74 (H.M.S.O.), 9*d.*

The Optical Profession. Available from the Association of Optical Practitioners.

ORTHOPTICS.

B. G.

Age. 17+.

Qualifications. O, but preferably A.

Pay. £405 p.a.–£480 p.a. (minimum scale).

Aptitudes. Patience, liking for people, especially children.

Method of Entry. Acceptance on a course at an approved hospital.

Further Training. 2 years' full-time training leading to the Diploma of the British Orthoptic Board.

The orthoptist is concerned with remedial work with patients (very often children) who suffer from squints and "lazy" eyes. She (for it is usually girls who take up this career) may work in an eye hospital, a children's hospital, a general hospital with an ophthalmic department, or a school clinic. There are also some opportunities with ophthalmic surgeons in private practice.

Those who become interested in teaching may take a course after at least 2 years' experience in order to qualify. The teaching side commands rather higher salaries. There are fourteen Orthoptic Training Schools attached to hospitals throughout the country, and a list of these and full details can be obtained from the address below.

Address.

The Faculty of Ophthalmologists, 45 Lincoln's Inn Fields, W.C.2.

Pamphlets.

Choice of Careers Series, No. 69 (H.M.S.O.), 6*d*.

Orthoptics. Available from British Optical Board, Tavistock House, Tavistock Square, W.C.1.

PERSONNEL MANAGEMENT.

B. G.

Age. 21+.

Qualifications. Usually at least A; preferably a degree.

Pay.

Men: about £600+ as an assistant, rising to £1,200 or more, depending on ability, etc.

Women: rates tend to be £100–£150 lower than men's for equivalent work.

Aptitudes. Patience, tact, persuasiveness, ability to get on with people.

Method of Entry. By application for posts advertised in the national Press.

Further Training. See below.

The work of a personnel officer is varied, but is usually concerned with the recruitment of workers and staff for business and industrial organisations, training, conditions of employment, welfare, and consultation arrangements between management and employees.

Probably the best method of gaining the necessary training to embark on this career is to take a degree or diploma in social science and to follow this up with a 1-year course in Personnel Management. The subjects covered in this post-graduate course are Economics, Economic History, Social Administration, General and Industrial Psychology, Industrial Law, Industrial Relations, Principles and Practice of Personnel Management, and Business Administration.

Alternative part-time courses are available at many Technical Colleges, and these occupy 2–3 evenings a week for a period of 5 years in preparation for the Diploma in Management Studies. Correspondence courses are also available. Full details can be obtained from the first address below.

Addresses.

The British Institute of Management, Management House, 80 Fetter Lane, E.C.4.

The Institute of Personnel Management, Management House, 80 Fetter Lane, E.C.4.

Pamphlets.

Training for Personnel Management (Institute of Personnel Management).

Careers for Men and Women, No. 35 (H.M.S.O.), 6*d*.

PHARMACY.

B. G.

Age. There is no age limit for entry.

Qualifications. O, preferably A.

Pay. Varied, depending on nature of post obtained on qualification (see below).

Aptitudes. Interest in science, capacity for detail.

Method of Entry. Registration with the Pharmaceutical Society as a student and acceptance by a School of Pharmacy.

Further Training.

1. 3 years' full-time study for Pharmaceutical Chemist's Diploma, followed by 1 year's practical training in a pharmacy, a hospital, or a manufacturing laboratory.
2. Degree in Pharmacy followed by 1 year's practical training as above.

Pharmacy is the branch of medical work concerned with the dispensing of medicines and appliances. There are three main branches of the profession, namely retail, hospital, and manufacturing. The majority of vacancies occur on the *Retail* side, and the normal procedure is for the newly qualified person to secure employment as an assistant to an established pharmacist, with the intention of eventually taking a partnership, starting alone, or obtaining a managerial post in one of the large retail concerns. *Hospital Pharmacy* work is growing in scope, but at the moment positions are rather hard to obtain as they are limited in number. *Pharmaceutical Manufacturing* provides many openings, often with the opportunity for research and travel.

It should be noted that there is nothing to stop a qualified young person gaining experience in more than one of these branches, as experience gained in one type of work is of undoubted value in the others.

Address.

The Pharmaceutical Society of Great Britain, 17 Bloomsbury Square, W.C.1.

Pamphlet.

Choice of Careers Series, No. 62 (H.M.S.O.), 9*d*.

PHOTOGRAPHY.

B. G.

Age. Usually 16.

Qualifications. Preferably O.

Pay.

1. In commercial work, about £425 p.a. after training.
2. In National Health Service, about £440–£760 p.a. (Whitley Council Scale).

Aptitudes. Patience, neatness.

Method of Entry.

1. Apprenticeship.
2. Acceptance on full-time course at School of Photography.
3. Securing of employment as junior assistant to photographer.

Further Training.

1. 4-year apprenticeship, combined with part-time study for the exams of the Institute of British Photographers.
2. 3 years' full-time study at Art School or School of Photography.
3. As a junior assistant, part-time study for the examination of the Institute of British Photographers or the City and Guilds of London Institute.

Photography as a career has many branches of which the following are the main ones: Portraiture, Advertising, Press, Medical, Scientific.

All these branches demand skilled work, not only in the taking of pictures but on the process-

ing side. Some, such as the Scientific or Press branches, require special aptitudes or training. Indeed, the amount of background knowledge of science needed to make a top rate Scientific Photographer is often of degree order.

Those who choose to acquire their training by apprenticeship or while working as a junior assistant must guard against the danger of getting too one-sided a practical experience while training. For an apprenticeship, this can generally be avoided by careful choice of a firm which deals with varied work, but it presents a real problem for the ordinary assistant attempting to study in his or her spare time. Even for those who wish to follow full-time courses, there is considerable difficulty in finding vacancies, as there are too few schools for the number wishing to train. Early application is therefore essential.

A full list of the Colleges providing full-time courses can be obtained from the Institute at the address below.

Address.

The Institute of British Photographers, 49 Gordon Square, W.C.1.

PHYSIOTHERAPY.

B. G.

Age. 18+.

Qualifications. O.

Pay. £480 p.a. starting salary when trained. Possibility of rising to £875 p.a.

Aptitudes. Physical fitness, tact, liking for people.

Method of Entry. Acceptance for training by a school recognised by the Chartered Society of Physiotherapy.

Further Training. 3 years' full-time training at a school as above, studying for the examinations of the Society.

The physiotherapist is the person who assists the doctor to hasten the recovery of patients suffering from many types of injury or illness by using physical means. Thus massage, electrotherapy, and exercises prescribed by a doctor all come within the scope of the physiotherapist. It is obvious, therefore, that the trained person must be fully grounded in physiological matters, as well as the potentialities of the aids which are now available. It is because of the necessary thoroughness of training that the course lasts 3 years.

Surprisingly enough for work of such social importance, training has to be paid for (unlike Nursing). There is, however, the possibility of financial assistance from Local Education Authorities, and the Society itself offers some small bursaries.

As is so often the case where work involving service to others is concerned, salaries are not particularly high, but the young man or woman who takes up physiotherapy as a career has at least the satisfaction of knowing that the work he or she is doing is of increasing social importance.

A detailed list of training establishments is available from the Society at the address below.

Address.

The Chartered Society of Physiotherapy, Tavistock House (South), Tavistock Square, W.C.1.

Pamphlet.

Choice of Careers Series, No. 52 (H.M.S.O.), 1*s.*

Physiotherapy, a career with a future. Available from the Society.

POLICE.

B. G.

Age.

Men, 19–30 (18 for Metropolitan Police).
Cadets, 16.
Women, 20–35 (20–30 in Scotland).

Qualifications. For Cadets: usually O.

Pay.

1. Men, £510–£695 after nine years.
2. Women, £460–£625 after nine years.

(These are Constables' rates only and are somewhat higher in the London area.)

Aptitudes. Good health, patience, team spirit, ability to pass simple entrance test.

Note. There are certain physical requirements:—

Men must be at least 5 ft. 8 in. tall (in some forces taller).
Women must be at least 5 ft. 4 in. tall.
Sight must be normal without glasses.

Method of Entry. By application to the local Police Station or the Chief Constable or Senior Officer of the local Police Force.

Further Training. 3 months' basic training, followed by practical training for about 2 years.

The fundamental purpose of the police is the maintenance of law and order, but there are many other ways in which they are of service to the community—from the relief of traffic congestion to the simple help and guidance of the general public.

There are 125 Police Forces in England and Wales, and thirty-three in Scotland, and they vary greatly in size and make-up. The largest and most complex are those in the large towns, and it is in these forces that the ambitious boy or girl will probably be most interested.

Specialist police work is done by the following branches: C.I.D., finger-prints and photography, motor patrol, wireless duties, river police work, registration of aliens. These departments draw on the ordinary constabulary for their recruits, and young people with special aptitudes have a good chance of being selected.

For the first 2 years new entrants are on probation, and during this time they have several courses and examinations. Promotion thereafter to the ranks of Sergeant and Inspector is by service and examination subject to vacancies being available. There is a contributory superannuation fund, and an officer may retire after 25 years' service on half the average pay of the last 3 years of service. Welfare and sports facilities are usually very good. One important thing to note is that the pay rates quoted (which are the minimum) do not show the "hidden income" of rent-free accommodation or allowance in lieu.

Those boys who have definitely decided on the police as a career (or who wish to find out for themselves what it is all about), but who are not old enough to join, can join the Police Cadets attached to certain police forces.

Addresses.

The Police Recruiting Department, Home Office, Whitehall, S.W.1.

The Police Recruiting Department, Scottish Home Department, 18 Rothesay Terrace, Edinburgh, 3.

Pamphlets.

Choice of Careers Series, No. 80 (H.M.S.O.), 1*s.* 9*d.*

Your Career: Life in the Police. Available from the Home Office.

PRINTING.

B.

Age. 15.

Qualifications. It is said to be useful if the candidate for an apprenticeship has a relation in the firm which he wishes to join.

Pay. Basic minimum over £11 per week on completion of training. Real wages often considerably higher.

Aptitudes. Intelligence, good eyesight, neatness, attention to detail.

Method of Entry. Acceptance of candidature for apprenticeship by Local Apprenticeship Committee.

Further Training. 6 years' apprenticeship coupled with day part-time release and evening study at a Technical College.

Printing is a skilled occupation, and the term covers the activities of compositors, machine managers, photo-process workers, stereotypers, electrotypers, etc. It is also one of the most highly remunerated manual industries, and there is considerable competition for the available apprenticeships. It is therefore helpful to have the agreement of a master printer to accept the would-be apprentice when applying to the Local Apprenticeship Committee.

Some schools also run full-time courses for those interested in the ancillary aspects of printing, such as costing, estimating, paper, and administration, as well as the practical operative work. Such courses last from 2 to 3 years.

Printing enjoys one of the highest degrees of security as an individual career, and does not suffer from the recessions which periodically hit other industries.

Full details of this career can be obtained from the second address below.

Addresses.

The British Federation of Master Printers, 11 Bedford Row, W.C.1.

The Joint Industrial Council of the Printing and Allied Trades, 11 Bedford Row, W.C.1; *or* 60 Doughty Street, W.C.1.

Pamphlet.

Choice of Careers Series, No. 45 (H.M.S.O.), 1*s.* 9*d.*

RADIOGRAPHY AND RADIOTHERAPY.

B. G.

Age. 18.

Qualifications. At least O.

Pay. About £450–£800, depending on experience and status.

Aptitudes. Interest in people, tact.

Method of Entry. Acceptance by training hospital recognised by Society of Radiographers.

Further Training. 2 years' full-time study at a training hospital leading to the Diploma Examination of the Society of Radiographers.

Radiography is the taking of X-ray photographs, and Radiotherapy is the treatment of disease by X-ray and radium techniques. The training for both branches is the same during the first year, but thereafter those who are going in for Radiotherapy follow a different course. The radiographer is a member of one of the important teams of doctors, nurses, therapists, and almoners who are essential to the efficient running of the hospital service. At the moment the majority of workers in Radiography and Radiotherapy are women, but there is no reason why young men with an interest in this type of work should not make a satisfying career, especially as radiography services are expanding.

A list of the hospitals offering courses can be obtained from the Society at the address below.

Address.

The Society of Radiographers, 32 Welbeck Street, W.1.

Pamphlets.

Choice of Careers Series, No. 41 (H.M.S.O.), 9*d.*

SECRETARIAL WORK.

G.

Age. 15+.

Qualifications. Preferably O.

Pay. £8–£12 per week as experienced secretary.

Aptitudes. Tact, discretion, ability to reach a high standard of shorthand and typing, and good memory.

Method of Entry. By application for advertised posts.

Further Training. If not qualified before entry, part-time study for shorthand and typing qualifications.

Secretarial work, for which there is an ever-increasing demand, offers an interesting and often well-paid career to a reliable and intelligent girl. The best way of acquiring training is a full-time course at a private secretarial school, preferably after having reached a good educational standard (O or A) at school. Alternatively, some schools include shorthand and typing in the curriculum (especially Secondary Commercial and Secondary Technical Schools), leading usually to the examinations of the Royal Society of Arts or the London Chamber of Commerce. For those who leave school with no experience of shorthand and typing and who wish to train in their spare time while working, perhaps at a junior clerical job, the Technical Colleges and Colleges of Further Education offer courses leading to the examinations of the Royal Society of Arts.

It should be pointed out, however, that pressure on these part-time classes is very great, and early enrolment at the beginning of the academic year is essential.

Many Colleges of Further Education also run courses in conjunction with the Office Management Association for the Certificates in Office Supervision, Office Methods, and Office Administration, which are useful for girls seeking supervisory posts.

Women graduates (usually with language qualifications) who take a secretarial course on completion of their degree can look forward to very interesting careers, often involving travel and increasing responsibility as they gain experience.

Many of the private colleges which run, in some cases, residential courses, have their own Appointments Bureaux and assist girls who qualify on their courses to find posts.

Mention should also be made of the Stenotyping courses available at the Palantype College in London and at other colleges and schools in the provinces. Stenotyping is a type of machine shorthand which has the advantage of legibility, speed, and absence of fatigue.

The following are the main private organisations offering secretarial and allied courses, and a list of the colleges run by them throughout the country can be had on request. Enquiries about Local Education Authority facilities should be made to the Education Officer of the authority concerned.

Addresses.

Pitman's College, 154 Southampton Row, W.C.1.

The Gregg Schools, Ltd., Gregg House, Russell Square, W.C.1.

Clark's College, 126 Chancery Lane, W.C.2.

The Palantype College, 229/231 High Holborn, W.C.1.

Pamphlet.

Choice of Careers Series, No. 65 (H.M.S.O.), 1*s.*

SPEECH THERAPY.

B. G.

Age. 18.

Qualifications. A.

Pay. £455–£815 p.a.

Aptitudes. Self-confidence, ability to speak well, liking for people.

Method of Entry. Acceptance by approved training school.

Further Training. 3 years' full-time training for the Diploma of the College of Speech Therapists.

Speech Therapists are usually girls, but there is no reason why boys who are interested in people and who satisfy the other preliminary requirements should not make a rewarding career in speech therapy, even though the financial return is unexciting.

The work involves the remedial treatment of speech defects, especially in children, at school, clinics, and in hospitals. There is also a considerable amount of part-time work available, payment for which is on a sessional basis.

One can practise only if one is a Licentiate of the College of Speech Therapists, and there are seven training schools recognised by this body, namely:—

1. The Central School of Speech Training and Dramatic Art, The Embassy Theatre, Swiss Cottage, N.W.3.
2. The Kingdom-Ward School of Speech Therapy, 26 Lower Sloane Street, S.W.1.
3. The Speech Therapy Training School of the West End Hospital for Nervous Diseases, 26 Holland Park, W.11.
4. The Oldrey Fleming School of Speech Therapy, 16 Harley Street, W.1.
5. The Leicester School of Speech Therapy, Adult Education Centre, Pelham House, 100 Welford Road, Leicester.
6. The Edinburgh School of Speech Therapy, 7 Buccleuch Place, Edinburgh, 8.
7. The Glasgow School of Speech Therapy, 25 Athole Gardens, Glasgow, W.2.

Address.

The College of Speech Therapists, 68 Queen's Gardens, W.2.

Pamphlet.

Choice of Careers Series, No. 51 (H.M.S.O.), 6*d*.

Speech Therapy as a Career. Available from the College.

SURVEYING.

B. G.

Age. 16+.

Qualifications. O.

Pay. Depending on branch, but roughly in region of £600–£1,300 p.a. on qualification.

Aptitudes. Capacity for detail, methodical mind, ability to calculate quickly and accurately.

Method of Entry. In general:—

1. As a junior assistant or under articles in an approved Surveyor's office.
2. Acceptance by approved training school for full-time course.
3. As a graduate holding B.A., or B.Sc. (Estate Management).

Further Training.

1. If entering as junior assistant or under articles: at least 4 years' part-time study leading to the Final Examination of the Royal Institution of Chartered Surveyors.
2. Full-time study for the First and Intermediate examinations of the Royal Institute, followed by 2 years' practical work and then the Final Examination.
3. If entering as a graduate, 2 years' practical work.

All the above methods lead to membership of the Royal Institute.

Surveying is a profession with many specialised aspects. The various branches are: Building Surveying, Housing Management, Land Agency, Land and Hydrographic Surveying, Mining Surveying, Quantity Surveying, Town and Country Planning, Valuation.

Building Surveying is concerned with the supervision of building, building repairs, and the specifications for builders' work of all descriptions.

Housing Management is more specifically the development and management of housing estates.

Land Agency involves the management of country estates, and agricultural improvements valuations.

Land and Hydrographic Surveying is concerned with measuring and drawing the shape of the land, and mapping the rivers, lakes, and seas. Surveyors in this category are usually government servants.

Mining Surveying is concerned with underground surveys and preparing plans for workings. Surveyors are usually employed by the National Coal Board, but have great scope for work overseas.

Quantity Surveying is concerned with drawing up the estimates of materials and labour required in accordance with the architect's plans. The Quantity Surveyor is also concerned with the valuation of work executed.

Town and Country Planning deals with the preparation and development of planning schemes and involves the surveying of resources and needs of a particular area. Further study to gain the Diploma of the Town Planning Institute is advisable for this branch of the career.

Valuation. The Valuation Surveyor either works for the Inland Revenue and is employed to value real property for the Crown in connection with death duties, income tax, etc., or is in private practice and carries on similar work on behalf of private individuals.

The newcomer to this profession will have decided which branch of surveying he or she wishes to take up. Except for Mining and Land Surveying, all branches have a common syllabus for the First Examination of the Royal Institution of Chartered Surveyors, but thereafter the Intermediate and Final Examinations are on work appropriate to the specialisation being followed. The requirements of the other professional bodies vary in detail, and full information may be had from the addresses below.

There is at present a shortage of qualified surveyors in the country, partly because many surveyors obtain lucrative employment overseas, and the prospects for energetic ambitious young people are excellent.

Addresses.

The Royal Institution of Chartered Surveyors, 12 Great George Street, Westminster, S.W.1.

The Institute of Quantity Surveyors, 98 Gloucester Place, W.1.

The Incorporated Association of Architects and Surveyors, 75 Eaton Place, Belgrave Square, S.W.1.

Pamphlet.

Choice of Careers Series, No. 87 (H.M.S.O.), 1*s*. 9*d*.

TEACHING (England and Wales).

B. G.

Age. 18+.

Qualifications. O, usually A.

Pay. Depending on qualifications, status, and experience, but within range £520 p.a. to about £1,750 p.a. (in State service).

Women will receive equal pay by spring, 1961.

Aptitudes. Patience, interest in the young, sense of humour, good health.

Method of Entry (State system).

1. Acceptance by Training College.
2. As a graduate followed usually but not necessarily by acceptance by University Department of Education.

Note. At the moment it is not essential for a graduate (or person holding certain other qualifications in, *e.g.*, art, music) to hold a Diploma in Education of a University Department of Education, but in a few years' time this may be essential for new entrants.

Further Training.

1. If accepted by Training College, 3 years' full-time training. This can sometimes be combined with study for an external Degree (General or unclassified Honours).
2. The Diploma in Education course offered by University departments of Education, which lasts for 1 year.

The majority of posts in teaching are available in schools run by the Local Education Authorities or assisted by them. These fail into three main categories: Primary, Secondary, and Further Education.

The Primary System is made up mainly of Infant Schools (5–7 years) and Junior Schools (7–11). Teaching in Infants' and Junior Schools demands special qualities of patience and understanding, and it is usual for the Training College student to follow a slightly different programme of studies from those who are going to specialise in Secondary Teaching.

The Secondary System is being constantly modified by many Local Education Authorities, but basically there are two distinct patterns: (i) The Secondary Modern/Secondary Technical/Secondary Grammar organisation, and (ii) The Comprehensive System.

In the first of these children are sorted out at the age of 11 (or 13) according to their parents' wishes and their educational possibilities. Those who go to Grammar Schools need a more specialised and academic course, and it is to this type of school that most graduates are attracted. There are nevertheless many Modern Schools (which outnumber the Grammar by 4 or 5 to 1) offering courses leading to " O " and thus giving opportunities to graduates. Technical Schools (which sometimes recruit their children at 13+) offer as well opportunities to people qualified in industry and commerce who wish to enter the teaching profession.

The Comprehensive School aims at offering the facilities of the above three types under one roof, and is usually a large organisation affording opportunities to many different types of teacher.

The Further Education system comprises the CATs, the Technical Colleges, The Colleges of Further Education, Village Institutes, Evening Institutes, and is of interest to those who feel more drawn to work with young people and adults. Much of the very varied field of work in Further Education is done by part-time teachers and lecturers, but there are nevertheless many opportunities for full-time teaching.

Salaries and conditions of service are gradually improving in the teaching profession, and it is now an attractive career (especially for women with the advent of equal pay). There are still many vacancies in all types of schools, and especially for qualified teachers of science and mathematics.

The independent schools are more and more coming into line with the State schools as regards salary, etc., and often are able to offer added inducements, such as free or cheap accommodation.

There are no fees for courses at the Training Colleges, and help with maintenance is available for those who need it.

The educational system and methods of teacher training are different in Scotland and Northern Ireland, and details can be obtained from the appropriate addresses below.

Addresses.

Ministry of Education (Teacher Training Branch), Curzon Street, W.1.

The National Committee for the Training of Teachers, 140 Princes Street, Edinburgh, 3.

The Ministry of Education, Massey Avenue, Stormont, Belfast.

Pamphlets.

Becoming a Teacher.

Career in Education for Graduates.

Ministry of Education List No. 172 (List of Training Colleges).

The above available from the Ministry.

VETERINARY WORK.

B. G.

Age. 21+ (on qualification).

Qualifications. A (to start University course).

Pay.

1. In private practice as assistant, about £600.
2. In Government Service, £795–£1,280.

Aptitudes. Patience, capacity for detailed observation, fondness of animals.

Method of Entry. Acceptance on University course.

Further Training. 4–6 years' University Degree course.

Veterinary work is concerned with the maintenance of good health in animals and the cure of animal diseases—in other words, the " vet " is the animal doctor. The vet suffers from this disadvantage, however—that animals cannot speak about their symptoms. The young man or woman contemplating veterinary work as a career must, therefore, have a real understanding of and love for animals. This is what makes veterinary work a vocation rather than a career for many people.

In order to practise as a " vet " one must be a member of the Royal College of Veterinary Surgeons, and the necessary qualification for this is a University Veterinary Degree. Degree courses are offered by the following bodies:—

Royal Veterinary College and Hospital, Camden Town, N.W.1.

Royal (Dick) School of Veterinary Studies, Summerhall, University of Edinburgh, 9.

University of Glasgow Veterinary School.

Veterinary Schools of the Universities of Bristol, Cambridge, Liverpool.

Veterinary College of Ireland, Ballsbridge, Dublin, S.E.4.

For the qualified person, openings are available with the Ministry of Agriculture, Fisheries, and Food, and for men in the Army (where after 1 year's service one reaches the rank of Captain). The majority of newly qualified people take a post as an assistant to an established vet in order to gain the necessary practical experience.

Address.

The Royal College of Veterinary Surgeons, 9–10 Red Lion Square, W.C.1.

Pamphlet.

Careers for Men and Women, No. 43 (H.M.S.O.), 6*d*.

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B.B.C. CAREERS PROGRAMMES.

The B.B.C. plan to broadcast the following programmes during 1960 and 1961:—

1. The *World of Work* series on sound radio during the autumn school term (1960) on Mondays from 11.30 to 11.40 a.m., covering such subjects as "choosing a job," "applying for a job," "what is a good job," etc.

2. *First Years at Work*, a television series, during the autumn and spring terms (1960–61) on Mondays from 2.05 to 2.30 p.m., repeated on Tuesdays from 11.05 to 11.30 a.m. Like (1), this programme will be of interest to pupils in secondary modern schools and will deal with individual careers or groups of careers.

3. The *Choosing a Job* series, details of which will appear in the *Radio Times*.

BOOKLETS.

Booklets in the series "Choice of Careers" are obtainable from H.M. Stationery Office at: York House, Kingsway, London, W.C.2; 423 Oxford Street, London, W.1; 13a Castle Street, Edinburgh, 2; 39 King Street, Manchester, 2; 2 Edmund Street, Birmingham, 3; 109 St. Mary Street, Cardiff; Tower Lane, Bristol, 1; 80 Chichester Street, Belfast; or through any bookseller.

Accountant (59). 9*d.*

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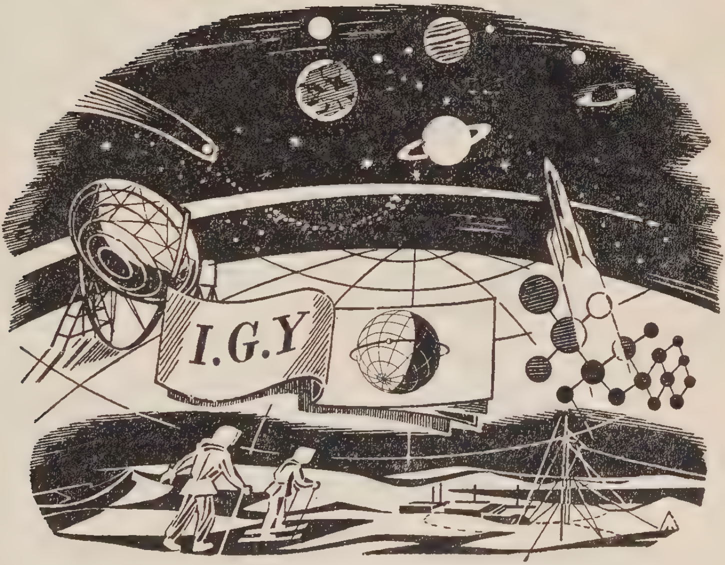
The World of Science



This section deals with everything from atoms to stars, from the simplest living things to the human mind in all its complexity. What could be more important or exciting?

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The World of Science

INTRODUCTION

At no time in our history has it been more necessary for the ordinary individual—and outside our own specialised knowledge we are all ordinary individuals—to know and understand what the scientists are doing; for we have now reached a state of affairs which may well prove to be the cross-roads of human destiny. The dramatic new developments have made it inevitable that all must live or all must die. On the one hand, there exists the possibility of undreamed-of abundance, peace, and happiness for an ever-increasing number of mankind, and on the other total annihilation, if not of the whole human species, at least of all that makes life worthwhile. Which way are we to choose?

In this choice ordinary people must play a major part, but this they cannot do without understanding the issues involved, since free choice must be based upon a certain minimum of knowledge, and this is the reason why *Pears Cyclopædia* decided to include a section dealing with scientific progress.

The section is divided into two parts, the first (I., II., and III.) setting out to give a very brief account of the universe as seen by modern science and forming a background to the second part (IV.), which will discuss some of the more recent developments and discoveries. It need hardly be said that such a section must be sketchy in the extreme, and that only a very few of the main issues can be discussed. But the writer of this section believes with the Editor that it is worth while trying. We are frequently reminded by the learned that modern knowledge increases so rapidly that no single mind can come anywhere near achieving the sort of universal knowledge which was possible, say, in the eighteenth century—and obviously this is quite true. But all this vast body of knowledge is not essential to most of us, who ask only two things from science: (1) that it should give us a *general* picture of the universe which will give us some idea of where we stand in relation to it; (2) that it should give us *particular* information concerning practical issues which concern us in everyday life. To describe modern knowledge from this point of view is certainly possible, although whether the present attempt succeeds in doing so the reader must decide for himself.

I. THE STRUCTURE AND ORIGIN OF THE UNIVERSE

The universe includes everything from the smallest sub-atomic particle to the mightiest system of stars. The scientific view of the universe (not the only view but the one we are concerned with here) is a remarkable achievement of the human mind, and it is worth considering at the outset what a "scientific view" is, and what is remarkable about it.

A scientific view of something is always an intimate mixture of theories and observed facts, and not an inert mixture but a seething and growing one. The theories are broad general ideas together with arguments based on them. The arguments are designed to show that, if the general ideas are accepted, then this, that, or the other thing ought to be observed. If this, that, or the other actually are observed, then the theory is a good one; if not, then the theoreticians have to think again. Thus theoretical ideas and arguments are continually subjected to the severe test of comparison with the facts, and scientists are proud of the rigour with which this is done. On the other hand, theories often suggest new things to look for, *i.e.*, theories lead to predictions. These predictions are frequently successful, and scientists are entitled to be proud of that too. But it follows that no theory is immutable; any scientific view of any subject may, in principle, be invalidated at any time by the discovery of new facts, though some theories are so soundly based that overthrow does not seem imminent.

A remarkable aspect of the scientific view of the universe is that same principles are supposed to operate throughout the whole vastness of space. Thus the matter and radiation in stars are not different from the matter and radiation on earth, and their laws of behaviour are the same. Therefore theories hard won by studies in terrestrial physics and chemistry laboratories are applied at once to the whole cosmos. Astronomy and cosmology are spectacular extensions of ordinary mechanics and physics.

LOOKING AT THE UNIVERSE.

The universe is observable because signals from it reach us and some manage to penetrate our atmosphere.

First, there are waves of visible light together with invisible rays of somewhat longer (infra-red) and somewhat shorter (ultra-violet) wavelengths. These waves show us the bright astronomical objects and, to make use of them, astronomers have constructed telescopes of great power and precision backed up with cameras, spectroscopes, and numerous auxiliaries. The most powerful telescope, at Mt. Palomar, California, has a 200-in.-diameter mirror. The next major advance in optical telescope performance probably awaits the erection of telescopes on satellites outside the earth's atmosphere, which at present acts as a distorting and only partially transparent curtain.

Secondly, there are radio waves of much longer wavelength than light. These can be detected by sensitive radio receivers with special aerial systems. These are the radio telescopes (**X18** (2)). The most well known is at Jodrell Bank and started working in 1957. A larger and more sensitive one is being built in West Virginia, U.S.A.

A third type of radiation from outer space impinges on the atmosphere. This is the cosmic radiation. It consists of very fast-moving fundamental particles, including protons (**F13**). Cosmic rays are detected by Geiger counters, by the minute tracks they leave on photographic plates, and by other means. The origin of cosmic rays is still uncertain, but many people think they must have an intimate connection with the nature and evolution of the universe itself.

By looking at, and listening to, the universe with optical and radio telescopes, astronomers have formed a remarkably detailed picture of its structure. The merest outline of this will now be given.

Great Distances and Large Numbers.—Let us start with nearby objects. This raises at once the question of what "nearness" and "distance" are in astronomy and how they are to be expressed. A convenient unit of distance is the *light-year*, *i.e.*, the distance that light, travelling at 186,000 miles per second, traverses in one year. Since vast numbers as well as vast distances will enter the question, we need a shorthand for large numbers. Ten times ten times ten will be represented by 10^3; six tens multiplied together (*i.e.*, one million) will be written 10^6, and so on. 10^{14} would mean a hundred million million. One divided by a million (*i.e.*, one-millionth) will be written 10^{-6};

the very small number obtained by dividing one by the product of fourteen tens will be written 10^{-14}. A light-year is $5{\cdot}88 \times 10^{12}$ miles: the radius of an atom is about 10^{-8} cm.

The Solar System.—The earth is the third, counting outwards, of nine planets revolving in nearly circular orbits round the sun. Their names and some other particulars are given in the table (**F7**). The sun and its planets are the main bodies of the solar system. Between Mars and Jupiter revolve numerous chunks of rock called the asteroids: the largest of these, Ceres, is 480 miles across. Apart from these, the solar system is tenuously populated with gas, dust, and small particles of stone and iron. Dust continuously settles on the earth, and frequently small fragments enter the atmosphere, glow, and evaporate; these are meteors or shooting stars. Sometimes larger rocks, called meteorites, hit the earth. Comets are relatively compact swarms of particles—containing ice according to one theory—which travel in elongated orbits round the sun. Their spectacular tails form under the sun's influence when they approach it. Not all comets stay indefinitely in the solar system; some visit us and go off into space for ever.

The sun itself is a dense, roughly spherical mass of glowing matter, 865,000 miles across. Its heat is so intense that the atoms are split into separated electrons and nuclei (*see* **F10**) and matter in such a state is called plasma. At the sun's centre the temperature has the unimaginable value of about 13 million degrees Centigrade (a coal fire is about 800° C.). Under such conditions the atomic nuclei frequently collide with one another at great speeds and reactions occur between them. The sun consists largely of hydrogen and, in the very hot plasma, the nuclei of hydrogen atoms interact by a series of reactions whose net result is to turn hydrogen into helium. This is a process which releases energy just as burning does, only these nuclear processes are incomparably more energetic than ordinary burning. In fact, the energy released is great enough to be the source of all the light and heat which the sun has been pouring into space for thousands of millions of years.

We may note in passing that the occurrence of these energy-producing reactions in sufficiently hot plasmas is the reason why so much effort is nowadays put into the study of plasma physics. The well-known Harwell machine, Zeta, is a device for producing and containing hot plasma. It is one of man's attempts to imitate on earth the energy-giving processes in the sun.

Stars.—In colour, brightness, age, and size the sun is typical of vast numbers of other stars. Only from the human point of view is there anything special about the sun—it is near enough to give us life. Even the possession of a system of revolving planets is not, according to some modern views, very unusual.

No star can radiate energy at the rate the sun does without undergoing internal changes in the course of time. Consequently stars evolve and old processes in them give rise to new. The exact nature of stellar evolution—so far as it is at present understood—would be too complex to describe here in any detail. It involves expansion and contraction, changes of temperature, changes of colour, and changes in chemical composition as the nuclear processes gradually generate new chemical elements by reactions such as the conversion of hydrogen to helium, helium to neon, neon to magnesium, and so on. The speed of evolution changes from time to time, but is in any case very slow compared with the pace of terrestrial life; nothing very dramatic may occur for hundreds of millions of years. Evidence for the various phases of evolution is therefore obtained by studying many stars, each at a different stage of its life. Thus astronomers recognise many types with charmingly descriptive names, such as blue giants, sub-giants, red and white dwarfs, supergiants.

The path of stellar evolution is marked by various explosive events. One of these, which occurs in sufficiently large stars, is an enormous explosion in which a substantial amount of the star is blown away into space in the form of high-speed streams of gas. For about a fortnight, such an exploding star will radiate energy 200 million times as fast as the sun. Japanese and Chinese (but not Western) astronomers recorded such an occurrence in A.D. 1054, and the exploding gases, now called the Crab nebula, can still be seen in powerful telescopes and form a cloud six or seven light-years across. While it lasts, the explosion shows up as an abnormally bright star and is called a *supernova*.

Groups of Stars.—It is not surprising that ancient peoples saw pictures in the sky. The constellations, however, are not physically connected groups of stars but just happen to be patterns visible from earth. A conspicuous exception to this is the Milky Way, which a telescope resolves into many millions of separate stars. If we could view the Milky Way from a vast distance and see it as a whole we should observe a rather flat wheel of stars with spiral arms something like the sparks of a rotating Catherine wheel. This system of stars is physically connected by gravitational forces and moves through space as a whole; it is called a *galaxy*.

The galaxy is about 10^5 light-years across and contains roughly 10^{11} stars. An inconspicuous one of these stars near the edge of the wheel is our sun; the prominent stars in our night sky are members of the galaxy that happen to be rather near us. Sirius, the brightest, is only 8·6 light-years away, a trivial distance, astronomically speaking.

The galaxy does not contain stars only, there are also clouds of gas and dust, particularly in the plane of the galaxy. Much of the gas is hydrogen, and its detection is difficult. However, gaseous hydrogen gives out radio waves with a wavelength of 21 cm. Radio telescopes are just the instruments to receive these, and workers in Holland, America, and Australia detected the gas clouds by this means. In 1952 they found that the hydrogen clouds lie in the spiral arms of the galaxy, and this is some of the strongest evidence for the spiral form.

Around the spiral arms, and forming part of the galaxy, are numerous globular clusters of stars. These are roughly spherical, abnormally densely packed, collections of stars with many thousands of members. Because of its form and density, a globular cluster may be assumed to have been formed in one process, not star by star. Thus all its stars are the same age. This is of great interest to astronomers, because they can study differences between stars of similar age but different sizes.

Galaxies.—One might be forgiven for assuming that such a vast system as the galaxy is in fact the universe; but this is not so. In the constellation of Andromeda is a famous object which, on close examination, turns out to be another galaxy of size and structure similar to our own. Its distance is given in the table (**F7**). The Milky Way, the Andromeda Nebula, and a few other smaller galaxies form a cluster of galaxies called the Local Group. Obviously it would not be so named except to distinguish it from other distinct groups, and it is indeed a fact that the universe is populated with *groups*, or *clusters*, of *galaxies*. A cluster may contain two or three galaxies, but some contain thousands. So far as the eye of the telescope and camera can see, there are clusters of galaxies.

On a photograph a galaxy is a nebulous blob without the hard outline that a single star produces. Such nebulæ were formerly thought to be inside the Milky Way, but, after controversy, it was established that many of them were separate distant galaxies. By about 1920 it was known that there were at least half a million galaxies, and with the advent of the 100-in. Mt. Wilson telescope this number rose to 10^8 and is being increased further by the 200-in. telescope which can see out to a distance of 7×10^9 light-years. Through the powerful telescopes the nearer galaxies reveal their inner structures. Photographs of galaxies are among the most beautiful and fascinating photographs ever taken, and readers who have never seen one should hasten to the nearest illustrated astronomy book. Among

the pictures are some showing pairs of remote galaxies in collision. Such occurrences are of particular interest because they appear to be very strong sources of radio waves detectable by radio telescopes.

The Expanding Universe.—Two discoveries about galaxies are of the utmost importance. One is that, by and large, clusters of galaxies are uniformly distributed through the universe. The other is that the distant galaxies are receding from us.

How is this known? Many readers may be familiar with the Doppler effect first discovered in 1842. Suppose a stationary body emits waves of any kind and we measure their wavelength, finding it to be L ins. Now suppose the body approaches us; the waves are thereby crowded together in the intervening space and the wavelength appears less than L; if the body recedes the wavelength appears greater than L. The Austrian physicist, J. Doppler (1803–53), discovered this behaviour in sound waves, and it explains the well-known change of pitch of a train whistle as it approaches and passes us. The same principle applies to the light. Every atom emits light of definite wavelengths which appear in a spectroscope as a series of coloured lines—a different series for each atom. If the atom is in a receding body all the lines have slightly longer wavelengths than usual, and the amount of the change depends uniquely on the speed. Longer wavelengths mean that the light is redder than usual, so that a light from a receding body shows what is called a "red shift." The speed of recession can be calculated from the amount of red shift.

It was the American astronomer, V. M. Slipher, who first showed (in 1914) that some galaxies emitted light with a red shift. In the 1920s and 1930s the famous astronomer E. Hubble (1889–1953) measured both the distances and red shift of many galaxies and proved what is now known as Hubble's Law. This states that the speed of recession of galaxies is proportional to their distance from us. This does not apply to our neighbours in the Local Group, we and they are keeping together. Hubble's Law has been tested and found to hold for the farthest detectable galaxies; they are about 7×10^9 light-years away and are receding with a speed $\frac{2}{5}$ of that of light.

Does this mean that the Local Group is the centre of the universe and that everything else is rushing away from us? No; Hubble's Law would appear just the same from any other cluster of galaxies. Imagine you are in a square on some fabulous chess board which is steadily doubling its size every hour; all other squares double their distances from you in an hour. Therefore the farther squares from you must travel faster than the nearer ones; in fact, Hubble's Law must be obeyed. But anyone standing in any other square would get the same impression.

This extraordinary behaviour of the universe is one of the most exciting discoveries of science. Let us envisage one possible implication. If the galaxies have always been receding, then in the past they must have been closer together. Following this to its conclusion, it seems that all the matter in the universe must have been packed densely together about 10^{10} years ago. Was this really so? The lack of any definite answer to this question is one of the things that makes cosmology so interesting.

THE ORIGIN OF THE UNIVERSE.

Errors of observation and interpretation occur of course. But there are many checks and repetitions made, so that, on the whole, the descriptive account of the universe would be generally agreed among astronomers. When it comes to inventing theoretical explanations, however, science is on less sure ground, and indeed the theory of the universe is an arena of controversy at present. In most other sciences experiments can be repeated and the same phenomena observed under differing but controlled conditions. This is very helpful. But, by definition, there is only one universe; one cannot repeat it or do experiments with it. On the other hand, it must be remembered that the light from distant galaxies has taken perhaps 10^9 years to reach us, so it tells us what the galaxies were like that number of years ago. Therefore we are not confined simply to describing the present state of the universe; by looking farther into space we are looking farther into the past as well. How, then, does the state of the universe vary with time?

Evolutionary Theories.—One answer to this can be obtained from Einstein's general theory of relativity. Some slight indication of what this theory is about is given on page **F14**, and its logical development is, of course, a matter for mathematical specialists. It turns out that, if we assume that matter is distributed uniformly throughout space (as observation strongly suggests), then the solutions of Einstein's equations show how the state of the universe may vary with time. Unfortunately there are many possible solutions corresponding to expanding, static, or contracting universes. As we have already seen, the actual universe is expanding, therefore the static and contracting solutions can be ruled out. There is still a multiplicity of expanding possibilities: some correspond to indefinite expansion from an initially very dense state, others to expansion followed by contraction to a dense state followed by expansion and so on repeatedly, *i.e.*, a *pulsating* universe. The "dense state" is presumably to be identified with the time when the receding galaxies were all concentrated near one another, possibly in some dense conglomeration of atoms. This initial state is thought by some to be the origin of the universe; they would say it has been expanding and evolving ever since. If the universe is pulsating, then sooner or later, gravitational attractions between galaxies will slow the observed recession down and turn it into a mutual approach and so back to the dense state. A straightforward application of the mathematics makes this dense state *infinitely* dense, and presumably something must happen before this inconceivable situation arises. For example, forces between atomic nuclei may play an important part and determine what the dense state (if any) is actually like.

Some evolving universe theory on these lines is the more popular one among cosmologists at present; it was originally propounded by the Dutchman, W. de Sitter, the Russian, A. Friedman, and the Belgian, G. Lemaitre, all in about 1920.

The Steady State Theory.—A rival theory has been advocated by Bondi, Gold, and Hoyle since 1948. They hold that the universe is not changing with time; there was no initial dense state and no pulsations; the universe always has been, and always will be, like it is now. This does not mean that no local changes can be observed—this would clearly be contrary to the facts. But it does mean that, on the large scale, the clusters of galaxies have a distribution which is uniform in space and unchanging in time. If the numbers of clusters of galaxies in a large volume of space were counted every few thousand million years the answer would always be the same.

At first sight this appears to contradict outright the observed expansion of the universe. For if the galaxies are receding from one another how can the number in a given volume remain constant? The situation is saved by a bold proposal. It is that matter, in the form of hydrogen atoms, is being *continuously created* throughout space. This gas accumulates in due course into new galaxies, so that as the old ones move apart the young ones appear to keep the numbers up. The necessary amount of continuous creation can be calculated and is equivalent to the appearance of one atom in an average-sized room every 20 million years. If this seems absurdly small, try calculating the rate of creation in tons per second in a sphere of radius 10^9 light-years.

The rate of creation is, however, much too small to have affected any of the laws of ordinary physics. The famous law of the conservation of matter ("matter can neither be created nor destroyed") is violated, but on such a small scale that physicists, it is said, should not complain. Nevertheless, some do complain and see in this

violation a strong point against the steady state theory.

The object of the steady state theory is to bring the universe completely within the scope of scientific laws. For, in principle, the continuous creation is a process which could be observed and checked against a definite proposed law for it. This is to be distinguished from a "dense initial state" of the universe which has to be postulated and not observed. At the time of writing no observational method of disproving either (or both) the "steady state" or "evolutionary" theory has been possible, but the next few years may alter this situation.

An Electric Theory.—On page **F11** will be found the statement that an atom is electrically neutral. If this were not quite true, nothing in physics would be affected, provided that the lack of neutrality was exceedingly slight. Suppose the proton charge exceeded the electron charge by 1 part in 10^{18}; then the hydrogen atom would be slightly positive electrically, but this would be undetectable in everyday physics. But cosmology is not everyday physics, and R. A. Lyttleton has recently pointed out that just such a small charge per atom would be sufficient, *on a galactic scale*, to cause the mutual repulsion of different parts of the universe by normal electric repulsive forces which always exist between similarly charged bodies. This leads to a new explanation of the expanding universe which is based on a theory, not of gravitation, but of electricity.

A valuable by-product of this view is that the electric fields caused in galaxies by the excess charge will, under suitable conditions, accelerate protons to very high velocities. This is a possible origin of cosmic rays, which consist largely of high-speed protons.

A triumph of this theory would be the actual detection in the laboratory of the difference between the charges on electrons and protons, but there has not been time yet for the experimental and theoretical suggestions of this theory to be followed up in full.

The Formation of Galaxies and Stars.—On any theory of the universe, some explanation has to be found for the existence of clusters of galaxies. In all theories galaxies condense out from dispersed masses of gas, principally hydrogen.

According to the evolutionary theory, the "initial dense state" consisted of very hot plasma in a state of overall expansion. The expanding plasma was both cooling and swirling about. The random swirling produces irregularities in the distribution of the hot gas—here it would be rather denser, there rather less dense. If a sufficiently large mass of denser gas happened to occur, then the gravitational attraction between its own particles would hold it together and maintain its permanent identity, even though the rest of the gas continued to swirl and expand. Such a large mass would gradually condense into fragments to become galaxies, the whole mass turning into a cluster of galaxies.

The steady state view is interestingly and significantly different, for, on this theory, galaxies have always been present, and the problem is one of finding how existing galaxies can generate new ones out of the hydrogen gas which is supposed to be continuously created everywhere. Moreover, this was to be done at just the right rate to maintain the galactic population density constant —otherwise it would not be a *steady state* theory.

Inside galaxies there is an average density of the order of 10 or 20 hydrogen atoms per cubic inch; between galaxies, the density is 10^5 times less. Consequently we can imagine the relatively dense galaxy attracting the surrounding gas towards it by gravitation. If the galaxy were stationary the gas would presumably form an accretion to the galaxy. But imagine the galaxy to be moving through inter-galactic space. Then the combined effect of gravitation and motion is to create a region of increased gas density in the wake of the galaxy. This concentration in the wake becomes sufficiently large and dense to condense itself, by its own gravitational attraction, into a new galaxy. The offspring may either stay near the parent, forming an embryonic cluster of galaxies, or separate. In either case the process is repetitive and leads to the required stability in the number of galactic clusters.

Once a huge gas cloud becomes sufficiently condensed to be separately identifiable as a galaxy, further condensation goes on inside it. It is believed on theoretical grounds that it could not condense into one enormous star but must form many fragments which shrink separately into clusters of stars. In these clusters many stars, perhaps hundreds or thousands or even millions, are born at once. A small cluster, visible to the naked eye, is the Pleaides. The Orion nebula, visible as a hazy blob of glowing gas in the sword of Orion, is the scene of much star-forming activity at present.

The Formation of the Chemical Elements.—A stable nucleus is one that lasts indefinitely because it is not radioactive. There are 284 known kinds of stable atomic nuclei and little likelihood of any more being found. These nuclei are the isotopes (*see* **F10**) of 83 different chemical elements; the other elements, including, for example, uranium and radium are always radioactive. Some elements are rare, others abundant. The most common ones on earth are oxygen, silicon, aluminium, and iron. However, the earth is rather atypical. It is especially deficient in hydrogen, because the gravitational attraction of our small planet was not strong enough to prevent this very light gas from escaping into space.

It is possible to examine the chemical constituents of meteorites and to infer the composition of the sun and other stars from the spectrum of the light they emit. By such means, the conclusion has been reached that 93% of the atoms in our galaxy are hydrogen, 7% are helium; all the other elements together account for about one in a thousand atoms. A glance at the Table of Elements on page **N30** will show that hydrogen and helium are two of the lightest elements; they are in fact the two simplest.

According to the steady state theory, hydrogen atoms are constantly being created. The evolutionary theory supposes that the dense initial state was a system of very hot protons and electrons, *i.e.*, split-up hydrogen atoms. In either case, therefore, the problem is to explain how the heavier chemical elements appear in the universe at all. It is here that a fascinating combination of astronomy and nuclear physics is required.

We have already referred to the fact that the energy radiated from the sun originates in nuclear reactions which turn hydrogen into helium. Why is energy given out? To answer this question we note that nuclei are made up of protons and neutrons (*see* **F10**). These particles attract one another strongly—that is why a nucleus holds together. To separate the particles, energy would have to be supplied to overcome the attractive forces. This amount of energy is called *binding energy* and is a definite quantity for every kind of nucleus. Conversely, when the particles are brought together to form a nucleus the binding energy is *released* in the form of radiations and heat. Different nuclei consist of different numbers of particles, therefore the relevant quantity to consider is the *binding energy per particle*. Let us call this B. Then if elements of *high* B are formed out of those of *low* B there is a *release* of energy.

Now B is small (relatively) for light elements like lithium, helium, and carbon; it rises to a maximum for elements of middling atomic weight like iron; it falls again for really heavy elements like lead, bismuth, and uranium. Consequently, energy is released by forming middleweight elements either by splitting up heavy nuclei ("nuclear fission") or by joining up light ones ("nuclear fusion").

It is the latter process, fusion, that is going on in stars. The fusion processes can be studied in physics laboratories by using large accelerating machines to hurl nuclei at one another to make them coalesce. In stars the necessary high velocity of impact occurs because the plasma is so hot. Gradually the hydrogen is turned into helium, and helium into heavier and heavier elements. This supplies the energy that the stars radiate and simultaneously generates the chemical elements.

The very heavy elements present a problem. To form them from middleweight elements, energy has to be *supplied*. Since there is plenty of energy inside a star, a certain small number of heavy nuclei will indeed form, but they will continually undergo fission again under the prevailing intense conditions. How do they ever get away to form cool ordinary elements, like lead and bismuth, in the earth? One view links them with the highly explosive supernovæ, to which we have already referred (**F4** (2)). If the heavy elements occur in these stars the force of the explosion disperses them into cool outer space before they have time to undergo the fission that would otherwise have been their fate. The heavy elements are thus seen as the dust and debris of stellar catastrophes. This view is in line with the steady state theory, because supernovæ are always occurring and keeping up the supply of heavy elements. In the evolutionary theory some of the generation of elements is supposed to go on in the very early stages of the initial dense state and to continue in the stars that evolve in the fullness of time. It cannot be claimed that the origin of the chemical elements is completely known, but we have said enough to show that there are plausible theories. Time and more facts will choose between them.

The Formation of the Planets.—Did the sun collect its family of planets one by one as a result of chance encounters in the depths of space? Or was the solar system formed all at once in some generative process? To this fundamental question at least there is a fairly definite answer. The planetary orbits all lie in about the same plane and the planets all revolve the same way round the sun. This could hardly have happened by chance; indeed, it provides almost conclusive evidence for the alternative view. But what was the generative process?

Many ideas have been proposed, and the problem is very intricate. One of the most famous theories was originally championed by Kant, the German philosopher (1755), and by Laplace, the French mathematician (1796). In essence, it was held that the solar system was originally a great cloud of diffuse gas, probably rotating. Under its own gravitational attraction the cloud contracted and, in accordance with a well-established mechanical law, the contraction caused the rate of rotation to increase. When the rate was sufficient, masses of matter were thrown off from the edge and later condensed into the planets. Numerous serious objections have been raised, but the whole problem is so complex that it is unreasonable to say that any theory of this sort must be wrong. On the contrary, recent work has reinstated to some extent the view that the sun and its planets formed in a stellar condensation, one feature of which was the pushing outwards from the central sun of a disc of matter which subsequently became the planets. Such a process would be regarded as normal in stars, and not exceptional.

On the other hand, the planets have been attributed to the effect of a passing star whose gravitational attraction drew out from the sun a jet of gaseous matter which condensed into the planets. Such an encounter between stars is very rare and, on this theory, the formation of planets must be an outside chance. This theory was first developed by Jeans, but is not widely held now.

The connection between stellar and planetary theory is brought out again by the existence on the planets of the heavier chemical elements. How did they get there? If it be true that heavy elements are hurled into space by exploding supernovæ (see above), then at least one such explosion must have mingled its products with the widespread interstellar hydrogen before the planets condensed. At one time Hoyle put forward the view that the sun was once accompanied by another star (there are many such binary systems known to astronomers) and that the sun's partner exploded. Some of the ejected gases, captured by the sun's gravitational attraction, later condensed into planets, while the remnant of the star recoiled from the explosion and got away into space. This explanation was later modified in that the exploding star and the sun need not be a close pair but merely two of a cluster of stars formed at the same time.

Before leaving this subject, where theories are more numerous than firm conclusions, one more question may be raised: was the earth formed hot or cold? There are adherents to both opinions. One side would say that the planets condensed from hot gases, became liquid, and subsequently cooled and solidified, at the surface if not throughout. Others would say that dust, ice, and small particles formed in space first and subsequently accumulated into large bodies, whose temperature rose somewhat later on.

With space exploration beginning in earnest, considerable future progress in understanding planetary formation can be anticipated, and subsequent editions of *Pears Cyclopedia* will attempt to keep up with the new developments without too much time lag. (*See also* **X18: Radio Astronomy.**)

THE SOLAR SYSTEM.

Name.	Distance from Sun (millions of miles).	Diameter (thousands of miles).	Average density (water = 1).	Number of Satellites.
Sun	—	865	1·41	—
Mercury	36	3·1	3·73	0
Venus	67	7·6	5·21	0
Earth	93	7·9	5·52	1
Mars	142	4·2	3·94	2
Jupiter	484	85·0	1·34	12
Saturn	887	70·0	0·69	9
Uranus	1785	30·9	1·36	5
Neptune	2797	33·0	1·32	2
Pluto	3670	?	?	0

SOME ASTRONOMICAL DISTANCES.

(1 light-year = $5{\cdot}88 \times 10^{12}$ miles).

Object.	Distance from Earth (light-years).	Velocity of recession (miles per second).
Sun	$1{\cdot}6 \times 10^{-5}$	—
Nearest star (Alpha Centauri)	4·3	—
Brightest star (Sirius)	8·6	—
Pleiades	340	—
Centre of Milky Way	$2{\cdot}6 \times 10^{4}$	—
Magellanic clouds (the nearest galaxies)	$1{\cdot}6 \times 10^{5}$	—
Andromeda Galaxy	$1{\cdot}5 \times 10^{6}$	—
Galaxy in Virgo	$7{\cdot}5 \times 10^{7}$	750
Galaxy in Gt. Bear	10^{9}	9,300
Galaxy in Corona Borealis	$1{\cdot}3 \times 10^{9}$	13,400
Galaxy in Bootes	$2{\cdot}3 \times 10^{9}$	24,400
Approx. limit of 200-in. telescope	7×10^{9}	~74,000

THE EARTH

Shape and Size.—The earth has the form of a slightly flattened sphere, the polar radius being 6,357 km. (3,950·4 miles) and the equatorial radius 6,378 km. (3,963·5 miles). Its mass is $5{\cdot}97 \times 10^{27}$ gm. and its volume is $1{\cdot}083 \times 10^{27}$ c.c.; hence its average density is about 5·5 grams per cubic centimetre. This is about twice the average density of the surface material, so it is inferred that there exists a large volume of high density material within the earth. *See also* **F49**.

Structure.—From a study of the passage of earthquake waves through the earth and observations of such properties as magnetism, moment of inertia, temperature increase with depth, etc. it is deduced that the earth has a structure consisting of a series of shells. The central *core* has a radius of some 3,600 km. (2,250 miles); it is probably in part liquid, and is almost certainly composed of an alloy of nickel and iron. Separated from the core by a fairly sharp boundary is the *mantle*; this has a thickness of about 2,800 km. (1,750 miles) and is solid. It is probably composed of silicates of iron and magnesium with some metallic iron in the inner region. The outer 100 km. (62·5 miles) is the *crust*, which is solid under ordinary conditions but which may partially liquefy during periods of igneous activity. Under the continents it is possible to distinguish two layers in the crust; an upper, less dense one, probably granitic in character, known as the sial, and a lower, denser one, the sima, probably basaltic in character. The sial appears to be absent under the Pacific Ocean and very thin or absent under the Atlantic and Indian Oceans. The concept of the sial blocks "floating" in the sima provides an explanation for the observed vertical movements of continents and leads to the theory that they may have "drifted" to their present positions. The junction between the sima and the mantle is quite sharp, the break being known as the Mohorovičić Discontinuity.

Composition.—Direct observation of the crust is confined to the surface and mines or boreholes, the deepest of which reach only to about 5 miles. From analyses of the crystal rocks, the abundance of the elements in the crust can be estimated. The commonest is oxygen (46·6%), followed by silicon (27·7%), aluminium (8·13%) and iron (5%). The next four are calcium, sodium, potassium, and magnesium, ranging between 3·6 and 2%. These 8 elements total 97·57% of the whole crust. Most of the other 84 elements are present in amounts to be measured in parts per million; *e.g.*, copper occurs to the extent of 45 p.p.m., tin, 3 p.p.m. These are average proportions over the whole crust; to be workable as ores, concentrations need to be much higher—*e.g.*, both copper and tin ores have to contain a minimum of 1% metal to be economic. Locating the rare occurrences of such concentrations is the job of the prospecting geologist. Taking the earth as a whole, *i.e.*, core, mantle and crust, most authorities agree that the commonest element is iron, followed by oxygen, silicon, and magnesium in that order; after this, there is only partial agreement.

The Age of the Earth.—It is possible to make an estimate of the age of the earth by considering the rate at which radioactive elements break down into inert elements. A number of methods are now available, the most important being those based on the decay of uranium and thorium to lead. From the data obtained, estimates can be made of the following points on the time scale: Origin of the earth 4·5 to 5×10^9 years; earliest known rocks $3{\cdot}3 \times 10^9$ years (found in Rhodesia and Manitoba); life appears about $1{\cdot}5 \times 10^9$ years ago; first large-scale occurrence of fossils, 600×10^6 years ago. Other points on the scale are given in the table on **F20** (10^9 = thousand million; 10^6 = million).

The Materials of the Earth's Crust.—Geologists recognise three main classes of rocks making up the crust—Igneous, Sedimentary, and Metamorphic. Rocks are aggregates of minerals, which may be regarded as simpler, homogeneous compounds, in contrast to the complex, inhomogenous mixture which is a rock. The bases of rock classification are minerals present, shape and size of the individual grains, and the mode of origin of the material.

Igneous rocks are usually regarded as having crystallised from a molten state, although certain types may have arisen in other ways, *e.g.*, by reaction between high-temperature fluids, of the right composition, and pre-existing rocks. Typical igneous rocks are granite and basalt; granite is coarse-grained, intrusive into other rocks, and contains the minerals quartz, potash or soda felspar, and usually a mica. Basalt is fine-grained, flows out as lava at the surface and contains the minerals augite, calcium felspar, and usually olivine. Between these extreme types are some thousands of intermediates, but together granite and basalt constitute 90–95% of all igneous rocks seen at the surface.

Sedimentary rocks are derived from pre-existing rocks by the processes of weathering and erosion, followed by transport to the point of ultimate deposition of the material, which is then converted from unconsolidated sediment to rock by the process of lithifaction. Typical sedimentary rocks are sandstone, limestone, and shale. Sandstone consists of particles of quartz and occasional other minerals, whereas shales are compacted clays, which may become slate if compressed very strongly during mountain building. Limestones may be chemical precipitates, but are commonly formed by the aggregation of skeletal material of animals. Some other sedimentary types of interest are conglomerates—lithified pebble beds—and evaporites, such as rock salt and gypsum beds. The bulk of the sedimentary rocks were formed under marine conditions.

Metamorphic rocks are produced by the action of heat and/or pressure upon pre-existing rocks, producing considerable changes in mineralogy and texture. Rocks subjected to heat alone are termed hornfelses (marbles if the original rock was a limestone). Pressure alone may produce slates, but often pressure results in shearing forces which crush and break up rocks to a fine powder (subsequently lithified), known as mylonite. Heat and pressure together produce the type of metamorphism known as regional, because it occurs over large areas (*e.g.*, the Scottish Highlands), where it can be seen to have been associated with mountain-building processes. Typical rocks of this kind are schist and gneiss; the former is a foliated rock, usually with much mica, while the latter is a banded rock, with dark and light bands of quartz and/or felspar and mica and/or hornblende. Some gneisses, called migmatites, were produced by the injection of granitic material along the foliation planes of schists.

Mountain Building.—There is no general agreement among geologists about the origin of mountains, despite many years of argument. It is a matter of observation that the great mountain ranges are built of sedimentary rocks—usually much metamorphosed in the deeper levels—and occur in relatively narrow belts of great length. The idea has developed that long, narrow depressions known as *Geosynclines* develop in the crust, into which vast quantities of sediments are poured. The floor is slowly depressed by the weight of material, and ultimately the two sides of the geosyncline move together, folding the sediments both upwards and downwards, producing the complex structures seen in such regions as the Alps and Himalayas. It has been suggested that convection currents in crust, core, or mantle may provide the forces required, but some geologists believe that the earth is contracting and causing the skin to "wrinkle." Another possibility is that the sial blocks move about in the sima, and the Alps, for example, were formed when Africa drove northwards towards Europe. It is suggested that radioactive heating of the sima layers may make them sufficiently mobile to allow movement to take place, and this seems to be an essential feature of most theories of mountain building.

Glaciation.—Within the last million years much of the northern part of the Northern Hemisphere was covered by ice sheets, now reduced to the Arctic ice-cap. This has profoundly modified the landscape, especially in mountainous regions such as the Alps, North Wales, and the Scottish Highlands. The ice, moving first as valley glaciers and later as sheets over wide areas, scraped off all loose surface material, which was then available to abrade the bare rocks to give the characteristic scenery. In Britain the maximum advance of the ice-sheets brought them to the line Bristol Channel–Thames Estuary, passing just north of London. The great heaps of débris transported by the glaciers are known as moraines. The cause of the ice age is not fully understood, but it is worth noting that in the Permo-Carboniferous period in the Southern Hemisphere there was a widespread glaciation at the same time as the coal measures and desert sediments were being laid down in the Northern Hemisphere. Other glaciations are known from several other epochs as far back as 2×10^9 years.

The Oceans.—The oceans cover 75% of the earth's surface. They may be divided into three main types of environment—the *shelf seas*, bordering the continents, the *continental slopes*, transitional between the shelves and the *abyssal region*. Each region has its own type of sedimentation, fauna, and flora. Because of the virtual absence of a sial layer under the oceans, the study of the ocean floor yields special information about the sima and mantle, and may provide data leading to a solution of current problems relating to geosynclines and mountain building. Study of sedimentation in the oceans is important for understanding the ancient sedimentary rocks.

The Atmosphere.—The atmosphere at sea-level contains about 78·1% nitrogen and 21% oxygen, the remainder being carbon dioxide (0·03%) and the inert gases. It is thought that in the early stages of the earth's history much more carbon dioxide existed and less oxygen. When plants developed, the carbon dioxide was utilised in the building up of food substances with the release of oxygen in the process of photosynthesis (**F30**). *See also* **L12**, **X3**, **F46**.

The International Geophysical Year, 1957–58.—The results of the IGY observations are still being analysed and discussed in order to exhaust their scientific content. It is certain that almost all the principal investigations in geophysics during the next half century and almost all the advances in our knowledge of the earth and of the forces acting upon it will be based upon the global data accumulated during the IGY. The oceans of the world have been so incompletely studied and present so many problems, many of which could not be investigated during the IGY, that further observations are to continue over a period of years, and a comprehensive programme of observations in the marine sciences has been planned.

THE WORLD OF PHYSICS.

Anyone compelled by curiosity or professional interest to look into contemporary journals of pure physics research is soon struck by the fact that the old text-book division of physics into "heat, light, sound, electricity, and magnetism" has become very blurred. The indispensable periodical of research summaries, *Physics Abstracts*, contains about 450 entries a month, under forty separate headings. This is very daunting even to the experienced physicist and, as a token of the human effort devoted to one single branch of science, it is impressive for variety, for degree of specialisation, and for sheer volume. How can the main features of this great work be presented to the non-specialist?

Two different, though complementary, sections can be distinguished. First, there is the physics concerned with the properties of matter in bulk, with solids, liquids, and gases, and with those odd but very important substances, such as paints, plastic solutions, and jelly-like material, which are neither properly solid nor liquid. In this vast domain of physics questions like this are asked: Why is iron magnetic, copper not? What happens when solids melt? Why do some liquids flow more easily than others? Why do some things conduct electricity well, others badly, some not at all? During the last century, particularly the last few decades, it has become clear that such questions can be answered only by raising and solving others first. In particular, we must ask: (i) Of what nature are the invisible particles of which matter is composed? and (ii) How are those particles arranged in bulk matter?

The first of these two questions has generated the second major category of modern physics: this is the physics of particles and of the forces that particles exert on each other. In this field, which represents science at its most fundamental, questions like this are asked: If matter is composed of small units or particles, what are they like? How many kinds of particle are there? Do the particles possess mass? electric charge? magnetism? How do the particles influence each other? How can their motion be described and predicted?

Once scientists became convinced that matter did indeed consist of particles, the *arrangement* of the particles in matter became an important question. This is the problem of *structure*. It was discovered, by von Laue in Germany and by W. H. and W. L. Bragg in England, that the structure of solids could be inferred from the way X-rays are reflected. It is well known that X-rays can penetrate solids. In doing so, they encounter successive layers of particles and are reflected from them. The reflections reveal how far apart the layers are and how the particles are arranged in space. This is the technique of X-ray crystallography. By now it has shown that most solid matter is *crystalline*, *i.e.*, it consists of a regular pattern of particles repeated over and over again to fill the volume of the solid—just as a wallpaper is covered by repeated units of design. The units in a crystal are very small, often about 10^{-8} cm. across, and the particles in them are very close together.

Liquids, on the other hand, have no repeated pattern, but consist of particles which are jumbled up, though still very closely packed—like marbles in a bag. In gases, the particles are widely separated and moving rapidly about; the average distance between particles in air is about 10 times that in ordinary solids, and air particles have an average speed of 5×10^4 cm. per sec. (1,000 m.p.h.)

In general, therefore, the structure of matter is fairly well understood. This does not mean that structure studies are out of date, but only that now they are devoted to elucidating the structure of particular substances, often extremely complex ones such as are found in living matter. We shall therefore say no more about structure, but turn to the major divisions of physics introduced above: (i) particles and their forces; (ii) the properties of matter in bulk.

I. PARTICLES AND FORCES.

The idea that matter is composed of small particles, or atoms, originated, it is true, in classical times. Nevertheless, the modern views need be traced back no farther than the beginning of the nineteenth century, when Dalton and his contemporaries were studying the laws of chemical combination. By that time the distinctions between elements, compounds, and mixtures were already made. Compounds and mixtures are substances which can be separated into smaller amounts of chemically distinguishable constituents. Elements (*see* **N30**) cannot be so divided. In a mixture the components may be mixed in any proportion and sorted out again by non-chemical means. In a compound the elements are combined in fixed proportions by weight. This last fact gives the clue to atomic theory.

Dalton and atomic theory.

Dalton pointed out that the fixed combining weights of elements could easily be explained if the elements consisted of atoms which combined in simple numerical ratios, *e.g.*, 1 atom of element A with one of B, or one of B with two of C, and so on. For instance, 35·5 gm. of chlorine combine with 23·0 gm. of sodium to make 58·5 gm. of ordinary salt. If we assume one atom of chlorine links with one of sodium, then the atoms themselves must have weights in the ratio 35·5 to 23·0. This turns out to be consistent with the combining weights of chlorine and sodium in all other compounds in which they both take part. Sometimes two elements combine in several different proportions by weight. But this is easily explained by assuming that the atoms link up in different numbers, *e.g.*, one iron atom with one oxygen, or two irons with three oxygens, or three irons with four oxygens. Then the three different combining proportions arise from the three different numbers of atoms, *using in each case the same ratio of oxygen atom weight to iron atom weight.*

Atomic weight.

Over the century and a half since Dalton, these ideas have been repeatedly tested by chemical experiments. No one now doubts that every chemical element has atoms of characteristic weight. By convention the number 16·0000 is ascribed to oxygen and called its "atomic weight." The atomic weights of other atoms are expressed by giving their ratio to that of oxygen, *e.g.*, hydrogen, 1·008; iron, 55·85. These numbers are only ratios; the real weight of one single oxygen atom is $2{\cdot}7 \times 10^{-23}$ gm.

J. J. Thomson and the electron.

Matter is electrically uncharged in its normal state, but there exist many well-known ways of producing electric charges and currents—rubbing amber, or rotating dynamos, for example. It is therefore necessary to have some theory of electricity linked to the theory of matter. The fundamental experiment in this field was made by J. J. Thomson when, in 1897, he discovered the electron.

If you take two metal electrodes sealed inside a glass vessel, and if the air is suitably pumped out and a high voltage applied to the electrodes, then the negative one emits a radiation which causes the walls of the tube to glow. The rays are called *cathode rays*. The discovery of the electron was essentially a clarification of the nature of cathode rays. Thomson showed that they were streams of particles with mass and negative electric charge and a general behaviour unlike any other atomic particle known at that time. The importance of this discovery for the world of science cannot be overestimated, and its technical progeny are in every home and factory in radio valves, television tubes, and other devices.

Rutherford-Bohr atom.

Since the electrons emerge from matter, they are presumably parts of atoms. The relation between the negative electrons and the positively charged constituents of matter was elucidated by the great experimenter Rutherford and the great theoretician Bohr. Their work, just before the First World War, showed that the positive charge, together with almost all the mass, is concentrated in the central core or nucleus of the atom about which the very light-weight electrons revolve. The diameter of an atom is about 10^{-8} cm., roughly one-three hundred millionth part of an inch. The central nucleus has a diameter about 10,000 times smaller still. The nucleus and the electrons hold together because of the electric attraction between them.

At this stage work could, and did, go on separately along several different lines:

(i) Electrons could be studied on their own. Nowadays the handling of beams of electrons of all sizes and intensities has become a major industry.

(ii) The nucleus could be treated as a special problem, and this led to the mid-century flowering of nuclear physics, to the atomic bomb, and to nuclear power.

(iii) The behaviour of electrons in the atom could be analysed; this is the great domain of atomic physics which spreads into many other sciences as well.

Volumes have been written about each of these three fields, but we can spare only a few lines for each.

The Electron.

Electrons are expelled from solids by light, heat, electric fields, and other influences. It has therefore been possible to study beams of electrons on their own *in vacuo*. Electrons inside matter, either as constituents, or temporarily in transit, can also be observed by their innumerable effects. These observations all show the particles to be indistinguishable one from another; all electrons are the same wherever they come from. They have a definite mass ($9{\cdot}11 \times 10^{-28}$ gm.), a negative electric charge, a magnetic moment, and a "spin" (intrinsic rotatory motion). No one has ever subdivided an electron or obtained an electric charge smaller than that on one electron. The electronic charge is therefore used as a basic unit of charge in atomic physics. The electron has come to be the best known of all the "fundamental particles."

The Nucleus.

The early research programmes in nuclear physics were greatly facilitated by the occurrence in nature of certain unstable (radioactive) nuclei which emit fast-moving fragments. The latter can be used as projectiles to aim at other nuclei as targets; the resulting impacts yield much valuable information. This technique still dominates nuclear physics, though nowadays the projectiles are artificially accelerated by one or other of the large costly machines designed for the purpose.

The most important early discovery was that the nucleus consists of two types of fundamental particle—the positively charged *proton* and the electrically neutral *neutron*. These two are of nearly equal mass (about 1,800 times that of the electron), and like electrons, have a magnetic moment and spin. The proton charge is equal to the electron charge, though opposite in sign. Consider a moderately complex nucleus like that of iron. This usually has 30 neutrons and 26 protons. Its atomic weight therefore depends on the total number of neutrons plus protons, but the total charge depends only on the number of protons—called the *atomic number*. This is also the number of electrons in the atom, since the atom as a whole is electrically neutral. The atomic number determines the chemical nature of the atom (see below), so that by altering the number of *neutrons* in a nucleus we do not change the chemical species. It is therefore possible to find—and nowadays to make—nuclei of the same element which nevertheless differ slightly in weight because they have different numbers of neutrons. These are called *isotopes*. Iron isotopes are known with 26, 27, 28, 29, 30, 31, 32, and 33 neutrons, but all have 26 protons. Only those with 28, 30, and 31, and 32 neutrons occur naturally; the rest have been made.

Radioactivity—natural and artificial.

It is known that the set of neutrons and protons in a nucleus can exist in states of greater or less energy. The normal one is the state of lowest energy, or "ground state." Bombardment of an element by streams of sufficiently energetic particles, protons or electrons, for example, excites some of the nuclei to new states. The new state has excess energy and, after an average time, which varies from minute fractions of a second to many thousands of years, according to the type of nucleus, it returns to a final ground state. The return process is accompanied by the emission of radiations. If the emitted rays are electrons, then they are called *β-rays* and we

have a case of β-radioactivity or beta-decay (**F62** (1)). The electrons may be ordinary negative ones or their positive counterparts called positrons. The loss of a negative electron means that a neutron in the nucleus has changed into a proton, generating and emitting the electron in the process. This changes the chemical nature of the nucleus. For example, if copper with nucleus of 34 neutrons and 29 protons is bombarded with neutrons, the latter are absorbed and excited copper isotopes with 35 neutrons are created. Some of these emit electrons, leaving a residual proton number of 30, which corresponds to the element zinc. The others emit positrons, leaving a nucleus with one more positive charge than copper, *i.e.*, a nickel nucleus. The overall process is one example of the artificial transmutation of elements which is now a commonplace of nuclear physics.

Excited nuclei do not always emit β-rays. Other typical products of nuclear change are *α-rays* or helium nuclei (see below) and *γ-rays*, which are like ultra-violet light and X-rays but more penetrating than either of these. A handful of naturally occurring elements are radioactive, and the most famous are radium and uranium. In such substances α-, β-, and γ-rays were first discovered. At present hundreds of artificial radioactive substances can be made—to the great benefit of medicine, industry, and scientific research. (The subject of radioactivity is more fully discussed in Part IV, **F60–63**.)

Nuclear fission—chain reaction.

A discovery important not just for nuclear physics but for the whole of mankind was made by Hahn and Strassman in 1939. This was the discovery of nuclear fission in uranium. One of the natural isotopes of uranium is an unstable one, U^{235}, with 143 neutrons and 92 protons. It normally shows its instability by emitting α- and γ-rays. If uranium is bombarded with neutrons, some U^{235} nuclei temporarily gain an extra neutron, which makes them even less stable. This they show by splitting into two roughly equal parts, called fission fragments, together with two or three neutrons. There are two highly important things about this disintegration. One is that the two or three neutrons can promote further disintegrations in other uranium nuclei, and the process can therefore be self-propagating; it is then called a *chain reaction*. The other is that the total mass of the fission products is less than that of the original nucleus. This mass difference does not disappear without trace; it turns into energy according to a formula referred to in a paragraph below.

Application of these new forces.

The world has found two uses for the energy liberated in nuclear chain reactions: the atomic bomb and nuclear power plants. In the first, conditions are arranged to promote and encourage a tremendous and rapid chain reaction leading to an explosion; in the second, the steady liberation of energy in the form of heat is controlled for use in turbines which can generate electricity or provide propulsion. Both uses represent epoch-making technical achievements, but mankind has yet to show itself capable of bearing sanely the burden of responsibility which nuclear physicists have laid upon it. One thing is certain: the discoveries will not cease Already, other fissionable elements have been made and used; new chemical elements have been created; nuclear plants (" atomic piles ") have stimulated great demands for new materials that will stand the heat and radiation inside the reactor, and this promotes research in other fields of science; irradiation inside an atomic pile gives new and potentially useful properties to old materials; nuclear power drives ships and aircraft. It is difficult to write even briefly about contemporary nuclear physics without feeling keenly the ambiguity of its powerful promises.

Although so much is known about the behaviour of nuclei, the theory of the nucleus leaves much to be desired. What holds the neutrons and protons together? Why are some nuclei more stable than others? It is certain that the forces between neutrons and protons in a nucleus are unlike the electrical attractions between the nucleus as a whole and its surrounding electrons. Nor have they anything to do with gravitation. Indeed, the best description and explanation of nuclear forces is the objective of much of the contemporary research effort in nuclear physics.

Atoms, Ions, and Molecules.

Atoms.

A nucleus surrounded by its full complement of electrons is an electrically neutral system called an atom. Neither the atom as a whole, nor its nucleus, counts as a "fundamental particle" because either can be subdivided into more elementary parts, thus:

$$\text{atom} \longrightarrow \text{electrons} + \text{nucleus} \longrightarrow \text{electrons} + \text{neutrons} + \text{protons}$$

The chemical identity of the atoms of a given element, which was Dalton's key idea, depends entirely on the number and motion of the electrons. For example, the simplest element, hydrogen, has one proton for a nucleus, and one electron. The latter is comparatively easily detached or disturbed by the electric forces exerted by neighbouring atoms, consequently hydrogen is reactive chemically, *i.e.*, it readily lends its electron to build chemical structures with other equally co-operative elements. The second element, helium, has a nucleus of two protons and two neutrons; outside are two electrons in a particularly stable arrangement. Indeed, this pair of electrons is so difficult to disarrange that a special name has been coined to cover such cases—*closed shells*. Helium, with its closed shell, will not react chemically with anything. As the nuclear charge increases, different electron arrangements of greater or lesser stability succeed one another, with every so often a closed shell corresponding to one of the chemically inert gases neon, argon, xenon, krypton.

Such considerations, pursued in sufficient detail, enable atomic physics to account for all the differences and similarities among the chemical elements and, in principle at least, for the other facts of chemistry as well.

Ions.

It is possible to remove one or more electrons from an atom, leaving it positively charged. The atom is then said to be *ionised* and is called a *positive ion*. Alternatively, some atoms are capable of accepting electrons above their normal complement, thus becoming negative ions. The behaviour of ions is very important in many fields of physics and chemistry, and some of these will be referred to later.

Molecules.

Electrical attractions of various kinds cause atoms and ions to form compound groups. This is the basis of chemical combination, and the smallest conceivable fragment of compound which still preserves the chemical identity of that compound is called a molecule. Molecules have a wide range of complexity, from simple pairs of atoms to highly intricate spirals and chains composed of thousands of atoms.

Excited atoms.

Like the nuclei described above, atoms can be given excess energy and will then return to their ground state with the emission of radiation. The excess energy usually resides in one of the electrons which is executing unusually violent motion. The electron returns to normal by releasing its excess energy in the form of light whose colour is characteristic of the atom involved. Herein lies the explanation of innumerable natural and technical phenomena, such as the colours of glowing gases whether they exist in the sun and stars, in auroræ, or in street-lamps and neon signs. Herein also lies the reason for the importance of spectroscopy, which is the study

of the characteristic radiation from excited atoms; for spectroscopy is not only a useful tool for the chemical identification of elements ("spectroscopic analysis") but was one of the main routes along which twentieth-century physicists broke through to a knowledge of the inner nature of the atom.

Other Fundamental Particles.

Neutrinos.

At the moment of β-ray emission, the disintegrating nucleus also emits an energetic but uncharged particle called a neutrino. It was always supposed that this happened, because otherwise β-radioactivity would defy certain basic laws of mechanics (the conservation of momentum and angular momentum) which nobody was disposed to abandon. However, neutrinos are supposed to have no mass, and calculations show that they will traverse millions of miles of dense matter without leaving a trace; thus it was not until 1956 that an apparatus of sufficient sensitivity working near a strong source of neutrinos (an atomic pile) finally detected this more than usually shadowy particle.

Anti-particles.

Meanwhile the study of cosmic rays—the energetic rays reaching us from outer space—was revealing new fundamental particles. First, the positron, which is simply a positively charged electron or "anti-electron." When electrons and anti-electrons collide, they usually annihilate one another and turn into γ-rays. Very recently, anti-protons and anti-neutrons have been artifically produced by an accelerating machine in California (**F13**). It is not impossible that somewhere in the universe there may be "anti-matter"—even "anti-creatures"—in which the corresponding anti-particles take the place of our own electrons, protons, and neutrons. This speculation is a gift that the science-fiction writers have eagerly grasped.

Mesons and hyperons.

Cosmic radiation also contains numerous other particles of various masses, designated mesons and hyperons. These are very unstable, and spontaneously disintegrate into other more familiar particles. A table of fundamental particles is shown opposite. If the reader feels that this table does not show much rhyme, reason, or pattern, then he echoes the feeling of many physicists. The field of fundamental-particle physics stands in great need of a major stroke of clarification.

Fields and Waves.

Maxwell and electromagnetic waves.

Atoms are held together by the electric attraction of the nucleus for the electrons. Finer details of atomic behaviour depend on the magnetic moments of the particles. Any region of space subject to electric and magnetic influences is called an *electromagnetic field*. Before the discovery of the electron, Maxwell had perfected a general theory of the electromagnetic field, giving to physics a celebrated set of equations which describe satisfactorily almost all electric and magnetic phenomena. *Inter alia*, he proved that disturbances in the electric and magnetic conditions at one place could be propagated to another place through empty space, with a definite velocity, just as sound waves are propagated through air. Such electromagnetic disturbances in transit are called *electromagnetic waves*, and their velocity turned out experimentally to be the same as that of light and radio waves—which was a decisive argument to show that both of these phenomena are themselves electromagnetic waves.

Einstein and photons.

In the years between about 1900 and 1920 this view was upset by Planck, Einstein, Millikan, and others, who focused attention on phenomena (radiant heat, photoelectricity) in which light behaves like a stream of particles and not at all like waves. A wave and a particle are two quite different things, as anyone will admit after a moment's contemplation of, say, the ripples on a pond and a floating tennis ball. The acute question was: is light like waves or particles? This celebrated dilemma soon multiplied its horns. In 1927 electrons were shown to be quite capable of behaving as waves instead of particles, and this is now known to be true of protons, neutrons, and all other fundamental particles as well.

Theoretical physicists have devised means of having it both ways. To say that light behaves as particles means that the waves of the electromagnetic field cannot have their energy subdivided indefinitely. For waves of a given frequency, there is a certain irreducible quantity of energy that must be involved whenever light interacts with anything. This quantity is the product $h\nu$, where ν is the frequency and h is a constant named after Planck. Each such unit is called a *quantum of the electromagnetic field* or a *photon* and is counted as one of the fundamental particles. Frequencies and wavelengths vary widely; typical wavelengths are: radio—hundreds or thousands of metres; radar—a few centimetres; visible light—5×10^{-5} cm.; X-rays—10^{-8} cm.

It is now accepted that every fundamental particle is a manifestation of the waves of one or other kind of field. Physicists speak of waves, particles, and fields in the same breath or, rather the same equation. Little is to be gained by asking if electrons or photons are "really" particles or waves. All one can say is that they are things whose behaviour is predicted and described by certain equations. Those who must visualise can imagine particles in some phenomena and waves in others: neither conception contains the whole truth. Why should the ultimate invisible constituents of matter be forced into one or other category derived from everyday experience? For convenience, however, we shall continue to call these things "fundamental particles."

Quantum Theory.

The point of view of the last paragraph is characteristic of quantum theory, which is the currently accepted fundamental theory of matter and motion. One can reasonably ask at what position in space, exactly, is a particle? Or, what, exactly, is the wavelength of a wave? But the first question cannot be reasonably asked of a wave, nor the second of a particle. Since electrons have something in common with both, one question cannot be answered precisely for electrons without ignoring the other; alternatively, both questions can be given an imprecise answer. As the wavelength of electrons is intimately connected with their speed, one has to accept an accurate knowledge of the speed (wavelength) and ignorance of position, or the converse, or *inaccurate* knowledge of both. This is the famous Heisenberg Uncertainty Principle. Quantum theory is a set of mathematical rules for calculating the behaviour of fundamental particles in accordance with the Uncertainty Principle. In spite of its equivocal-sounding name, the principle has led to an enormous increase in the accuracy with which physical phenomena can be described and predicted. Quantum theory includes all that previous theories did and more.

Quantum theory grew up in the same epoch as the Theory of Relativity. Heroic attempts have been made to combine the two, but with only partial success so far. Relativity is concerned with all motion and all physical laws, but its characteristic manifestations occur only when something is moving with nearly the velocity of light. Quantum theory is likewise all-embracing, but its typical phenomena almost always occur when something on the minute atomic scale is in question. Consequently, the vast majority of everyday mechanics needs no more than the classical theory laid down by Newton, which is neither relativistic nor quantum.

THE ATOMIC FAMILY.

Particle.	Charge in units of one electron charge.	Ratio of rest mass to that of the electron.	Description.
Electron	−1	1	Discovered by J. J. Thomson in 1897. The number of orbital electrons in an atom determines its chemical properties. Actual rest mass = $9 \cdot 1 \times 10^{-28}$ gm. Emitted as β-rays by some radioactive nuclei.
Positron	+1	1	Positive counterpart, or "anti-particle," to the electron. Predicted theoretically by P. A. M. Dirac in 1928 and first discovered in cosmic rays by C. D. Anderson in 1932. Emitted as β-rays by some radioactive nuclei. When positrons and electrons collide they usually annihilate each other and turn into γ-rays; consequently, positrons only last about 10^{-10} sec. within ordinary matter.
Proton	+1	1836·2	The positively-charged constituent of nuclei; the hydrogen nucleus is one proton. Fast-moving protons occur in cosmic rays. Does not spontaneously disintegrate.
Anti-proton	−1	1836·2	Negative anti-particle of the proton. Its existence was long suspected. Artificially produced and detected for the first time in 1955.
Neutron	0	1838·6	Discovered by J. Chadwick in 1932. The neutral constituent of nuclei. When free it spontaneously disintegrates into a proton, an electron, and an anti-neutrino, after an average lifetime of about 18 minutes. Passes through matter much more easily than charged particles.
Anti-neutron	0	1838·6	The anti-particle of the neutron from which it is distinguished by properties connected with its magnetic moment and spin.
Neutrino and anti-neutrino	0	0	These particles travel with the speed of light and are distinguished from one another by the relation of their spin to their direction of motion. A neutrino is emitted with the positron during positive β-decay; and an anti-neutrino with the electron during negative β-decay. Their interaction with matter is extremely slight. First postulated by Pauli in 1933 and detected in 1956.
Photon	0	0	A quantum of electromagnetic radiation, *e.g.*, light, X-rays, γ-rays. The concept was introduced by M. Planck in 1900 when he described the emission of light as taking place in "packets" rather than in a steady stream. The energy of a photon is proportional to the frequency of the radiation and inversely proportional to the wavelength.
Meson			A particle with rest mass between that of the electron and proton. There are various kinds. The concept was advanced theoretically by H. Yukawa in 1935 and the first one was detected in 1937. Varieties are still being discovered. All disintegrate after extremely short lifetimes. They occur in cosmic rays and can be artificially produced in large accelerating machines.
Muon	+1 −1	206	The μ-meson. Similar to, but heavier than, the electron and positron; disintegrates into electron (or positron if positive) + neutrino + anti-neutrino.
Pion	+1 0 −1	273 263 273	The π-meson. Charged pions decay either into muons and neutrinos or into electrons and neutrinos. Neutral pions decay into γ-rays, into "positron-electron pairs," or both. Pions interact markedly with nuclei.
K-meson	+1 0 −1	About 966	These are being currently investigated. They decay in a considerable variety of ways.
Hyperon	+1 0 −1	various	A particle with rest mass greater than that of the proton. There are several kinds, not very well understood at present.

Relativity.

Historically, relativity grew out of attempts to measure the speed with which the Earth moved through that hypothetical medium, called the ether, which was supposed at that time to be the bearer of light waves. To take a simple analogy: sound waves travel through still air with a certain definite speed, v. If you move through the air with speed v' towards oncoming sound waves, they will pass you at the speed $v + v'$. Michelson and Morley, in their celebrated experiment of 1887, failed to find the corresponding behaviour on the part of light. This is so important an experiment that it has been repeated, and repeatedly discussed, ever since. In October 1958 the latest and most accurate confirmation of the Michelson–Morley result was announced. It seems as if light always travels with the same speed relative to an

observer, however fast he moves relative to anything else. Einstein put it this way: two observers moving with any constant velocity relative to each other will always agree that light travels past them at the same speed; this speed is denoted by c, and is approximately 186,000 miles per second.

This postulate, logically developed, leads to remarkable conclusions. For instance: if you walk from tail to nose of an aircraft at 4 m.p.h. and the plane is receding from me at 300 m.p.h., then you recede from me at 304 m.p.h. "Common sense," Newton, and Einstein would all agree on this. But if you could walk at $0{\cdot}25c$ and the plane moved at $0{\cdot}5c$, the Newtonian mechanics would give your recession speed as $0{\cdot}75c$, whereas Einsteinian relativity would give about $0{\cdot}71c$. Although at everyday speed, the disagreement, though present in principle, is absolutely negligible, at speeds near that of light it becomes very pronounced. Many experiments show that the relativity answer is right.

Equivalence of mass and energy.

Another famous consequence of relativity is the equation $E = mc^2$, connecting energy, E, with mass, m. c is so great that when mass is converted to energy a small mass gives a large energy. The grim demonstration of this was given to the world at Hiroshima; a more hopeful one at Calder Hall. The life-giving energy of the Sun is derived from nuclear processes which consume mass and deliver energy according to this equation.

Mass and rest mass.

"Mass" is far from being a simple notion. The only complication we shall note here is that the mass of a body is not necessarily constant. A stationary body can be observed to have a mass called its *rest mass*. If the body moves, it has energy of motion and therefore, according to Einstein's mass–energy equation, it increases its mass. Mass thus depends on speed, but in such a way that there is very little change unless the speed approaches that of light. Many experiments on atomic particles demonstrate this. The interesting question now arises: do all fundamental particles have rest mass? or do some have mass derived solely from their energy? The answer appears to be that photons and neutrinos have no rest mass; all other particles have. The Table on F13 gives their rest masses.

Special theory of relativity.

The mathematical development of Einstein's ideas, leading to the conclusions just referred to, constitutes the Special Theory of Relativity. Stated more generally, the theory raises the question whether two observers in uniform relative motion could ever detect, as a result of their relative speed, any difference in the physical laws governing matter, motion, and light. To this, Special Relativity answers: No. The detailed theory involves special consideration of the results the two observers would obtain when measuring (i) the spatial distance, and (ii) the time interval, between the same two events. It turns out that they would not agree on these two points. They would agree, however, on the value of a certain quantity made up jointly of the spatial distance and the time interval in a somewhat complex combination. The intimate mixture of space and time in this quantity has led to the treatment of the three space dimensions and time on a equivalent footing. Hence the frequent references to time as the "fourth dimension." Minkowski devised an extremely elegant presentation of relativity theory by using an extension of ordinary geometry to four dimensions. A line drawn in his four-dimensional space represents the path of a particle in space and time, *i.e.*, the whole history of the particle. Thus the movement of particles in the ordinary world is turned into the geometry of lines in Minkowski's four-dimensional world of "space-time."

Gravitation.

General theory of relativity.

The apparently innocuous extension of the preceding ideas to include observers in accelerated relative motion opened up new fields of mathematical complexity, but enabled Einstein to bring gravitation into the argument. In speaking of atoms and particles we have not yet mentioned gravity. This is because the electrical and magnetic forces acting between the particles constituting matter are much stronger than the gravitational; gravity need not enter atomic theory at all. But in the discussion of astronomical problems and the movements of large-scale, electrically uncharged bodies, it has been usual, ever since Newton, to say that two bodies of mass m_1 and m_2, separated by a distance r, attract one another with a force proportional to m_1m_2/r^2. This is Newton's inverse square law of gravitation. With this, Newton explained the movements of planets and comets and the falling to Earth of the apple from his tree.

The apple's fall is accelerated, and we observe this by noting its position relative to certain marks fixed with respect to us, and by timing it with some sort of clock. This system of location in space and time may be called our "frame of reference." We therefore assert that, in our frame of reference, the apple falls down with an acceleration which Newton saw no alternative but to attribute to a thing called gravitational attraction. Galileo had shown that *all* bodies fall with the same acceleration at all points, and we can now rephrase this by saying that in our frame of reference there is a constant gravitational attraction or *uniform gravitational field*. (This last statement and Galileo's demonstration only refer strictly to points fairly near the Earth's surface; at greater distances the gravitational field decreases and is therefore not uniform.)

Now suppose a collection of falling bodies is observed by an intelligent creature, designated C, who inhabits one of them. C has his own frame of reference fixed relative to him. In C's frame neither his own body, nor any of the others, is accelerated, and therefore he has no reason to suppose a gravitational force is acting on them. We have, therefore, the following situation:

(i) in our frame, fixed relative to us, we find all the bodies falling subject to a gravitational pull;

(ii) in C's frame, undergoing accelerated fall relative to us, no gravitational field is apparent.

It looks, therefore, as if one has only to choose the correct frame of reference for the measurements in order to remove the need for any assumptions about the existence of gravitational fields. This is a simple illustration of the connection between gravitation and frames of reference for the measurement of space and time. Einstein's General Theory of Relativity extends this to cover non-uniform gravitational fields and shows that what Newton taught us to call the gravitational field of material bodies is better thought of as a peculiarity of the space and time in the neighbourhood of such bodies. Since space–time, as we mentioned above, can be expressed in geometrical terms, Einstein has transformed the theory of gravitation into an exercise (a difficult one) in the geometry of space–time. Other physicists, in Einstein's tradition, are trying to turn *all* physics into geometry, but no one knows whether this is really feasible.

All this abstruse work is much more than a demonstration of mathematical power and elegance. Observable phenomena which fall outside the scope of Newton's theory of gravitation are accounted for by relativity. One is the small but definite discrepancy between the actual orbit of the planet Mercury and the predictions of Newton's theory. Another is the bending of stellar light rays as they pass close to the Sun, an effect which results in the apparent displacement of the position of the star. A third is the effect of the intense gravitational field of stars on the light emitted by atoms—

the fields make its wavelength slightly longer than normal.

Conclusion.

Over a century's development of the atomic ideas has brought a progressive, if jerky, increase in the mathematical precision of the theories. In some fields of particle physics, observations to one part in a million, or even better, can be explained, to that level of accuracy, by the existing theories. At the same time, however, the theories have lost visual definition. An atom as an invisible but none the less solid billiard ball was easy enough; so was a light wave conceived like a sound wave in air. Even after Rutherford, an atom consisting of a miniature solar system merely exchanged the solid billiard ball for a system of revolving billiard balls and was no great obstacle to visualisation. But since quantum theory and the Uncertainty Principle, every unambiguous visualisation of fundamental wave-particles leaves out half the picture, and although the electrons are in the atom, we can no longer represent them in definite orbits. The moral seems to be that visualisation is unnecessary, or at best a partial aid to thought. All the theoretical knowledge is in the equations, and these are very precise. Hence the non-physicists' grumble—that physics is too mathematical these days—has some justification, and hence also the growing distinction in physics between the theoreticians, who are usually mathematically trained, and the experimenters, who can rarely read the papers their theoretical colleagues write, but provide the results for them to write about.

II. THE PROPERTIES OF MATTER IN BULK.

One of the most obvious and at the same time most wonderful things about the properties of matter is their great variety. Think of air, diamond, mercury, rubber, snow, gold, pitch, asbestos. . . . Even the differences of state of the same chemical substance are remarkable enough, ice, water, and steam, for example. One of the aims of physics is to reach an understanding of all these different properties by explaining them in terms of the behaviour of the particles discussed in the previous section (**F9–14**). The widespread success with which this imposing programme has been carried out indicates the maturity of physics. It is difficult to think of any major property of matter in bulk for which there is not some attempted theoretical explanation, though future physicists will no doubt regard some present-day theories as rudimentary or incorrect.

Physics, Statistics, and Thermodynamics.

Take a number equal to the population of London, multiply it by itself, and multiply the product by another million. The answer is about the number of molecules in 1 cubic centimetre of ordinary air. They are constantly moving about and colliding with one another. Even if the nature of the molecules and their laws of motion were perfectly understood, it would clearly be impracticable to calculate the exact paths described by each particle of so vast an assembly. This difficulty brought into being a whole branch of physics concerned with calculating the overall or average properties of large numbers of particles. Just as statisticians will provide the average height, income, expectation of life, and so on, of the population of London, without knowing everything about every individual, so statistical physicists can work out average properties of molecules or atoms in large groups. This important branch of physics is called *Statistical Mechanics*. It was founded in the nineteenth century by Maxwell, Boltzmann, and Gibbs and is still being actively developed.

Consider now all the molecules in 1 cubic centimetre of air contained in a small box. They are continually bombarding the walls of the box and bouncing off. This hail of impacts (it is actually about 10^{23} impacts per square centimetre per second) is the cause of the pressure which the gas exerts against the walls of the box. Now suppose we pump air in until there is twice as much as before, though the box is still the same size and at the same temperature. This means that the density of the gas (*i.e.*, the mass of 1 unit of volume) has doubled. We should now expect twice as many impacts per second on the walls as before, and consequently twice the pressure. We therefore arrive at a conclusion that, if the volume and temperature are constant, the pressure of a gas is proportional to its density. This is one of the simplest statistical arguments that can be checked against observation; in fact, it stands the test very well.

Heat, temperature, and energy.

The proviso about the temperature remaining the same is an important one for the following reason. In the nineteenth century there was much discussion about the nature of heat. To Joule we owe the now well-established view that heat is equivalent to mechanical work. In one of his experiments, in the 1840s, the work necessary to rotate paddle wheels against the resistance of water in a tank generated heat that caused a slight rise in the temperature of the water. Joule found out exactly how much work was equivalent to a given quantity of heat. However, one can do other things with work besides generate heat; in particular, work creates motion, as when one pushes a car. Bodies in motion possess a special form of energy, called kinetic energy, which is equal to the work done in accelerating them from a state of rest. We have, then, three closely connected ideas: work, heat, and kinetic energy. Now according to the views of the nineteenth century, which are still accepted, any heat given to a gas simply increases the kinetic energy of its molecules; the hotter the gas, the faster its molecules are moving. If, therefore, the gas in our box is allowed to get hotter, there is an increase in molecular speed, and the impacts on the walls become correspondingly more violent. But this means the pressure increases, so we have another law: if the density remains the same, the pressure increases if the temperature does.

Laws of Thermodynamics.

Such considerations as these have been pursued with great elaboration and subtlety. The notions of heat, temperature, energy, and work—familiar but vague in everyday life—have been given precise definitions, and the relations between them have been enshrined in the Laws of Thermodynamics. Enshrined is perhaps a suitable word, because these laws are so soundly and widely based on experimental results that they have greater prestige than any others in physics. If any proposed physical law comes in conflict with thermodynamics, then so much the worse for that law—it has to be revised. It is sometimes asserted that no one is properly educated who does not understand the Second Law of thermodynamics. We cannot, therefore, leave this section without at least stating the two best known thermodynamic laws:

First Law: *If any physical system is given a quantity of heat, and if the system performs some work, then the energy of the system increases by an amount equal to the excess of heat given over work done.* This law asserts that heat, energy, and work are convertible one into the other, and that all such transactions balance exactly. This is one form of a principle accepted as fundamental in all science, *viz.*, the Principle of the Conservation of Energy, according to which energy can never be created or destroyed, but only changed from one form to another.

Second Law: *It is impossible to make an engine which will continuously take heat from a heat source and, by itself, turn it all into an equivalent*

amount of mechanical work. In fact, all engines which produce work from heat—steam engines for example—always use only a fraction of the heat they take in and give up the rest to some relatively cool part of the machine. The Second Law makes this obligatory on all work-from-heat devices. This statement of the Second Law has an engineering ring about it and, indeed, it arose from the work of the nineteenth-century French engineer Carnot. Nevertheless, it can be rephrased in very abstract terms, and has been applied with unbroken success to all fields of science involving the transfer of heat and allied matters. It sets a definite limit to the kinds of physical process that can be conceived to take place. Nothing has been known to contravene it.

The States of Matter.

The molecular motion in gases has been referred to in the previous section. Tacitly it was assumed that each molecule acted independently of all others, except that collisions occurred between them. In reality, molecules exert attractive forces on one another and, if a gas is cooled so that molecular movements become relatively sluggish, a time comes when the attractive forces succeed in drawing the molecules close together to form a liquid. This process is called condensation.

The molecules in a liquid are packed tightly together and they impede each others' movements. On the other hand, movement still persists, and the molecules struggle about like people in a milling crowd. Besides wandering about, the molecules vibrate. These motions represent the energy contained in the liquid.

The fact that the molecules, though irregularly packed, can still slip past one another and move from place to place, explains the essential property of liquids that distinguishes them from solids—ability to flow. As a matter of fact, although the rather vague assertion that in a liquid molecules are irregularly packed would be generally accepted, there is no agreed opinion on what the irregularity is actually like. Indeed, not only the precise structure of liquids, but the theory of liquids in general, is fraught with such considerable mathematical difficulties that the liquid state is much less well understood than the solid or gaseous.

Most solids are crystals. The popular idea of a crystal is of something which has a more or less regular geometrical form with faces that glint in the light—like snowflakes or gems. However, crystallinity really depends on a regular inner pattern of the atoms, and may or may not show itself on the visible surface. A lump of lead, for example, is crystalline, though it may not look it.

The actual arrangement of the atoms in a crystal can be extremely complex. Some are quite simple, however. The largest model of a crystal structure must surely be the 400-ft. "Atomium" building in the 1958 Brussels Exhibition. This consisted of eight balls, representing atoms, situated at the corners of a cube, and one more ball exactly in the middle. Imagine this repeated in all directions so that every ball is the centre of a cube whose corners are the eight neighbouring balls. This is known to crystallographers and physicists as the "body-centred cubic structure"; it is the actual arrangement of atoms in iron, sodium, chromium, and some other metals. If every ball, instead of being the centre of a cube, were the centre of a regular tetrahedron (a solid figure with four equal triangular faces), and had its four neighbours at the corners of the tetrahedron, then we should have the "diamond structure." This is how the carbon atoms are arranged in diamonds.

In crystals the atoms are locked into a regular ordered structure by attractive forces which give the solid its rigidity and prevent it from flowing. The atoms are so close together that any attempt to press them closer involves crushing or distorting the atoms—a process they resist strongly. This explains why solids (and liquids too) are so difficult to compress. Gases can easily be compressed because there is so much space between the molecules.

The distinction between solid and liquid is not so sharp as is commonly supposed. A lump of dough will not bounce, but is plastic; a steel ball-bearing is very elastic and bounces excellently, but one cannot mould it in the fingers. Neither dough nor steel qualifies for description as a liquid. There are, however, substances which can be moulded like plasticine into a ball that will then bounce very well on the floor like an elastic solid, and finally, if left on a flat table, will spread into a pool and drip off the edge like a liquid. There is no point in trying to force such things into rigid categories. One may say instead that for short, sharp impacts the material behaves like an elastic solid, but under long-sustained forces it flows like a liquid. The properties of these, and many other anomalous materials, are increasingly engaging the attention of those who study the science of flow—*rheology*. It is interesting to see how many familiar and important materials exhibit peculiar rheological behaviour—paint, dough, ball-pen ink, cheese, unset cement, and solutions of nylon and other plastics are only a few examples.

Inside a Crystalline Solid.

We now return to our wallpaper analogy of crystal structure and give some free play to our visual imagination.

Suppose we have walls papered with a regular pattern of, say, roses, fuchsias, and green leaves. These represent the different kinds of atoms in the solid. Careful observation shows that the whole pattern is shimmering. The flowers and leaves are not stationary, but are undergoing slight random oscillations about their proper positions. In a crystal these movements are called thermal vibrations, and are never absent. The hotter the crystal, the more the vibration, and at a high enough temperature the vibrations become so great that the atoms get right out of position and the pattern disappears altogether, *i.e.*, the crystal melts. Thermal vibrations are essential to the theory of solids, and are responsible for numerous physical properties.

Next we note something extraordinary about some of the papered walls. On these the paper has been hung in irregular patches fitted together like a not very well-made jig-saw puzzle. Lines of roses which should be vertical are horizontal in some patches, oblique in others. This represents the situation in most ordinary solids, for they consist of many small pieces of crystal irregularly packed together. Such material is called *polycrystalline*, and the small pieces are *crystal grains*. Crystal grains may be almost any size, sometimes visible to the naked eye, as often on galvanised iron.

However, on one wall, we see excellent regularity and no obvious patches at all. The physicist would call this a *single crystal*, and several techniques exist for preparing them. Natural single crystals can be found, and there are some beautiful large single crystals of rock salt. But on examining the single crystal wall closely, we find a number of places where the paperhanger has failed to make adjacent pieces register perfectly—there is a slight disjointedness. This occurs in real single crystals, and the line along which the structure fails to register is called a *dislocation*. These are much studied by physicists because of their bearing on the mechanical properties of solids, on the yielding of metals under strong stress, for instance.

This by no means exhausts the possibilities of the wallpaper analogy; several other phenomena can be found. For example, in a place where there should be a fuchsia there is actually a daffodil—something completely foreign to the pattern. Or perhaps a small wrongly shaped leaf is jammed between the proper leaves in a place that should really be blank. These represent chemical impurity atoms. The first is called *substitutional*, because it occupies the position of an atom that should be there, the second is called *interstitial*, because it does not. Substitutional impurities of indium metal, deliberately added to the semi-conductor germanium, make possible the manufacture of transistors (*see* F66). Some steels derive their valuable properties from interstitial carbon atoms within the iron pattern.

What physicists call a vacancy would occur if a flower or leaf were simply missing. Remembering that all the atoms are vibrating, we should not be surprised if occasionally an atom jumps into a neighbouring vacancy if there happens to be one, *i.e.*, the atom and the vacancy change places. Later this may occur again. In the course of time, a rose which was near the ceiling may make its way to the floor by jumping into vacant rose positions when they occur near enough. This process, which the physicist calls *diffusion*, is also analogous to the game in which numbers or letters can be moved about in a flat box because there is one vacant space to permit adjustment. The more vacancies there are in a crystal, the faster diffusion occurs. It is, in fact, very slow in solids, but is nevertheless evidence that apparently quiescent materials are really internally active.

Metals, Electricity, and Heat.

There is ample evidence that inside metals there are large numbers of free electrons. To illuminate this statement let us take sodium metal as an example. One single sodium atom has a nucleus with eleven protons; there are therefore eleven electrons in the atom. The outermost one is easily detached, leaving a positively charged sodium ion behind. We may think of these ions arranged in the three-dimensional pattern characteristic of sodium crystals. It is the same as the iron structure previously described. The detached electrons, one per atom, occupy the spaces in between. The usual metaphor is that the structure of ions is permeated by a "gas" of eletrons. Like all visualisations of fundamental particles, this must be taken as a rough approximation. The important point is that the electrons in the gas are not bound to individual atoms but may wander freely about the crystal, hindered only by the collisions they make with the vibrating ions.

This is the picture as it appeared to physicists of the first decade of this century, and we can explain many properties of metals with it. Naturally the theory has developed greatly since then, thanks to the great work of Lorentz, Sommerfeld, and Bloch; it now relies heavily on quantum theory, but it is surprising how little violence is done to modern ideas by the simple picture we are using.

The free electrons move randomly in all directions at thousands of miles per hour. If the metal is connected across a battery it experiences an electric field. Electrons are negatively charged particles, and are therefore attracted to the electrically positive end of the metal. They can move through the metal because they are free; this flow is not possible to those electrons which remain bound to the ions. The function of the battery is to keep the flow going and, for as long as it is going, it is the electric current.

The flow of electrons is not unimpeded. They constantly collide with the ions and are deflected from the path of flow. This hindrance is what the electrician calls *electrical resistance*. The electric force, due to the battery or a dynamo, accelerates the electrons, thus giving them extra energy; but they lose this to the ions at collisions because the ions recoil and vibrate more than before. The net effect of innumerable collisions is to increase the thermal vibrations of the ions, *i.e.*, to make the metal hotter. This is the explanation of the fact well known to every user of electric irons; that electric current heats the conductor. If a strong current is passed through a wire, the heating is so great the wire glows, as in electric-light bulbs, or melts and breaks, as in blown fuses.

If one end of a metal rod is heated we soon feel the heat at the other end; metals are excellent thermal conductors. This is because the mobile free electrons carry the heat energy down the rod, passing it on to the ions by colliding with them. Substances without free electrons cannot do this, nor can they conduct electricity well; so we have, in the free electrons, an explanation of the fact that the good electrical conductors are the good heat conductors. For technical purposes, it would be useful to have electrical insulators that would conduct heat well, and *vice versa*; but this is almost a contradiction in terms, and one can only compromise.

Non-conductors and Semi-conductors.

There are some elements, and numerous compounds, in which all the electrons are so tightly bound to their parent atoms that free electron flow is impossible. These materials are electrical and thermal insulators.

Let us return to our sodium atom. It readily loses its outer electron, forming a positive ion. The ion is very stable; indeed, its electron arrangement resembles the "closed shell" belonging to the inert gas neon. The chlorine atom, on the other hand, would have a very stable structure, resembling the inert gas argon, if only it could be given one extra electron to complete the closed shell. If the outer sodium electron were given to a chlorine atom we should have two stable ions, one positive and one negative. These would then attract each other and form a compound. This is just how common salt, sodium chloride, is formed, and its crystals consist of a regular network of alternate sodium and chlorine ions. As all the electrons are bound to ions, it is not surprising that salt will not conduct electricity or heat to any appreciable extent. Not all insulating compounds are built on this pattern, but all have structures which bind the electrons tightly.

We have seen (**F16**) that Nature does not permit a hard-and-fast distinction between solids and liquids; nor does she between conductors and insulators. Over a hundred years ago, Faraday knew of substances which would conduct electricity, but rather badly. A common one is the graphite in pencils. Others are the elements selenium, germanium, and silicon, and a considerable number of compounds. Such substances are called semi-conductors.

Semi-conductors conduct badly because they have so few free electrons, many thousands of times fewer than metals. In very cold germanium—say, 200 degrees below freezing—all the electrons are tightly bound to atoms and the substance is an insulator. It differs from normal insulators in that, on warming it, the gradually increasing thermal vibration of the crystal detaches some of the electrons, for they are only moderately tightly bound. The warmer the crystal becomes, the more of its electrons become detached and the better it conducts electricity. By about the temperature of boiling water, there are so many freed electrons that conduction is moderately good, though less good than in metals. This is basic semi-conductor behaviour. Because transistors can be made of germanium, and because they are of such great technical importance, more knowledge has accumulated about germanium than about any other material. The fascinating story of the semi-conductor is told in Part IV, **F66–68**.

Magnetism.

The most important thing about magnetism is that it is inseparably connected with electricity. Oersted showed this in July 1820, when he deflected a magnetic compass needle by passing an electric current through a wire near it. Since then, many experiments have shown that wherever a current flows there will certainly be a magnetic field in the surrounding space. The laws of this are very well known now—they are the Maxwell equations previously referred to (**F12**). However, most people first meet magnetism when, as children, they pick up pins with a magnet. Where is the electricity here? and what is a magnet?

The explanation of magnetism exemplifies beautifully the technique of explaining the bulk properties of matter in terms of fundamental particles. In the atoms the electrons are moving, and a moving electric charge constitutes an electric current. Therefore each moving electron is a tiny source of magnetism. It does not immediately follow that every atom is a source of magnetism because it might—and often does—happen that the magnetic effect of different electrons in the atom cancel out. In helium

atoms, for example, the two electrons have equal but opposed magnetic effects. Nevertheless, some atoms and ions have a net effect called their *magnetic moment*. This simply means they behave like tiny magnets. Crystals containing such atoms will be magnetic, though the magnetism is much weaker than in ordinary magnets because the different atoms largely annul one another's effects. In a very limited number of crystals, however, the magnetic ions act on one another in a special way which forces all the atomic magnets to point in the same direction. The total effect of many co-operating atoms is very strong and the crystal becomes what we normally call a magnet. Iron acts like this, so do cobalt and nickel, the rarer elements gadolinium and dysprosium, and a fair number of alloys. On the whole, this behaviour, which is called *ferromagnetism*, is very rare. The reason for the co-operation of all the atomic magnets is not explained to everyone's satisfaction yet, though the key idea was given by Heisenberg in 1928.

In the section dealing with the electron it was pointed out that every electron has an *intrinsic* magnetic moment. This is in addition to any effect simply due to the electron's motion round a nucleus. The net effects of ions are therefore partly due to the intrinsic magnetism of electrons. In the ferromagnetic metals the latter is by far the most important contribution. Thus we pick up pins, and benefit from magnets in other ways, because innumerable fundamental particles act in co-operation for reasons that are still somewhat obscure. It is interesting to ask whether the electrons responsible for magnetism are the same free electrons that allow the metals to conduct electricity. It is thought not.

We are accustomed to think of magnets as metallic. Actually the magnet originally discovered by the Chinese was the mineral lodestone, which is a non-metallic oxide of iron. Nowadays a number of non-metallic magnets are made. They are called *ferrites*, and some are insulators and some are semi-conductors. The combination of magnetism and insulation is technically very valuable in radio, radar, and other applications. The explanation of ferrite behaviour is related to that of metallic ferromagnetism, but is not the same.

Conclusion.

The aim of the second part of this account of physics is to show how our conception of fundamental particles allows us to build theories of the properties of matter. This very aim shows that the two "major divisions" of physics referred to at the beginning (**F9**) are divided only in the way that labour is divided by co-operating workers to lighten the task. For the task of physics is a very great one—no less than to explain the behaviour of matter; and since the universe, living and inanimate, is made of matter, physics must necessarily underlie all the other sciences.

II. BIOLOGY—THE SCIENCE OF LIFE

Biology embraces the study of all living things which exist on earth at the present time and also the recognisable remains of those which are now extinct. Living things or *organisms* range from the simplest microscopic animals and plants to the largest animals and forest trees. Although it is extremely difficult to give a comprehensive definition of life, we may attempt to distinguish the living from the non-living. All organisms when alive undergo continual physical and chemical changes. These *metabolic* processes are extremely complex, but are exhibited by even the smallest organism, however simple its structure may be. Metabolism also involves the processes of *nutrition*, *i.e.*, the intake of food materials, *excretion* or removal of the waste end products of metabolism, and also *respiration*. All organisms also exhibit *irritability*, by which is meant that they react to external stimuli and changes in their environment. *Growth* is also a characteristic of living things and involves the increase in size and complexity of the individual. Finally, all organisms *reproduce*, *i.e.*, they give rise to new individuals which enable the species to survive. It should be emphasised that non-living things may possess one or other of these properties separately, but it is only the living organism which exhibits all of them together.

THE GEOLOGICAL RECORD.

London is an old city as cities go, although not so old as Rome, but geologically speaking it is not so long since the land upon which London stands was beneath the sea. Later in time there were tropical jungles on the banks of the Thames in which sabre-toothed tigers hunted their prey, the Thames was a tributary of the Rhine, and, still more recently (in fact only yesterday on the cosmic time-scale), the great Ice Ages brought sub-arctic conditions to our land.

The various stages in the history of the earth can be read by the geologists in the strata or layers of rock laid down since the planet began to solidify, and it is in these rocks, too, that the record of life upon earth may be traced.

No Life Rocks.—The earliest rocks in the record are known as the Azoic (no life) rocks, because they show no trace of living things, and these layers are of such thickness that they occupy more than half of the whole record. That is to say, for more than half of the earth's history nothing living existed upon any part of the globe. For millions of years the surface of our planet was nothing but bare rock without soil or sand, swept by hot winds exceeding in violence the wildest tornadoes of today, and drenched by torrential downpours of tropical rain, which, as we have seen elsewhere, gradually tore away the surface to form sandy sediments at the bottom of the seas. In such ancient rocks pushed above the surface by later upheavals we can still trace the marks of primeval oceans as they rippled upon the barren shores or of raindrops which left their imprint perhaps 1,500 million years ago.

Primitive Sea-life.—As we move upwards through the strata, however, traces of life begin to appear and steadily increase as we come to the more recent levels. The earliest signs appear in what is known as the Early Paleozoic Age (or by some writers as the Proterozoic Age), when we find the fossilised remains of small shellfish, seaweeds, and trilobites—the latter were creatures somewhat like the plant-lice of modern times. All these primitive animals and plants lived in the shallow tidal waters of ancient seas; for as yet life had not invaded either the dry land or the deep oceans. It is, of course, clear that these creatures of Early Paleozoic times were not the first living things: they were merely the first creatures capable of leaving fossilised remains, and without doubt must have had more primitive ancestors—amœbic-like forms, jellyfish, bacteria, and so on whose bodies were too soft to leave any traces in the record of the rocks. This problem, however, will be discussed more fully later.

The Age of Fishes.—Towards the end of the Early Paleozoic Era, in what we now know as the Silurian period (see F20), there arose a new form of life: the first backboned animals, primitive fishes somewhat similar to the sharks of today; and in the division of the Upper Paleozoic Era known as the Devonian, they had come to multiply so greatly that this is frequently described as the Age of Fishes.

First Land Animals and Plants.—It is about this time, too, that we begin to find traces of animal and plant life upon the dry land. Both animals and plants had acute problems to solve before it became possible for them to live out

of water; for both animals and plants had hitherto been supported by the surrounding water and respired by removing oxygen dissolved in the water. In land animals this problem was solved by a long series of adaptations from gills to lungs. Plants were able to invade the land because of the evolution of an impermeable outer cuticle which prevented water loss and also the development of woody tissues which provided support and a water-conducting system for the whole plant body.

Amphibia and Spore-bearing Trees.—The first type of vertebrates (backboned animals) to live upon dry land was the group of amphibia in the Carboniferous Age, which is today represented by the newts, frogs, toads, and salamanders. In all these forms the eggs give rise to a tadpole stage with gills which lives for some time entirely in water. Later the gills give place to a primitive form of lung which enables the animal to live upon land. Even so, amphibia are restricted more or less to swampy or marshy land, and without a damp environment they would dry up and shrivel to death. The most abundant forms of plant life in the Carboniferous period were the tree-like horsetails, clubmosses, and ferns, the fossilised tissues of which are found in the coal measures and are burned as household coal. But these plants also, as in the case of the amphibia, could exist only amongst the swamps and marshes, and life, although it had freed itself from the necessity of existence in the waters of the earth, still had to return to the water in order to reproduce itself. The highlands and the deeper waters of the planet were still empty of living things. Although the Carboniferous period had been a period of warmth and abundance, the Paleozoic Era came to an end with a long cycle of dry and bitterly cold ages. Such long-term climatic changes were due, it is now supposed, to such factors as changes in the earth's orbit, the shifting of its axis of rotation, changes in the shape of the land masses, and so on. Long before the Ice Ages of more recent times, there are records in the rocks of alternating periods of warmth and cold as far back as the Azoic and Early Paleozoic Eras. This long cold spell at the close of the Paleozoic era came to an end about 200 million years ago, and was succeeded by a long era of widely spread warm conditions—the Mesozoic Era, the so-called Age of Reptiles.

The Mesozoic Era.—The reptiles first appeared in the Permian, but it was during the Mesozoic era that they became the dominant group of animals. The giant reptiles included the stegosaurus, the gigantosaurus, the diplodocus, and many other kinds which were far larger than any land animals living today. Some, for example the diplodocus, were 100 ft. long, although they were vegetarian in habit and were preyed upon by other almost equally huge flesh-eating reptiles. Some species, such as the plesiosaurs and icthyosaurs, became secondarily aquatic, while the pterodactyl possessed wings with which it could glide and perhaps fly short distances. However, they all differed from the amphibia in that they had hard, dry skins, their lungs were more efficient, fertilisation was internal due to the development of copulatory organs, and they laid eggs with hard, protective shells.

It was also during the Mesozoic era that the warm-blooded birds and mammals arose from reptilian ancestors. The birds, like the reptiles, lay eggs with hard shells, and they have several internal features found in the reptiles. The fossil bird Archæopteryx, three specimens of which have been found in Germany, lived in the Jurassic period. Although it was obviously a bird, it retained many reptilian features. The fossil Trituberculata, which are also found in the Jurassic, are believed to be the fore-runners of the true mammals. Although insects were present as far back as the Ordovician, it was in the Mesozoic that many of the groups we know today first appeared.

Great changes also took place in the plant cover of the land during this era. The spore-bearing giant horsetails and tree clubmosses declined and were replaced by gymnosperms—trees bearing naked seeds. One large group of these, the cycadeoids, has become extinct, but the conifers and a few of the once abundant cycads still remain. The flowering plants or angiosperms also made their appearance, and towards the end of the Cretaceous their evolution was extremely rapid. In fact, many of the fossil leaves found in rocks of Cretaceous age are indistinguishable from those of some present-day flowering plants.

A New Era.—But, perhaps 150 million years later, all this seemingly everlasting warmth and sunshine, the lush tropical life, the giant reptiles who had ruled the world, were wiped out by a new period of bitter cold which only the hardy species could survive. A new Era known as the Cainozoic was beginning, ushered in by a period of upheaval and volcanic activity, following which the map of the world came to resemble more closely the picture we know today. The cold period may have lasted several million years, and the main species to survive it were those which had come into existence towards the end of the Mesozoic Era, the seed-bearing flowering plants, the birds, and the mammals. The once all-powerful reptiles from this time onwards are represented only by the comparatively few and relatively small reptilian species of today: the snakes, lizards, crocodiles, and alligators. It was at this time, too, that, long after the creation of the mountains of Scotland and Norway (the so-called Caledonian revolution), or even of the Appalachian mountains (the Appalachian revolution), there arose the great masses of the Alps, the Himalayas, the Rocky Mountains, and the Andes. These are the mountain chains of the most recent, the Cainozoic revolution. Initially, as we have seen, the climate of the Cainozoic Era was cold, but the weather grew generally warmer until a new period of abundance was reached, only to be followed at the end of the Pliocene by a period of glacial ages generally known as the First, Second, Third, and Fourth Ice Ages.

The Great Ice Age.—The latter was separated by interglacial periods when the climate was milder—we are, in fact, living at the moment at the end of the last Ice Age, for the retreat of ice from Europe began only about 25,000 years ago. It must be remembered, however, that even at the height of the Glacial periods the ice never extended over the whole face of the earth; it was, indeed, limited to an area which never moved farther south than what is now Northern Germany, Northern France, the larger part of the British Isles, small areas in the North of Asia, and about half of the North American continent.

Adaptation to Environment.—The earliest mammals and birds evolved out of reptilian-like ancestors, whose scales in the former case had developed into hairy fur, and in the latter, into feathers. These developments, together with the evolution of an entirely new type of mechanism by which they became warm-blooded, no doubt enabled the mammals and birds to survive the increasing cold at the close of the Mesozoic era. Whereas the earlier species, the reptiles and amphibia, had been cold-blooded, with a body-temperature little raised above that of the surrounding environment, the warm-blooded birds and mammals developed a temperature-regulating centre in the brain which kept their temperature more or less constant independent of climatic conditions. Furthermore, as we move up the evolutionary tree, we find that increasing attention is given to the care of the young. Birds, like reptiles and amphibia, lay eggs, but unlike these creatures they look after their young, which initially have to be fed by the parents. The earliest mammals also laid eggs (even at the present day two species of mammal, the echidna, and the duck-billed platypus of Australia lay eggs), but increasingly became viviparous and brought their young into the world alive (there are, of course, a few species of snake and lizard which do the same). These undeveloped young had to be cared for by the parent animal and *taught*—in short, the possibility of a more or less prolonged period of learning arose. When we

think of the young of reptiles, fish, and amphibia, which from the outset can look after themselves, and compare them with the human child, which may spend ten or more years learning how to adapt itself and conduct its life, we can see the great importance of this new development. Intelligent adaptation became more important than mere instinct to the more complex forms of life. Finally, perhaps half a million years ago, during the first glacial epoch of the Pleistocene, the earliest type of man developed from a primeval stock of anthropoid apes.

How Did Life Arise?—Turning from this all too brief and necessarily over-simplified account of the history of life upon earth, we have to consider the problem of life in more detail. How did it arise? How have the many species of animals and plants evolved from more primitive forms of life? What is the nature of life, and how does the living organism work? How are living things classified? It need hardly be said that only the most sketchy outline of such matters can be given here, but they are so important that we must do our best to give a simple account of them.

THE GEOLOGICAL TIME SCALE.

ERAS	PERIODS	AGE (millions of years)	LIFE
CAENOZOIC	Pleistocene	1	Man
	Pliocene		Birds, Mammals and modern plants; Molluscs
	Miocene	25	
	Oligocene		
	Eocene	70	
MESOZOIC	Cretaceous	135	Dinosaurs, Cycads; Earliest Birds; Ammonites and Sea-urchins
	Jurassic	180	
	Triassic	225	
PALAEOZOIC	Permian	270	First mammals; Early reptiles
	Carboniferous	350	Amphibians, tree-ferns, first insects
	Devonian	400	Fishes, first land plants
	Silurian	440	Mainly invertebrate animals; no life on land. Trilobites and graptolites
	Ordovician	500	
	Cambrian	600	
PRE-CAMBRIAN (also PROTEROZOIC, ARCHAEOZOIC)		1,500	Life appears
		5,000	Origin of the Earth

THE ORIGIN OF LIFE.

There are only three possible explanations of the origin of life upon our earth: (1) that it was supernaturally created, (2) that it was brought from some other part of the universe, or (3) that it arose by natural processes from inorganic matter.

In a scientific account, however, we must reject the first two of these explanations, not because we know them to be false, but because they are not strictly speaking explanations. It is in the nature of science that it attempts to define all that we observe in terms of natural laws, and to bring in supernatural assumptions would be to break the rules of the game. This is not, of course, meant to imply that no supernatural sphere exists, but if we habitually brought in such assumptions whenever something appeared difficult to explain "naturally," there could be no science at all.

Furthermore, there is nothing whatever irreligious in the assumption (held, incidentally, by many modern theologians) that the Deity works through natural laws and does not break the laws He Himself has created. The second explanation, that life was brought from somewhere else in the universe, is also unsatisfactory: (a) because it does not explain the origins of life but merely pushes the problem one step farther back, and (b) because, if we accept the usual form in which this suggestion is put forward—that life was brought to earth inside a meteorite—we are then presented with the extremely difficult task of explaining how any living substance could survive such a journey. We are therefore left with only the third possibility, that life arose upon the earth from natural causes, and this thesis must therefore be further investigated.

The Nature of Life.—All living things are built up from compounds of the element carbon, which has the peculiar characteristic that it can link its atoms in series to form long chains of rings which are immensely more complex than the compounds formed by any other element.

When at an earlier stage we are considering the universe of non-living matter, our natural response was, perhaps, to be overwhelmed by the thought of such vast distances in time and space, to feel mere pigmies in the face of such immensity. Indeed, as the late Monsignor Ronald Knox said, "Sheer multitudinosity has power to oppress the mind." But here, when we are beginning our study of the organic sphere, it is worth while administering a corrective to our cosmic awe; for all the vast inorganic universe is really a very simple matter. It consists of nothing but radiations, subatomic particles, and atoms, and even the greatest galaxies contain only the simplest of molecules which rarely possess more than half a dozen atoms. The chemistry of even the simplest living things is almost infinitely more complex than the whole of this tremendous collection of galaxies and stars put together. Compare, for example, the formulæ of such inorganic substances as sulphuric acid (H_2SO_4), common salt (NaCl), Epsom salts ($MgSO_4$), or hydrogen peroxide (H_2O_2), with a biological substance such as insulin, which has a formula so complicated that to write it down in full would take up the larger part of this page, and we shall feel much less impressed by the mere "multitudinosity" of the non-living sphere. In his *Doubt and Certainty in Science*, Professor J. Z. Young has pointed out that the human cerebral cortex, the thinking area of the brain, which represents but a small portion of the whole, contains a number of cells more than seven times the total human population of the entire world. Furthermore, its organisation is of such inconceivable intricacy that beside it the organisation of the whole of the rest of the universe can be regarded only as child's play.

The Chemistry of Life.—So complex are many of the compounds in living cells and tissues (including blood and sap) that it was long supposed that they

could be formed only in living organs. The chemistry of carbon compounds is still called "organic" chemistry. In 1828 the German chemist Wohler artificially made the substance urea, present in blood and urine of higher animals. Many natural substances have since been made artificially, as well as others, such as chloroform, D.D.T., nylon, many drugs, dyes, etc., which do not occur in nature.

Hydrocarbons (*e.g.*, methane, benzene) consist of carbon and hydrogen only; in sugars, fats, alcohols, and organic acids, oxygen is added; the constituent amino-cells of proteins contain nitrogen in addition (some, also sulphur). Complexity is, however, mostly manifested in *arrangements* of atoms of few kinds; as in the mirror-image molecules mentioned below, and the vitamin-like carotene hydrocarbons, all $H_{40}H_{56}$, which differ biologically and otherwise.

The fact that many of the compounds found in living matter can be synthesised in the laboratory gradually led chemists and biologists to realise that, apart from its greater complexity, there is nothing unusual about the chemistry of life, and a new science, the science of biochemistry, was created. More recently an unexpected link between living and non-living was discovered when it was found that some viruses, the smallest and simplest of living things, can exist in crystalline form. Now in crystals the constituent atoms are arranged in rows one above the other, like bales of cotton in a warehouse, and it is extremely difficult to see how living things can at the same time be "alive" and yet exist in crystalline form. Nevertheless, this is so, and the viruses show the most typical of reactions of living matter in that they are capable of reproducing themselves. It is no longer so easy to draw a sharp dividing line between the organic and inorganic, the living and non-living spheres.

Origins of Life.—Life probably arose from physical agencies acting differentially on simple materials like water, carbon dioxide or methane, and nitrogeneous matter, such as ammonia (along with others) when conditions were very different from those of today. If the first step was for the materials to group into suitable systems of atoms, the question is not only *how*, but what would be suitable? The farther the inquiry is pushed, the more awkward it appears (*see* **Abiogenesis**). Three essentials stand out: the living material must contain water and be compatible with it, but must not be soluble; it must be able to reproduce in a way more specialised than viruses do; and it must have at least two kinds of organisation—biological (into at least single cells) and chemical.

Living Matter.—About 1850 Pasteur's chemical studies offered a clue which led him to studies of microbes, via fermentations. Briefly, much of living matter consists of molecules having a one-way twist or polarity; that is true of all sugars and nearly all amino-acids (above). Every such molecule can exist in at least two forms, identical in every feature except that they have opposite twists; one is like the other seen in a looking-glass. Yet, nature tends to employ only one member of the pair; the mirror-image molecule of glucose has never been found naturally.

It has been suggested that natural insistence on unsymmetrical patterns of organic molecules is a reflex or "memory" of primeval conditions exerting some preferential stimulus. Ordinary light vibrates equally—without selection—in all directions; but reflected light, as from the moon or still water, has its vibrations appreciably in particular planes or modes, and is said to be polarised. Solutions of mirror-image molecules act oppositely on polarised light, that being their main physical distinction which may have given the first selective impulse towards life.

Living is a set of reversible chemical processes, constantly going both ways so that growth or an apparently steady state is attained. When an organism becomes unable to reverse its tissue changes with the aid of its enzymes and water, it dies; because it has lost the ability to maintain its organisation, and is ready for dissolution and for the return of its elements to general circulation.

THE EVOLUTION OF ORGANISMS.

Historical Theories.—As most people are aware, the theory which attempts to explain the origin of the many species of animals and plants is Darwin's theory of evolution. But it would be wrong to suppose that the concept of evolution, the belief that all living things have developed over many centuries from much simpler forms, originated with Darwin's work in the nineteenth century; for, as we have already seen, certain Greek writers in the fifth and sixth centuries B.C. had already thought of such a possibility. Much later the Frenchmen Buffon and Lamarck, during the late eighteenth and the early nineteenth centuries, developed similar theories, and the philosopher Descartes (who died in 1650) privately held evolutionary views which he suppressed because of "distaste of hell-fire and respect for the Church."

Scientific Approach.—The importance of Charles Darwin, who, with another Englishman, Newton, may safely be accounted among history's greatest geniuses, was that he was able to present a scientific account of how evolution might have taken place—the theory of natural selection, generally described as the theory of "the survival of the fittest." Even so, Darwin's work would have been impossible had it not been for the work, particularly in the field of geology, of other great men at an earlier period. In 1788, for example, James Hutton of Edinburgh, the founder of modern geology, had shown that the history of the earth had been marked by widespread changes in sea-level, periodic volcanic action, and the raising and wearing-down of mountain ranges in the way we have already discussed. From his work it followed that the earth must be vastly more old than had previously been imagined by those who, without any adequate theological justification, had claimed the Biblical account in the book of Genesis to be literally true. Hutton was followed by William Smith, who, between 1799 and 1817, developed a technique for dating geological strata by means of the fossils they contained, and thereby showed that, at different periods in the earth's history, widely varied types of animals and plants have existed.

There have been, as we have noted already, periods when fishes were supreme, or amphibia, or reptiles; seaweeds precede ferns in the record of the rocks and coniferous trees the flowering plants. How else can these facts, which are beyond doubt, be explained, except by supposing that life upon earth has developed in a particular order and, in general, from simpler forms to more complex? Certainly attempts were made to explain away such observations, for example, by the Frenchman Cuvier, who, while accepting the geological data, supposed that each epoch in the earth's history had ended in a world-wide catastrophe, after which creation had begun anew. Even more fantastic was the thesis of the brilliant English naturalist Gosse, who was led by his religious beliefs (he was a member of the Plymouth Brethren) to accept the belief that the fossils had been placed in the rocks by a wily Deity to test man's faith.

However, the work of the early geologists made it possible for Darwin's theory to be more readily accepted by scientists than it might otherwise have been, and this theory was based upon the two facts of variation and natural selection.

Darwinian and Lamarckian Theories.—It is an observed fact that the offspring of parents in the animal and plant world both resemble and differ from their parents, and a matter of common-sense to suppose that, in a world in which not all those creatures which are born can survive, those which are best fitted to do so will live longer and reproduce themselves more abundantly than those which are less fitted to the existing conditions.

This, in essence, is the Darwinian theory, and it must be contrasted with the theory of Lamarck to the effect that characteristics acquired during the life-time of organisms could, if useful, be handed on to their offspring. The latter thesis is known as the theory of the inheritance of acquired

characters and is now rejected by most scientists, with a few exceptions who will be mentioned shortly.

Darwin and Organic Evolution.—To put the matter rather crudely, we might say that Darwin's theory of natural selection implies that giraffes have long necks because, in a country in which the food-bearing trees were tall, those animals which happened to be born with relatively long necks were at an advantage, and lived longer and produced more offspring than those with shorter necks. But long-necked parents have, on the average, more offspring with long necks (since the offspring, for reasons which we now know but Darwin did not, tend to resemble more than they differ from their parents), and so the quality of "long-neckedness" tends to increase and that of "short-neckedness" to die out.

Lamarck and Inheritance of Acquired Characters.—Lamarck, on the other hand, would have said that the parent animals had to stretch out their necks in order to reach the more succulent branches of the trees, their necks grew longer, and this acquired change was handed on to the offspring.

This theory, however, cannot reasonably be substantiated in the light of modern knowledge. Let us take, for example, the now well-known fact of drug-resistance in bacteria exposed to penicillin or the sulphonamides, when the physician finds that the formerly potent drug no longer works to destroy the bacteria and his patient may die. Is this result due, as a Lamarckian might suppose, to the bacteria becoming habituated to the drugs and passing on the resistance they have acquired to their offspring? No, as the American biologist Demerec has shown, this is not at all what has happened. The true explanation is that in every generation of bacteria there already exist, completely by accident, a few variant individuals which are resistant to the drug, and ordinarily these are so few as to make no difference to the effectiveness of penicillin or streptomycin or sulphonamide in curing the patient's illness. But if the treatment is continued too long these variants continue to multiply, and survive, whilst their competitors, formerly the "normal" bacteria, are all killed off until finally the new penicillin or streptomycin-resistant strain begins to predominate. Similarly, the insects known as water-boatmen vary "accidentally" in colour and shade, but when exposed to insect-eating fish, the water-boatmen of a colour which makes them inconspicuous against the natural background will survive and the others will not.

Natural Selection.—Darwin's idea, therefore, may be expressed as follows: (1) there are always more organisms born than can possibly survive; (2) all organisms show accidental variations from the norm; (3) any variation which proves useful in a given environment has survival value, and gives its possessor an improved chance of surviving and having more offspring; (4) that variation, therefore, will spread throughout the species by the elimination of those who do not possess it and the favouring by natural selection of those who do; (5) in this way, new varieties and even new species may come to be established.

But, it may well be asked, granted that natural selection can cause minor variations to arise within a species, is it possible to explain in this way the "*origin* of species"? Can we explain by natural selection the transformation of reptiles into birds or of monkeys into man? The answer, according to the vast majority of modern biologists, is that we can. "Natural selection," says Professor Sir R. A. Fisher, "is a mechanism for generating an exceedingly high degree of improbability." That is to say, changes which are small in themselves, may, when selectively picked out by the mechanism of natural selection, add up in the millions of years which have been available to very considerable changes in a species.

Mutations.—On the other hand, the modern biologist attaches less significance to the importance of the minute "natural" variations which Darwin emphasised, and more to the periodic occurrence of "sports" or mutations which Darwin had thought largely irrelevant. This change in outlook was due to the work of the biologist Hugo de Vries, whose *Mutation Theory* was published in 1901. De Vries claimed, and his view is now generally accepted, that evolution depends, not upon the accumulation of continuous minute variations, but primarily upon relatively large and discontinuous variations or mutations. New species, according to this theory, may arise quite suddenly because of changes in the genetic constitution of the organism of the type popularly known as "sports." Two cases of mutation which are well known to the biologist may be mentioned here: the copper beech and the Shirley poppy. The copper beech-tree, with its brownish-red leaves, is now a familiar sight in most parts of the country; but until the seventeenth century it did not exist. About that time a single specimen arose spontaneously from ordinary beech-tree stock, and it had bred true ever since. The first specimen of the Shirley poppy, with its variously coloured petals, was found by the Vicar of Shirley growing amongst a field of ordinary poppies in 1880; he sowed the seeds of the one plant he had found, and it, too, has bred true ever since. It seems likely, then, that such major types of variation occurring spontaneously are of fundamental importance in the evolutionary process.

The Evidence for Evolution.—Let us now sum up the evidence for evolution.

1. *The Geological Record.*—We have already seen that in the record of the rocks the simpler organisms precede in time the more complex. Fish appear before amphibia, and both before reptiles. Animals without a backbone occur much earlier in the record than the vertebrates. Similarly, non-flowering plants occur before flowering, and cone-bearing trees before those in which the seed is enclosed. Unless we are prepared to accept quite fantastic theories such as those of Cuvier or Gosse in order to explain such observations, it seems impossible to avoid the conclusion that evolution has happened, whatever the mechanism by which it has occurred.

2. "*Missing Links*."—Although it is true that the links between species are less common than one might expect, nevertheless such links have in some cases been found. For example, the creature known as Archæopteryx, found as a fossil, is bird-like in shape; it possessed wings and feathers, and was obviously able to fly. On the other hand, it had a long tail similar to that of a reptile, a reptile's mouth and teeth, and, whereas in modern birds the bones of the wing are fused together, this creature had a quite definite thumb. This seems a clear case of a missing link between birds and reptiles. It must be remembered that the record of the rocks is by no means complete, and that far more fossils have been destroyed in the long course of prehistory than have ever survived, and, of course, many yet remain to be found.

3. *Relatively Complete Series.*—The development of the horse is known fairly completely from the record of the rocks. The earliest-known "horse" was about the size of a hare or a small terrier, and ran about upon the tips of its three toes. It was vastly different from the horse of today. Similarly, not one, but many links are known between man and ape.

4. *The Evidence from Geographical Distribution.*—Nearly all the marsupials or pouched mammals are found only in Australia, for the Australian continent was cut off from the mainland about 60 million years ago, and at this time the more modern type of mammal in which the offspring develop to an advanced stage within the mother's womb had not been evolved. Yet, as Julian Huxley points out, although the only type of mammal naturally found in Australia is the marsupial, these have branched out into a large number of species very similar in appearance to those which developed elsewhere in the world amongst the placental or modern mammals. There are marsupials which look like dogs, moles,

squirrels, and ant-eaters; yet they have no near biological relationship to such creatures. It is almost as if life had happened to develop along similar lines in two separate planets with similar environments.

5. *Recapitulation.*—Animals develop in a way which is incomprehensible unless we assume that early development is, in some degree, a recapitulation of biological history. Why, for example, should the human child in the early stages of prenatal development show gill-slits like a fish unless it is recapitulating its evolutionary story?

6. *The Evidence from Comparative Anatomy.*—The anatomical similarities between the many different species of vertebrate are striking. As Darwin wrote: "How inexplicable is the similar pattern of the hand of a man, the foot of a dog, the wing of a bat, the flipper of a seal, on the doctrine of independent acts of creation?"

7. *The Evidence from Vestigial Characters.*—There are structures in the human body which are meaningless unless regarded in the light of evolutionary history. The appendix, for example, is useless to man, but important to certain herbivorous mammals; in the inner corner of our eye there is a vestige of the third eyelid found fully developed in birds and rabbits; the muscles whose function it is to move the ear in more primitive mammals no longer work in most men.

Modern Darwinism.—The present status of Darwinian theory is best summed up in the words of Professor Neville George, who writes in his *Evolution in Outline*: "A sharp distinction must be made between the two aspects of Darwinism. As an alternative word for biological evolution, or as an expression of the fact that evolution enters into the ancestral history of animals and plants, it is unexceptionable, and is indeed the central theme of current biology. But as implying a particular kind of evolutionary mechanism which Darwin favoured, it is by some scientists regarded as erroneous and by many others are inadequate. During the present century its deficiencies in genetics have been met by Mendelian theory, the synthesis of Darwinian natural selection and Mendelism being known as Neo-Darwinism."

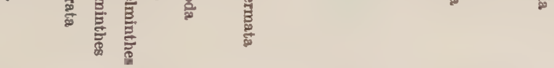
We may, therefore, conclude: (1) That evolution is an undoubted fact. (2) That "natural selection"—the "survival of the fittest," as described by Darwin is also an undoubted fact. But (3), many scientists doubt whether natural selection is *in itself* capable of explaining the evolution which has occurred (*i.e.*, whether the accumulation of *small* and *continuous* variations is the most important mechanism whereby evolution occurs).

THE CLASSIFICATION OF ORGANISMS.

The structural unit of nearly all organisms is the cell. This essentially consists of a minute amount of living substance, the cytoplasm, which contains a single, often spherical structure, the nucleus. The latter controls the activities of the cell and also carries the hereditary factors or genes (F30). In animals the cell is bounded by a thin, flexible membrane, but in most plants there is a rigid cell wall composed primarily of cellulose. There are many uni-cellular, microscopic animals and plants, as well as thousands of multi-cellular ones of diverse kinds. The naming and classifying of this vast assemblage of living things has received the attention of man for centuries. At first the main interest was a practical one, to recognise those which were useful as food, fuel, and medicine and also those which were harmful or poisonous to human beings. With the exploration of the earth by Western man so many new types of animals and plants were found and brought back to Europe that a uniform system of naming and classification became imperative, and over the last 300 years such a system has been slowly built up. It was soon realised that some species were very similar and could be grouped together in what are now known as genera and that these could be grouped together into recognisable families and so on. With the general acceptance of Darwin's conception of evolution a new element was introduced into the problems of classification. Obviously a satisfactory classification of a group of organisms should reflect the past history or evolution of that group. Thus the aim of the present-day taxonomist who is concerned with such matters is to produce a natural classification based on phylogency or true relationships. Our knowledge of this must always be incomplete, even if only because of the incompleteness of the geological record. Hence there is no finality in any proposed classification, which may have to be drastically modified as new facts about all aspects of living things are discovered.

CLASSIFICATION OF ANIMALS.

As indicated in the chart, the animal kingdom is usually divided into two groups, the invertebrates and the vertebrates. The former includes a number of distinct groups which are arranged in order of complexity. However, this arrangement does not necessarily indicate close relationships between them. Strictly the invertebrates are to be distinguished from the chordates, *i.e.*, animals possessing a longitudinal skeletal structure, the notochord. In two small groups, the hemichordates and the urochordates, this structure is still present, but in the largest group, the euchordates or vertebrates, the notochord is replaced by a cartilaginous or bony backbone. The five groups of living vertebrates are clearly distinct, but the fossil record indicates that the order in the chart reflects their evolution in time. Thus the first true vertebrates were the fishes, and from these arose the amphibia. The amphibia gave rise to the reptiles, and both the birds and mammals evolved from different unspecialised reptilian stocks.



Protozoa.—These are all microscopic animals which are unicellular, though some may have more than one nucleus and others form colonies. Many are able to swim by waving hair-like flagella or cilia. Others, such as *Amœba*, exhibit a kind of flowing movement, parts of the cell putting out pseudopodia which are followed by the rest of the cell. Protozoa are found in all types of habitat, they are abundant in the soil and fresh-water, and many of the most beautiful forms occur in the floating plankton of the seas. Others are important diseases of man, and include *Trypanosoma*, which causes sleeping sickness, and *Plasmodium* the malarial parasite.

Porozoa.—The sponges are fixed, multicellular aquatic animals, most of which are marine. Basically a sponge consists of a central cavity surrounded by two layers of cells, although the body may be branched and plant-like in form. Between the two layers of cells is a thin, gelatinous tissue containing calcareous or siliceous spicules which may be fused to form a rigid skeleton. Water is drawn in through many inhalant apertures and is passed out of the single apical exhalant aperture. Minute food particles present in the water are ingested by the inner wall cells.

Cœlenterata.—These are aquatic animals with a two-layered wall surrounding a central cavity which has only a single opening. This mouth is often surrounded by tentacles which bear many specialised stinging cells. A few live in fresh water, such as the solitary *Hydra*, but most are marine. The corals are colonial, and the remains of their calcareous skeletons form the large reefs and atolls common in the Pacific Ocean. Other familiar members of this group are sea-anemones, jelly-fish, and the floating Portuguese-man-of-war.

Platyhelminthes.—These are the worms which have soft, bilaterally symmetrical, and usually flattened bodies. The body tissue originates from three embryonic cell layers, and no body cavity is present. Some have a mouth and digestive tract, but these may be absent, and there is no blood system. The group includes the small fresh-water, free-living flatworms and also internal parasites, such as the liver-fluke which attacks sheep and the tape-worms which live in the gut of dogs, poultry, and man.

Nemathelminthes.—The round worms may be microscopic or up to 2 ft. in length. The body is smooth and pointed at both ends and has a digestive tract but no body cavity or blood system. Although they can move actively, they are unable to progress in any direction. The round worms occur everywhere, in water, in soil, and some, such as *Ascaris*, are parasites in the gut of various animals.

Annelida.—These are the worms with segmented bodies. Due to this feature, waves of muscular contraction can occur along the length of the body, and directional movement is possible. Usually they have a digestive tract open at both ends, a body cavity, and a blood system. The group includes the common earthworm *Lumbricus*, many marine worms, and the leeches.

Arthropoda.—This large group of animals has the general characters of the annelids, but there is usually a hard exoskeleton, each segment bears a pair of appendages which may have various functions, and the blood is contained in the body cavity. Further, they possess a simple " brain " at the front end of the body. The most important classes are:

Crustacea.—Mostly true aquatics which have two pairs of antennæ. Included here are the crabs, shrimps, wood-lice, water-fleas, and the sedentary barnacles.

Myriopoda.—These are the millepedes and centipedes which have only one pair of antennæ and numerous pairs of legs.

Insecta.—This is the largest of all animal groups with over 100,000 species. The body has a head bearing one pair of antennæ, a thorax of three segments, each bearing a pair of legs, and an abdomen. Usually the adult possesses wings. Cockroaches, locusts, grasshoppers, earwigs, lice, dragon-flies, aphids, moths, butterflies, beetles, flies, bees, wasps, and ants all belong to this vast group.

Arachnida.—These are mostly terrestrial, air-breathing forms with no antennæ and four pairs of legs, such as the scorpions, spiders, and mites.

Mollusca.—The molluscs are mostly aquatic and differ from the arthropods in having non-segmented bodies with restricted body-cavities. The exoskeleton is a shell. There are three important groups:

Lamellibranchiata.—These are the bi-valved shell-fish, such as the mussel, oyster, and scallop. The head is reduced, and no eyes are present.

Gasteropoda.—These molluscs are not symmetrical and possess a single shell. The head bears eyes and tentacles. Included here are the slugs, snails, limpets, and whelks.

Cephalopoda.—This is a group of highly specialised, free-swimming, marine molluscs which are bilaterally symmetrical. There is a definite head containing a brain and bearing a pair of large eyes similar to those of vertebrates. Cuttle-fish, the octopus, and the giant squids, which may reach 50 ft. in length and are the largest invertebrates known, are included here. The extinct Ammonites, the shells of which are commonly found in many rocks, were also cephalopods.

Echinodermata.—These marine invertebrates are all radially symmetrical and have a calcareous skeleton just beneath the surface. Included here are the star-fish, sea-urchins, and sea-cucumbers. The stalked, sedentary sea-lilies which inhabit the deep oceans are also echinoderms. They have a long geological history, and many extinct forms are known.

Pisces.—The fishes are all cold-blooded, aquatic, and possess gills by means of which they breathe. The body is covered with scales or spines and bears fins for balance and propulsion. The cartilaginous fishes, such as sharks, rays, and dogfish, have no bones in the skeleton, the gill-slits are exposed, and the skin is covered with many minute tooth-like spines. The much larger group of bony fishes have bony skeletons, the gill-slits are covered by a flap of tissue, and the body is covered with flat, overlapping scales. Many fossil fishes are known from as far back as the Silurian period.

Amphibia.—These are cold-blooded vertebrates which have to return to water for breeding. They show various advances over the fishes. Pentadactyl limbs are usually present, and the skull is jointed at its connection with the vertebral column so that the head can be moved. The eggs, which are laid in water, have no hard shell and hatch into a larval form with external feathery gills. With rare exceptions a metamorphosis takes place, the larva gradually changing into the adult, which possesses lungs. The skin of the adult is usually naked and may be important in assisting respiration. The class includes the newts and salamanders, which possess tails, and the frogs and toads, which have no tails in the adult.

Reptilia.—As has already been pointed out, the reptiles were the first vertebrates to become truly land animals. They are cold-blooded but have a more completely bony skeleton and more highly organised blood system than the amphibia. The egg contains much food material, which supports the developing embryo, and there is no larval stage. The present-day reptiles, snakes, lizards, turtles, tortoises, crocodiles, and alligators, are much smaller and far less numerous than those of the Mesozoic.

Aves.—The only diagnostic feature of birds is the possession of feathers, although the presence of scales on the legs, the structure of the skull, and the laying of eggs with shells are characters which indicate a reptilian ancestry. However, they show many specialised adaptations to the habit of flight. The fore-limbs are developed as wings for flapping and gliding, and the skeleton is rigid and light, with air cavities in the bones. The body i

compact and streamlined and the weight is centralised beneath the wings. As there is no bladder and the rectum is short, waste materials are not retained and the weight is thereby further reduced. The power necessary for flight requires a high metabolic rate, the maintenance of which is assisted by a large heart with a high rate of beating, a very efficient respiratory system, and a constant body temperature of 38–42° C. The 19,000 or more species of birds can be divided into the perching birds, which include many of our song birds, those which scratch for their food, such as the pheasant, the waders, such as the long-legged stork and heron, the swimming birds, which include gulls, ducks, and geese, and finally, the large flightless birds, such as the emu and ostrich.

Mammalia.—The mammals are the dominant land animals of the present time. They are warm-blooded and have a glandular skin bearing hairs. The body cavity is divided into thorax and abdomen by a muscular diaphragm, the former containing the lungs and heart, which is completely divided into four chambers. The red corpuscles of the blood have no nuclei. The ear is divided into three regions, the middle ear containing three small bones. They all possess mammary glands with which they suckle their young. In the largest group of mammals, the *Eutheria*, the young develop within the uterus of the female and are born at an advanced stage. In the small group of marsupials of Australia and Central and South America, such as the kangaroos and opossums, the young are born at an early stage and transferred to a pouch round the mammary glands, where they remain for a considerable time. There are also two species of monotreme mammals, the duck-billed platypus (*Ornithorhynchus*) and spiny ant-eater (*Echidna*) of Australia, which lay eggs. It is impossible in the space available to describe the vast range of eutherian mammals, but the main orders may be briefly referred to as follows:

Edentata.—The American sloths, ant-eaters, and armadillos, which are mostly insectivorous and have incomplete dentition.

Cetacea.—These are the entirely aquatic whales, porpoises, and dolphins, which are fish-like in form and have no hind-limbs.

Ungulata.—A large group of hoofed mammals, most of which can run quickly on land. It includes the herbivorous pigs, sheep, antelopes, deer, camels, and giraffes.

Carnivores.—These are mostly carnivorous, have keen hearing, sight, and smell, and have sharp teeth and claws for killing and tearing their prey. The cats, dogs, bears, hyenas, and also the aquatic seals, sea-lions, and walruses belong to this group.

Rodentia.—The rodents are a highly successful world-wide group characterised by the possession of long, sharp, incisor teeth which are used for gnawing. The mouse, rat, squirrel, and rabbit are examples.

Insectivora.—Small, carnivorous, mostly nocturnal mammals, such as the shrews, hedgehogs, and moles.

Cheiroptera.—The bats are truly aerial mammals which have many of the adaptations to flight found in birds. The wings are, however, sheets of skin stretching between the fingers of the fore-limbs.

Primates.—Mainly arboreal, with opposable thumb and big toe for climbing. Nails instead of claws are present at the end of the digits. They have stereoscopic vision, which is important for judging distances when jumping. The brain is well developed. The primates include the small primitive lemurs, monkeys, the anthropoid apes, such as the chimpanzee, and man, *Homo sapiens.*

THE PHYSIOLOGY OF MAN.

Digestion.—Animals, unlike plants, can exist only by taking in and digesting organic material—that is say, the dead bodies of other animals or plants. The necessary materials which they must aborb from their food come under the three categories of protein, carbohydrate, and fats. Proteins are the body-building foods, the "spare parts" if we think in terms of a machine, which are found in lean meat, nuts, cheese, and egg. Carbohydrates, the starches and sugars, are found in fruits, grains, and so on; they are fuel foods, the petrol of the body-engine. Finally, fats, found in animal and vegetable oils and fats, form the insulating system of the living machine. In addition to these, water, vitamins (see in Medical Section), certain inorganic salts, and minute quantities of certain metals (iron and calcium) are necessary to life. Dieticians measure the value of food (*a*) in terms of the necessary amounts of these basic foodstuffs, and (*b*) in terms of its energy-giving value. The average man or woman engaged in light work requires 3½ oz. of protein, 3½ oz. of fat, and 16½ oz. of carbohydrate daily, and such a diet, in terms of energy, provides nearly 3000 Calories; an individual doing heavy work may require 6000 or more Calories daily. (It must be emphasised that an adequate diet must supply *both* the requisite number of Calories and the correct *proportions* of the basic foods.) (*See* Diet in Medical Section.)

Enzymes.—Food, of whatever sort, is broken down in the digestive tract—the stomach and small intestine—into the few simple materials which the body can make direct use of. Fats end up as the so-called fatty acids and glycerine, carbohydrates as glucose and fructose, and proteins as amino-acids. The most elegant meal thus ends up in the same forms as the most humble, and this is the scientific explanation of the observation which troubled the poet:

> "It's a very odd thing, as odd as can be,
> That whatever Miss T eats turn into Miss T."
> (Walter de la Mare.)

The substances which bring about this breakdown which we known as digestion are known as enzymes, a word which means "in yeast," because it was in yeast that they were first discovered. The enzyme in yeast is, as we know, used in the baking of bread and in brewing, because of its property of breaking-down starch into sugar and alcohol; in the process it liberates carbon dioxide gas, which can be used to leaven bread. The enzymes in the digestive tract of animals, pepsin, rennin, tryspin, steapsin, and others, each perform a specific function in breaking down individual food substances. A very large number of enzymes, each producing different types of effect, have been found in nature in every kind of living thing; they exist in every tissue, and are as necessary to plants and bacteria as to the more complex animals. Life is a matter of enzymes, for nearly all vital processes take place through their activity, and it is an extraordinary demonstration of the essential unity of life that the simplest organisms possess enzymes which are very similar in nature and even in number to those of the highest. For example, a single bacterium so small that it would take about 300 million million to weigh 1 oz. may have in its protoplasm several hundred distinct types of enzyme, or even a thousand or more. It has recently been found that such drugs as the sulphonamides and the antibiotics (penicillin, streptomycin, aueomycin, etc.) produce their fatal effect upon certain bacteria by putting their enzyme systems out of order.

Environment, Internal and External.—Absorbed into the blood-stream, the amino-acids, fatty acids, and glucose go each to their appointed place: the amino-acids to replace damaged or aged tissue-cells, the fatty acids to the fat stores of the body, and the glucose to the liver, where the excess over what is required is stored in the form of glycogen. Broken-up and useless protein (nitrogenous) material is excreted through the filters of the kidneys in the form of

urea and uric acid. The body always works as a unit, and shows a remarkable ability to maintain a constant balance between its constituent substances and to compensate when its balance is upset. This tendency is described by the physiologist Cannon as "homeostasis." Although the body-balance is constantly being disturbed both by the breakdown of its own tissues and by changes in the surrounding environment, immediate steps are always taken to maintain a state of adjustment. When food material is used up the stomach muscles begin a series of rhythmic contractions which are consciously appreciated as a feeling of hunger and followed by the search for more food to redress the lost balance. Violent exercise necessitates the taking in of more oxygen, and automatically the organism breathes more rapidly; excess heat is produced and, in order to disperse this into the atmosphere, the tiny blood-vessels of the skin dilate, causing more heat to be given off, so that the body-temperature remains almost constant. In cold weather, when heat has to be retained, the blood-vessels contract, the skin becomes pale, and heat-loss is reduced. If we drink a lot, the blood might be expected to become diluted, but the excess water is excreted by the kidneys, leaving the chemical constitution of the blood unchanged; conversely, when water is lacking, the urine excreted is small in amount and concentrated. Within a great variety of changing circumstances the body-balance is maintained.

The System of Defence.—The red cells of the blood are mainly concerned with the transport of oxygen, whilst the white cells, which are normally in the proportion to the red of 1 to 500, are of various types, all concerned with defence. Bacteria entering the body exert their harmful activity through the poisonous toxins which they excrete, and one type of white cell has the function of producing antitoxins—substances which neutralise the bacterial toxins. Yet another type of white cell produces antibodies which act upon the germs, causing them to coagulate into clumps which are more easily dealt with by the third type of white cell, the phagocyte, which absorbs bacteria in much the same way as an amœba digests other small plants or creatures. Bacterial invasions of the body are a battle which either side may win or lose, and there are always casualties; in the case of an infected wound, for example, the pus which exudes from the surface is largely composed of the bodies of white cells which have perished in the struggle. This defensive system is the theoretical basis upon which is built much of the preventive medicine of modern times. When, for instance, a person is inoculated against typhoid, what we are, in fact, doing is to inject into him a carefully calculated dose of dead typhoid germs which will cause his body to respond with the production of antitoxins and antibodies. In the case of any typhoid infection these may destroy the germs completely or, at the worst, ensure that the infection is a very mild one. On the other hand, we can inject animals with the disease, causing them to produce antitoxins which are then withdrawn in the blood-plasma and injected into a person who is either already ill or has recently been exposed to infection. Whereas the former method produces what is known as "active immunity," the latter leads to a more temporary state of "passive immunity." Active agents are known as "vaccines," passive ones as "sera," the plural of the word serum. In some cases—*e.g.*, in the case of the new B.C.G. vaccine against T.B.—the patient is actually injected with live germs which have been bred to produce a weak strain harmless to the individual but nevertheless capable of producing immunity when they are injected.

The Nervous System.—Perhaps the simplest way of understanding the nervous system, which has the function of correlating all the activities of the complex mechanism we have been discussing, is to regard it as a hierarchy of control similar to that found in a factory or the army. All the more important messages reach the Board (the cerebral cortex or higher centres of the brain) along the sensory nerves (the incoming telephone system), and on the basis of this information the Board sends out directions as to what to do along the motor nerves (the outgoing telephone system). But, it need hardly be said, the arrival of *all* available information from below, so far from being a help, would be a nuisance, and to a considerable extent the various departments have to be autonomous and manage their own internal affairs. A prick from a pin causes the limb to be rapidly drawn away from the source of pain long before ever the message has reached the brain; for the incoming message goes at once to the spinal cord which automatically sends back the impulse to withdraw. This is an example of the simplest kind of nervous action described as a spinal reflex. A more complex type of automatic control is seen when we attempt to learn skating or cycling: in this case we begin by painfully and deliberately carrying out the appropriate actions, which, at this stage, are initiated by the cerebral cortex. But as we improve the actions are taken over by the lower centres in the cerebellum and elsewhere, which act as an automatic pilot in an aircraft, and we cycle or skate without conscious effort. It is therefore a principle of nervous action in the more complex animals that the higher centres should not be troubled with what can equally or more effectively be carried out by the lower ones.

Autonomic Nervous System.—That part of the brain which we have described as the hypothalamus is the control centre of the most primitive nervous system: the automatic nervous system, which takes the form of certain nerve chains lying at the back of the chest and abdomen. The familiar term "solar plexus" refers to one of the ganglia or knots of nerve cells upon this chain, which possesses many such ganglia scattered throughout its length. Whereas the nerves of the central nervous system are either sensory or motor in function, the nerves of the autonomic system are divided into what are described as sympathetic and parasympathetic groups, the former concerned with preparing the organism for emergencies, the latter with preparing it for relaxation. When the organism meets a dangerous situation, it has only two possibilities of action—fight or flight—and the sympathetic division of the automatic nervous system has the function of preparing it for such circumstances. It is this part of the nervous system which produces the rapid heart-beat, the dilated pupils, the pallor, and (in the case of hairy animals) the erect hair of the back and neck, all of which are the outward signs of fear and anger. There are also internal changes: an increased blood-sugar, an increase of blood-supply to the muscles with a reduced supply to the internal organs, and so on. All these changes, which result from the secretion of a substance known as adrenalin into the bloodstream under the influence of sympathetic stimulation serve a useful function to the organism—they increase its fighting efficiency, or, should the worst come to the worst, its ability to escape.

The parasympathetic division of the autonomic nervous sytem has an exactly contrary effect. Under its influence, the heart beats more slowly, digestion (which is inhibited by sympathetic action—hence the danger of eating when one is angry or worried) proceeds peacefully, the pupils contract, and the skin becomes flushed. The results of parasympathetic stimulation are seen at their most obvious in the baby after it has been fed at its mother's breast, or, a somewhat similar situation, in the gourmet who, after a large meal, is settling down to enjoy his cigar. The autonomic nervous system has only recently been fully investigated, and is of tremendous importance in understanding the so-called "psychosomatic disorders" such as angina pectoris, gastric ulcer, high blood-pressure, and so on, all of which are believed to be physical diseases due basically to chronic anxiety. The autonomic nervous system is, in fact, the physical basis of the emotions; the thalamus, the part of the brain in which emotions become conscious.

Hormones.—The sexual characteristics of men and women are controlled by secretions from the sex-glands. These secretions are examples of

the important class of physiological substances known as hormones which have a profound influence upon the body functions, structure, and even the personality of the individual. The thyroid gland in the neck produces a hormone named thyroxin which, when secreted in excess, causes the individual to become thin, excitable, flushed, and nervous; when, on the other hand, the secretion is lacking, as in the disease of myxodema, the patient becomes slow, stupid, and emotionally dulled. The suprarenal glands, which, as the name implies, lie above the kidneys, produce several hormones, one of which, adrenalin, we have already described in connection with the autonomic nervous system. Adrenalin enables the individual to face an emergency, to fight or run away. Another suprarenal hormone, cortisone, has recently produced dramatic results in the treatment of certain diseases; it is mentioned in the Medical Section. All these glands have this in common, that they secrete their hormones directly into the bloodstream instead of by way of a duct; they are therefore known as the endocrine or ductless glands. The most important endocrine gland of all is the pituitary, which is about the size of a pea and situated just below the hypothalamic area in the base of the brain. The pituitary has been described as the "conductor of the endocrine orchestra," since it controls all the other glands, and more than any other gland it profoundly affects body-build and character. Pituitary defects or excesses may cause the individual to grow into a giant (gigantism or acromegaly); to grow monstrously fat; to become a human skeleton; to be a wizened dwarf or a child who never grows up. Here again, as in the case of the autonomic nervous system we find ourselves on the narrow border-line between physiology and psychology.

THE PHYSIOLOGY OF OTHER ANIMALS.

Digestion.—What we have said about the structure and function of the human body applies very closely to the other mammals. It may be useful to note, however, some of the variations which have resulted from adaptation to widely divergent ways of life. In the case of digestion, for example, there are characteristic differences between the digestive systems of animals which are carnivorous and those which are herbivorous. All herbivorous animals have flat grinding teeth for crushing their food, and sheep have no front teeth in the upper jaw, the teeth being replaced by a horny plate against which it clips off the blades of grass with the lower teeth and swallows them immediately. The stomach of sheep and other animals that chew the cud consists of four separate compartments, and the food swallowed during grazing enters the first two compartments, in which it is stored and softened. After eating, the sheep settles down quietly to "chew the cud"—a process in which the food from the first two compartments of the stomach is returned to the mouth for further chewing; it is then returned through the first two into the third compartment, and returned again. Finally, it reaches the last, the true stomach, where it is digested by the gastric juices. Carnivorous animals need sharp tearing teeth, and as their food is largely protein, and protein digestion begins in the stomach, they gulp their food down, as one may observe in a dog.

The amœba eats simply by flowing round and absorbing food-particles, and even in more complex animals such as the hydra, the body-cavity and digestive tract are identical. Earth-worms, however, have a more complex digestive tract consisting of mouth, pharynx, crop, and gizzard (in which the humus upon which they feed is crushed into a soft pulp) before entering the intestine. This sort of arrangement is very similar to what is found in birds in which the food from the mouth (which is without teeth) passes down the œsophagus to be softened and stored in the crop. From the crop it enters the stomach to mix with the digestive juices, and then passes on to the gizzard, which has thick muscular walls and contains stones which the bird has swallowed and which take the place of teeth. In the gizzard the food is ground to a pulp.

In birds there is no separate excretion of urine and fæces, and the fæces contain waste matter from both intestines and kidneys which passes out through a single tube or cloaca, which is also the tube by which impregnation takes place and by which eggs leave the body. Bird fæces are rich in nitrogenous materials and, in the form of guano, are a valuable manure.

Movement.—Movement in the mammals is usually upon land, but we have the interesting exceptions of seals, sea-lions, walruses, and whales, in which the limbs have become modified to form flippers for swimming in water. Nevertheless, these flippers in their bony structure correspond, bone for bone, with the limbs of land animals. The limbs of bats have been even more drastically modified for progression in the air; in this case the bones of both fore- and hing-legs have become encased in the covering of skin which forms the wing. Other, although slighter modifications, are seen in the use made by monkeys and man of the fore-limbs for manipulation of objects; man, however, is the only mammal which does not use the fore-limbs for walking at all.

Reproduction.—Of course, all mammals, in common with birds, reptiles, amphibia, and indeed the vast majority of living things, produce eggs within which their young develop. The only difference is that in the placental mammals the egg hatches out inside the mother and does not possess a hard shell. The human infant, for example, develops within a membrane which resembles a cellophane bag filled with fluid in which the infant floats, and when we read of a baby being born in a "caul" this means that the bag did not rupture before birth as is usually the case. The child, in fact, was born in an egg-shell. Both birds and reptiles lay eggs upon land where they need protection, therefore they usually have a hard, or at any rate a leathery, shell; in the case of birds the egg needs to be kept warm by the parent's body and the offspring has to be fed, but reptiles usually live in hot climates and trust to the heat of the sun to hatch their eggs, after which the young are ignored. The young of reptiles are capable of looking after themselves immediately after birth, so reptiles, unlike birds, have few parental responsibilities. It is obvious, too, that all animals living upon land must reproduce themselves in such a way that fertilisation takes place within the mother's body; their mode of sexual intercourse, therefore, assumes more or less the same pattern as in the mammals. In the case of frogs and other amphibia, however, although copulation takes place with the male lying on top of the female's back and grasping her around the chest, fertilisation actually takes place just outside their bodies in the water as both simultaneously set free the male and female sex-cells.

By the time we reach the level of the fishes the possibilities of love between the sexes and parental care of the offspring become even less; for, although some fishes like the stickleback build nests which are guarded by the male, the eggs of most fishes are fertilised in the water. The female ejects the eggs at random to fall to the bottom of the pool or the ocean bed, and the male later sprays the "milt" or male sex-cells over them to produce fertilisation.

Further peculiarities of sexual reproduction may be noted amongst the insects. In the ant, for example, the male and female go on a "nuptial flight," during which the female is fertilised; the male is short-lived, and neither male nor female use their wings on any other occasion. On this single occasion, the female takes into her body enough spermatozoa to last her for the rest of her life as a queen. As the thousands of eggs pass out of her body, some are fertilised by the sperms and others not, the fertilised eggs developing into male and females in the usual way, the non-fertilised developing into workers which are sterile or neuter females. Ants, as in the case of butterflies, bees and wasps, and other insects, pass through a complicated life-history; the eggs hatch into grubs or caterpillars, these later build cocoons or chrysalises (which are often mistakenly described by the sellers of fish-foods as "ant's eggs"), and from the cocoon arises the full-grown insect. But worker ants are not the only animals

which can develop without fertilisation—even animals as high in the evolutionary scale as frogs can develop from eggs which have been specially treated in salt solution or pricked with a needle. Such individuals therefore have only one parent, the mother.

Still lower down the scale, we find that worms and snails are bisexual—that is to say, both male and female sex cells are present in the same individual. When copulation takes place, each individual fertilises the other. Finally, at the simplest levels, we have the asexual reproduction of the amœba, which simply divides into two. Other single-celled animals, such as the slipper animalcula, paramecium, can reproduce both sexually and asexually.

Respiration.—Respiration occurs by various methods in different animals species, from the amœba and other single-celled animals which depend upon direct absorption of oxygen dissolved in the surrounding water to the complex breathing systems of larger creatures. Worms, like amœbæ and other simple creatures, absorb oxygen directly through the skin and transport it by means of hæmoglobin, which, as in man, is the oxygen-carrier of the blood. The hæmoglobin of worms, however, is dissolved in the plasma, and is not, as in the higher animals, contained in red cells. The bodies of insects are covered in a hard, horny armour made of a substance known as chitin, and they therefore cannot absorb oxygen directly as worms do. Nor is the oxygen carried in the blood-stream. Instead, they have a row of apertures or spiracles along both sides of the body communicating with thin branching air-tubes which ramify throughout the system to which they supply oxygen without the intervention of the blood-stream. The oxygen is forced in and out of the body by movements of the abdominal wall similar to the breathing movements of other animals.

The breathing-apparatus of the fish has to be modified for a life in water, and, as is well known, the oxygen-containing water is taken in at the mouth and passed out at the gill-slits. Beneath the gills there are rows of filaments richly supplied with blood which absorb oxygen and discharge carbon dioxide through their thin walls. The tadpoles of frogs and other amphibia also possess gills, which at first are external, and then, like those of a fish, internal. Finally, some time before the tadpole leaves the water, the lungs develop, and it has to come to the surface in order to breathe atmospheric air. Adult frogs breathe through their nostrils, and air is forced into the lungs by contractions of the floor of the mouth (this, of course, is why the floor of a frog's mouth can be observed to move constantly up and down). But, even when fully-grown, frogs absorb additional air both through the lining of the mouth and through the damp skin.

In birds, breathing is adapted to the necessity of flying and a life of great activity. Muscular contraction of the chest wall produces expiration, not inspiration, as in the case of mammals. The lungs do not expand, and the excess of inspired air is stored in air-sacs outside the lung itself, but communicating with the lungs. When a bird breathes in, fresh air fills both lungs and air-sacs, and the oxygen is absorbed within the lungs as in mammals; on breathing out, the used air leaves the lungs, which are immediately filled with fresh air from the sacs. In the bird, therefore, *both* inspiration and expiration supply fresh air to the lungs—an important adaptation for such an active creature.

CLASSIFICATION OF PLANTS.

There are various ways in which the main classes of the plant kingdom can be grouped, but a simple, up-to-date arrangement is given in the chart. Vascular plants are often known as the *Tracheophyta* because they all possess woody conducting elements. These are absent in non-vascular plants, and the bacteria, fungi, and algæ are often called *Thallophyta*, *i.e.*, they have a relatively simple plant body or thallus. Many of the bryophytes also possess a thallus, but in some there is a stem bearing leaves, although a true vascular system is absent. Many thallophytes are aquatic, whereas the tracheophytes are mostly land plants in which the development of woody tissues can be related to the attainment of the land habit as the plant kingdom evolved. However, the chart should not be taken as indicating the evolutionary relationships of the various groups. It is more a convenient arrangement which reflects the relative complexity of the plant body.

Plant Kingdom

- Non-vascular Plants
  - Bacteria
  - Fungi
  - Algae
  - Bryophyta
- Vascular Plants
  - Psilopsida
  - Sphenopsida
  - Lycopsida
  - Pteropsida
    - Filicinae
    - Gymnospermae
    - Angiospermae
      - Monocotyledones
      - Dicotyledones

Bacteria.—This is a vast group of minute organisms of very simple structure. They are spherical or rod shaped and may exist as separate cells, some species being motile, or as long chains or irregular masses. Their minute size makes the elucidation of their structure very difficult. There is a wall of unknown composition, and cytoplasm which contains glycogen and fat. Electron-microscope studies have revealed the presence of structures which appear to consist of nuclear material. Multiplication is by simple division, which may take place very rapidly. For example, *Bacillus subtilis* can divide every 20 minutes, so that in 8 hours a single cell may give rise to 16 millions. Recent research indicates that a sexual process may also occur. Bacteria can survive unfavourable conditions by producing a resistant spore within the cell. They do not possess chlorophyll, though a few are pigmented. Most obtain their food already formed, and are thus either saprophytes or parasites. The saprophytic bacteria occupy a vital position in the living world. They are responsible for most of the decay of dead organic matter, and it has been truly said that without them the surface of the earth would soon become completely covered with the dead bodies of animals and plants. Bacteria also play a vital part in the circulation of nitrogen in nature. By breaking down organic material ammonia is released and ammonium carbonate is formed in the soil. This is oxidised by other bacteria to form nitrates, which can be absorbed by plants again. Yet other bacteria can "fix" atmospheric nitrogen, and one species, *Rhizobium leguminosum*, occurs in the root nodules of plants such as clover and lupins. These plants are often grown on poor soils and ploughed in, thus improving the fertility of the soil. The parasitic bacteria are also of great importance, as they are responsible for many diseases of plants, animals and man.

Fungi.—This is a large group of plants, none of which contain chlorophyll. Hence, like the bacteria, they are either parasites on other living plants and animals or saprophytes which live on dead organic matter. Some are unicellular

aquatic plants, but many have a body called a mycelium composed of many branched threads or hyphæ. In the higher fungi (*e.g.*, toadstools, bracket fungi, and puff-balls) complex reproductive structures are formed. All fungi produce spores. In the aquatic species these may be motile, but the majority form minute, airborne spores. The spore output is often very great, and a single mushroom may produce 1,800 million spores. Some fungi are serious diseases of crop plants, such as potato blight and wheat rust.

Algæ.—These are essentially aquatic plants which contain chlorophyll. They range from microscopic forms to the large seaweeds. The green algæ (*Chlorophyceæ*) live mostly in fresh water and may be unicellular, motile or non-motile, or filamentous, though a few found in tropical seas are more complex. The brown algæ (*Phæophyceæ*) are mostly seaweeds which possess a brown pigment, fucoxanthin, which masks the green chlorophyll. They include the bladder-wracks (*Fucus*) and kelps (*Laminaria*) of our coasts and the seaweeds which form dense floating masses over hundreds of square miles of the Sargasso Sea. Other groups are the red algæ (*Rhodophyceæ*), mostly seaweeds of delicate form, the unicellular motile diatoms (*Bacillariophyceæ*), and the blue-green algæ (*Cyanophyceæ*). All algæ possess unicellular reproductive organs. Various types of life cycle occur, the most complex being found in the red algæ.

Bryophyta.—These are the liverworts (*Hepaticæ*) and the mosses (*Musci*). They are all small plants characterised by a sharply defined life-cycle. This consists of an alternation of generations, the "plant" being a gametophyte bearing sex organs. The latter are multicellular, the female archegonium containing a single stationary ovum and the male antheridium producing many motile sperms. The latter are released and swim in water to the archegonium, where fertilisation takes place. After this a sporophyte is formed which is always dependent on the gametophyte and never becomes free living. The sporophyte usually consists of an absorbing foot buried in the tissue of the gametophyte and a stalk or seta bearing at the top a single sporangium. In many mosses this is a complex structure with hygroscopic teeth which move apart only when dry, thus releasing the minute spores only when conditions are suitable for their dissemination in the air. The bryophytes are of little economic importance, and may be looked upon as an evolutionary side-line. However, they occupy suitable "niches" in many plant communities, and species of the bog-moss *Sphagnum* cover large areas where rainfall is high.

Psilopsida.—This is a small group of primitive, vascular, spore-bearing plants. Its only living representatives are two rare genera of the Southern Hemisphere. However, a number of fossil forms are known from the Devonian period. The best known are those found in the chert at Rhynie in Scotland. The plants are excellently preserved, and their internal structure can be easily seen. They were probably marsh plants with prostrate and erect leafless stems, although *Asteroxylon* had simple leaves.

Sphenopsida.—The only living members of this group are about twenty-five species of horsetails (*Equisetum*). In the Carboniferous period many tree forms existed (*e.g.*, *Calamites*), the remains of which are very common in coal deposits.

Lycopsida.—In the Carboniferous period the tree clubmosses were also prominent members of the forests (*e.g.*, *Lepidodendron*). They often reached 100 ft. in height, were branched or unbranched, and had large simple leaves. They also had extensive root systems. The only living members belong to a few genera of small herbaceous clubmosses, such as *Lycopodium* and *Selaginella*. Like the true mosses, they have an alternation of generations, but the elaborate plant with stem, leaves, and roots is the sporophyte, and the gametophyte is very small. In *Lycopodium* only one kind of spore is produced, and the resultant gametophyte is bisexual. *Selaginella* produces numerous small microspores which give rise to the very reduced male gametophytes and motile sperms and the few large megaspores which produce the female gametophytes. The latter are formed within the megaspore wall, which splits to allow the sperms to reach the small archegonia.

Filicinæ.—These are the true ferns, which in some classifications are put with the horsetails and clubmosses in the Pteridophyta or vascular cryptogams (*i.e.*, vascular plants without seeds). The ferns have a long fossil history, and remains very similar to the living Royal ferns (*Osmunda*) are known from the Carboniferous. The ferns are widespread and particularly abundant in tropical forests. The majority are herbaceous perennial plants, but a few are aquatic, and there are some tree ferns, which may reach 20 ft. in height. Most ferns possess a stem bearing roots and large leaves or fronds. The plant is the sporophyte and produces numerous spores in sporangia borne on the fronds. Each spore gives rise to a minute green free-living gametophyte known as the prothallus, which bears the archegonia and antheridia. After fertilisation a young sporophyte develops, which at first draws nourishment from the prothallus. Thus, as in the *Bryophyta*, external water is essential for the motile sperms to swim in, and there is a clearly defined alternation of generations, but the sporophyte is a complex independent plant, and the gametophyte is reduced though free-living.

Gymnospermæ.—These were the dominant land plants in the Mesozoic era, although fossil remains are found as far back as the Devonian. The living members still form large forests in the North Temperate regions. They are mostly tall evergreen trees with roots, stems, and small leaves. The conifers include the pines (*Pinus*), larches (*Larix*), and yews (*Taxus*). The cycads are a relic group of tropical plants with thick, unbranched trunks and large fern-like leaves. The maiden-hair tree of Japan (*Ginkgo biloba*) has also had a long geological history. Another interesting Gymnosperm is *Metasequoia*, a genus well known to palæobotanists. In 1948 a few living specimens were found in a remote area of China. Seeds were collected and plants are now being grown in botanical gardens all over the world. The Gymnosperms are characterised by the production of "naked" seeds, which are usually borne on cones. The male pollen grains, which are equivalent to the microspores of *Selaginella*, are carried by wind to the ovule of the female cone. The pollen germinates and the pollen tube carries the male gametes to the reduced archegonia borne on the female prothallus, which, unlike those of the ferns, is retained within the ovule on the parent plant. After fertilisation an embryo is formed, the prothallus becomes the food store or endosperm, and the outer part of the ovule becomes the seed coat. The cycads and *Ginkgo* retain a primitive feature in that the male gametes are motile and they swim to the archegonia from the pollen tube.

Angiospermæ.—The apparent sudden rise of the Angiosperms in the Cretaceous period is still the "abominable mystery" it was to Darwin. Various suggestions have been put forward, but nothing definite is known about the origin of the group. The Angiosperms or flowering plants are now the dominant group over most of the land surface of the earth, and at least 250,000 species are known. Apart from the natural vegetation, the majority of our crop and garden plants are Angiosperms. They occur in every type of habitat and range in form from gigantic trees to minute plants, such as the duck-weeds. Some are climbers, others succulents, and a number have reverted to the aquatic habit. Although most possess chlorophyll, a few are partial (*e.g.*, Mistletoe) or complete parasites (*e.g.*, Dodder).

The diagnostic feature of the group is the production of seeds, which are completely enclosed within the female part of the flower, the ovary. Basically a flower is a short reproductive shoot which bears several whorls of lateral organs. At the base are several, often green, protective sepals forming the calyx, and above this are the

often brightly coloured petals of the corolla. Within this are the stamens of the andrœcium or male part of the flower. Centrally is the female gynœcium of one or more carpels containing the ovules. The parts of the flower may be free, as in the buttercup, or fused together. In many species the petals are fused (sympetalous), the stamens are borne on the corolla (epipetalous), and the carpels are fused to form a compound gynœcium (syncarpous). The stamens possess anthers, which produce pollen grains. These are shed and carried by insects or wind to the receptive stigmas of the carpels. Each produces a tube which grows down the style to the ovary and enters an ovule. The ovule is a complex structure containing an ovum and a primary endosperm nucleus. Two male nuclei are discharged from the pollen tube, one fuses with the ovum and the other fuses with the primary endosperm nucleus. After this "double fertilisation" an embryo is formed which is embedded in the nutritive endosperm and the outer tissues of the ovule form the seed coat or testa. The ovary of the carpel develops into the fruit containing the seeds. Fruits are of various kinds, being either dehiscent and opening when mature to release the seeds or indehiscent, with a succulent or dry wall. The indehiscent fruits are shed as a whole, and often contain only a single seed. Seeds and fruits show great variation in structure, and often have adaptations assisting dispersal. Some have hairs or wings which aid wind dispersal, whereas others have hooks or are sticky and are transported by animals. Some have flotation devices and may be carried a great distance from the parent plant by water. Seeds vary in size from the microscopic seeds of orchids to those of the double coconut, which may weigh 40 lb. Only about 10% of the weight of a seed is water, and the embryo, although alive, is dormant. The bulk of a seed consists of stored food material, commonly fats or starch and proteins, which may be contained in the endosperm surrounding the embryo, although in some species the endosperm is absorbed during seed development and the food is stored in the one or two swollen seed leaves or cotyledons of the embryo.

John Ray (1627–1705) was the first botanist to recognise the two great divisions of the Angiosperms—the dicotyledons with two seed leaves and the monocotyledons with only one. This primary division of the flowering plants has stood the test of time and is still recognised. Other differences are also found between the two groups. The dicotyledons usually have net-veined leaves and the floral parts are in fours or fives, whereas the monocotyledons usually have leaves with parallel veins and the floral parts are in threes.

THE PHYSIOLOGY OF SEED PLANTS.

When a dormant seed is planted it takes up water and dissolved oxygen from the soil and germinates. Early growth is dependent on the food reserves present in the seed, but when these are exhausted the young plant becomes self-supporting. The root hairs absorb water and simple inorganic compounds of nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, and iron. These, together with certain trace elements, such as boron and manganese, are essential for healthy growth. The water passes up the woody tissues of the root and shoot, and a great deal is lost by evaporation through the stomatal pores present in the leaf surfaces. In most plants the stomata are only open during the day, and it is through these that gaseous exchange also takes place. Oxygen is taken up from the atmosphere and carbon dioxide is given out due to respiration. In photosynthesis light energy from the sun is absorbed by the green chlorophyll in the leaves and is used in the photolysis or splitting of water molecules. The hydrogen of the water combines with carbon dioxide, and organic compounds are formed, while the oxygen is given out. Thus green plants are unique in the living world in being able to synthesise organic compounds from carbon dioxide and water, and it is upon this process that all life ultimately depends.

Like all organisms, plants react to their environment in many ways. They exhibit many growth movements or tropisms. For example, stems are commonly positively phototropic and grow towards light, and they are also negatively geotropic and grow away from the centre of gravity. Many roots are positively geotropic and also positively hydrotropic and grow towards water. Some plant organs also exhibit nastic movements and can assume various positions. Thus many flowers and leaves open out during the day and close at night.

THE MECHANISM OF HEREDITY.

The subject of heredity is a vast one, and no attempt will be made here to describe it in any detail. The most that can be attempted is to give a brief account of how characters are handed on from one generation to another—a discovery which is mainly due to the pioneer work of the Austrian monk Gregor Mendel (1822–84). Curiously enough, although Mendel was a contemporary of Charles Darwin, and had, in fact, discovered facts which would have been of the greatest use to Darwin in elaborating his theory of evolution, nothing was known of Mendel until his theory, published in obscure scientific journals, was brought to the public notice long after his death, in the early years of this century.

It had been known, of course, for many centuries that animals could be mated deliberately in order to produce offspring with the qualities desired by stock-breeders and farmers. But this process had been a haphazard one which by no means always produced the expected results. Mendel, in the garden of his monastery, was the first individual to experiment scientifically with heredity by deliberately observing the interaction of single specific characters. His most important experiments, which we shall describe here, were carried out on the ordinary garden pea, in which it is a relatively simple matter to distinguish several inherited characteristics: some seeds are round, other seeds wrinkled; some seeds are green, others yellow; some plants are tall, others dwarf. By deliberately fertilising one type of plant with the pollen of another, Mendel was able to observe how these characters were handed on.

The layman might suppose that such characters mingle to form others which are a compromise between the two—that the offspring of one tall and one short parent would be medium-sized; that green seeds crossed with yellow would result in greenish-yellow seeds. But this is not the case when we are dealing with pure characters. In his experiments Mendel first of all produced pure lines of dwarf and tall peas by constant inbreeding; these were tall and dwarf lines which bred true to type. He then crossed one with the other and found that the offspring were *all* tall; this is described as the F1 (first filial) generation. When the hybrids of the F1 generation were interbred, another generation—the F2—developed, in which tall and dwarf peas reappeared in the proportion of three tall to one dwarf; but further breeding showed that only some of these tall plants bred true and the others were hybrid. There were, in fact, two hybrid to one dwarf and one tall. This relationship is best expressed in the following diagram:

```
                    Tall crossed with Dwarf
                              |
                        Tall (hybrid)        (F1 generation)
                              |
      ------------------------------------------------------
      |                       |                           |
1 Tall (pure)           2 Tall (hybrid)            1 Dwarf (pure)     (F2 generation)
      |                       |                           |
      |            ---------------------------            |
      |            |          |              |            |
Tall (pure)     1 Tall   2 Tall (hybrid)   1 Dwarf    1 Dwarf (pure)
```

As the result of his experiments Mendel deduced that all characters are transmitted from parent to offspring as separate units which are arranged in pairs of contrasting factors or allelomorphs. The gametes or sex cells can each carry only one of such pairs: tallness or dwarfness, green or yellow seed-colour, wrinkled or round, but never both of the contrasting factors together.

Genes and Chromosomes.—Although Mendel did not know this at the time, these factors are carried on the genes strung along the bodies known as chromosomes within the nucleus of each cell. Every cell in the animal or plant body (with few exceptions such as the human blood-cell) has a nucleus, which when it is about to divide to give rise to another cell, breaks up into the chromosomes, which are tiny rod, comma, or globular-shaped bodies composed of many separate genes. In the ordinary cell-division by which the cells of the body multiply or replace each other, each chromosome divides down the middle, so that each daughter cell gets the same genes—that is to say, the same hereditary material. But, since sexual reproduction implies the union of two sex-cells from separate individuals, the number of chromosomes (which is constant for any one species) would always be doubling when male and female sex-cells meet if there were not some method by which this could be avoided. When, therefore, the sex-cells are formed, the chromosomes do not divide down the middle into two equal halves; instead, half of the chromosomes go to one cell and half to another, so that each sex-cell contains only half the number contained in the body-cells. The pure-bred tall peas carried in each body-cell two factors for tallness, so that when division for the sex-cells occurred each sex-cell had one factor for tallness, and the same applied to the pure-bred dwarf peas. Hybrids, on the other hand, had in their body-cells one factor for tallness and one for dwarfness, and when division for the sex-cells occurred, some gametes were left with a unit for tallness and others with a unit for dwarfness. So, if two hybrids were crossed, the possibilities for the offspring were: tall unites with tall, tall unites with dwarf, dwarf unites with tall, and dwarf unites with dwarf. According to the laws of probability, these various possibilities will occur in the statistical order 1 : 2 : 1, or, in other words, there will be one tall and one dwarf to every two hybrids. But the hybrid offspring will always look tall, for tallness is dominant to dwarfness, which is what is known as a recessive character. Therefore, in the F2 generation, there appeared to be three tall peas to one dwarf, although of these only one was a pure line. Of any pair of allelomorphs, according to Mendel's theory, one must be dominant and the other recessive—that is to say, when the two facts are mixed the dominant one is the one which influences the immediate result. In human beings, for example, brown eyes are always dominant to blue, and therefore two blue-eyed parents cannot have a brown-eyed child.

Evolution by Natural Selection and Mutation.—As we have elsewhere seen, some writers believe that evolution cannot be explained purely in terms of natural selection, which, says Professor Neville George, is a passive filter eliminating the "unfit" and then showing a bias in favour of those surviving, ". . . but it cannot induce structural novelties for future selection, and thus cannot initiate evolutionary lines." Novelties, according to de Vries and most modern biologists, can only arise by mutation—that is, by the drastic modifying of the genes, which occurs either spontaneously or by outside interference. It is now possible to produce mutations by means of drugs, X-rays, and so on, and some authorities have suggested that the supposedly spontaneous mutations are produced by "cosmic rays" reaching the earth from outside space. These rays have great penetrating power, and it is quite possible that they might produce such effects upon the sex-cells of animals or plants.

III. THE ORIGINS OF HUMAN SOCIETY

THE EARLIEST MEN.

In the last section we brought our study of life down to the period known as the Pleistocene and the four Ice Ages. It was during these ages that man first appeared upon the face of the globe somewhere about 700,000 years ago. Now, a period of 700,000 years is not a long time in terms of the sort of figures we were discussing in Part I of this section when we were dealing with the origins of the universe, but it is a very long time relative to the scale of recorded history. For example, it is only 500 years ago since Columbus discovered America, and 1,000 years ago Alfred was King of England and the Norman Conquest had not yet begun. When we go back to 2,000 years ago, British history does not even exist; for Britain was an unknown island—or, at any rate, an island known only by rumour and travellers' tales to a few educated Romans. A further step back to 3,000 years, and there was no Roman Empire—indeed, there was no city of Rome—and the only literate people in the world were the Chinese and the Egyptians. Finally, 5,000 years takes us right back to the beginnings of written history in Babylonia and Egypt, and earlier than this no written records exist; yet this is only a minute fraction of the period we are considering.

Four Phases of History.—It is convenient to divide the whole of human history into four main periods—or perhaps it would be simpler to say that there have been four main turning-points in the history of man. In the first period, which started at the beginning of the Ice Age 700,000 years ago, *Homo sapiens* (that is, modern man of our own species) was only one of a number of other types which we shall discuss later. For the present it is simplest to describe them as: (1) ape-men; (2) half-brained men; (3) full-brained men with ape-like faces. That is to say, some were species most closely related to the apes, others approached the human type but had smaller brains than *Homo sapiens*, and yet others had large brains but ape-like features.

At the beginning of this period man had learned to make tools of stone and perhaps wood and bone. He may have been able to speak, and later on discovered how to make fire. By the time the period was over (and this took 650,000 years—by far the largest part of human existence), *Homo sapiens* was monarch of all he surveyed and had eliminated his ape-like and half-brained rivals. Throughout all these many thousands of years man's home was in the warmer parts of Asia, Europe, and Africa, the areas south of those where frost in winter makes life uncomfortable. Neither man himself nor his more primitive associates had reached the New World of America.

The second phase lasted about 30,000 years, and ended about 6000 B.C. During this phase, man began to learn how to cook foodstuffs and he—or more probably his wife—acquired the knowledge of sewing and making clothes to protect himself from the extremes of weather. Perhaps this discovery had something to do with his advance from the warmer areas of Europe, Asia, and Africa into the colder North and finally across the Behring Straits into what is now America. He was a hunter, and after some hundreds of thousands of years invented the bow and arrow and domesticated the wild dog; still he knew little or nothing of the art of cultivating plants for food or domesticating cattle, fowls, sheep, and so on. These first two phases are known by archæologists as the Paleolithic or Old Stone Ages because the main material for making tools was stone. Together, the two phases fill more than 90% of the whole period of human history.

The third phase began, as we saw, about 6000 B.C., and was a stage of increasingly rapid progress in civilisation. Stone tools gave way to tools of bronze and, later, iron. Man passed through the New Stone Age (Neolithic), the Bronze Age, and the Iron Age. He domesticated farm animals, cultivated crops, and in place of the wandering hunter there was the farmer who had a more or less fixed abode. This phase, with its ever-increasing technical progress, has lasted

right up to a few years ago. The wind, animal, and water power prevalent until the eighteenth century gave way to the steam engine, electrical power, the world of steel, concrete, and artificial materials of the twentieth century. Although in time the phase occupied less than 1% of human history, it was man's greatest hour. He obtained an ever-increasing control over nature, over other animals, plants, materials—over everything except, perhaps, his own nature. In some ways he became, as time went on, more humane to his fellow-man, less war-like, more civilised—or so he thought—throughout the nineteenth century and up to 1914, when the First World War broke out. The third phase came to an end during the Second World War with the explosion of the atomic bombs at Hiroshima and Nagasaki. When it came to an end man had been taught two lessons: first, that beneath his skin there was still a primitive and savage nature which his grandfathers had thought to be dying out as the world became more "civilised," and second, and more terrifying still, that he now had, as his forefathers had not had, unlimited power for destruction.

These then are the turning-points in the history of man. First, man the animal (who, however, differed from other animals in certain important ways, and particularly in the possession of a large brain and the power of speech), then man the hunter with his spear or bow and arrow, then the neolithic farmer, whose discoveries in new materials and new methods of production led, by way of the Bronze and Iron ages and—many centuries later—the Industrial revolution, to the world of the earlier twentieth century.

Lastly, there is the atomic revolution which has opened new and tremendous possibilities once more for the human race.

The important point to note is that for almost 90% of his whole history man made hardly any progress at all—or, at any rate, progress was slow and painful. It was only after the hunter gave place to the farmer in Neolithic times that power over the environment and technical progress really got under way, and ever since then it has moved ever faster, until now we have difficulty in keeping up with it.

Having taken this brief bird's-eye view of history in order to set the scene, we can now go back to prehistoric days to see what happened in greater detail.

The Earliest Men.—Since, of course, there are no written records from these early days, we are left to deduce the record of prehistoric man from his bones, his stone tools, and, at a later stage of prehistory, from his paintings in caves, remains of villages, and stone circles. However, for the moment we have to go back in time to a period when man did not exist at all, to a period about twenty million years ago when a species of large monkey lived in the tropical forests of Africa, and possibly in Asia. They lived on fruit, roots, bird's eggs, and young birds which they took from the nests.

But in the course of centuries there were changes in the climate and the forests began to shrink. The supply of food grew less, and the monkeys (or those which survived) had to take the dangerous step of moving out into the plains. No longer could they live in the trees—they had to walk on the ground and constantly risk their lives where there were prowling lions and other enemies. They also acquired a taste for meat—probably at first from the remains left by beasts of prey. This was the first act in a long evolution—the leaving of the tree-tops for the ground.

Centuries went by, and, with other climatic changes, the forests moved back over the plains once more. When this happened three groups of monkeys began to evolve. When they had first left the trees the original species had gone about the plains on all fours. Some of them continued to do so, and became the types now represented by baboons. But others had learned to stand erect, and of these some went back to the forests, becoming the ancestors of the present-day apes—the chimpanzees, gorillas, and so on—whilst others remained on the plains. This last group became the forerunners of man. Man is not, therefore, descended from the apes; the fact is that both apes and men are descended from a common ancestor, the one who came out of the tropical forest into the plains. Man's ancestor accepted the challenge of the plains, whilst the apes did not and went back to their original home when the possibility arose.

Ape-men.—Then, about ten or fifteen million years ago, at some time in the Miocene or Pliocene periods (see **F20**), there developed in East Africa and Northern India the two types of apeman known as *Proconsul* (the African variety) and *Sivapithecus* (the Indian one). Both probably walked erect and were about the size of a modern chimpanzee. Nevertheless, this particular evolutionary development branched out, so that, it is now believed, by the end of the Pliocene—about one million years ago, there were a number of new species; ape-men (such as the ones we have just been discussing), primitive types of men with projecting eye-brow ridges and chins and with small brains, and, finally, men with brains and features like those of people living today.

The Age of Ice.—About this time the warm climatic conditions which had been typical of the Miocene and Pliocene periods gave way to a period of violent changes in climate—the Pleistocene or era of Ice Ages. Great sheets of ice formed at the North and South Poles and spread towards the equator. In the South they had only the ocean to spread into, but in the North the ice moved over half of Europe and North America. There were four Ice ages, in between which the ice sheets melted and moved back; the seas fell to low levels with the freezing of their waters, and rose to very high levels as, in the interglacial periods, the ice melted once more.

These changes in climate stimulated the more intelligent species of our ancestors to make new adaptations—new tools, clothing, and ways of living—whilst the less intelligent were wiped out. By the end of the Age of Ice there was only one species of man left upon the face of the earth—*Homo sapiens*. Modern scientists believe that every type of mammal now alive existed at the beginning of the Pleistocene, but, on the other hand, many species then alive no longer exist. They were unable to accept the challenge of climatic changes. The Age of Ice was the great testing-time.

Half-brained Men.—We can now discuss in greater detail those more primitive types which came to an end during the Pleistocene. But first of all we have to mention the fossilised ape-men remains discovered in South Africa from 1924 onwards by Dr. Robert Broom. About six different types were discovered, and they are collectively described as Australopithecines—a name which has nothing to do with Australia but simply means "ape-like creatures of the South." These ape-men were about the same size as *Proconsul*, the earlier type, but had larger brains. They were not ancestors of modern man, since, as is now generally believed, *Homo sapiens* was in existence already at that time—the beginning of the Pleistocene—in other areas of Africa.

In 1890 a Dutch doctor, Eugene Dubois, discovered a primitive skull-cap, jaw-bone, and thigh-bone in Java, and named the new-found species "the erect ape-man"—*Pithecanthropus erectus*. Java man was the size of modern man, but had beetling brows and a retreating chin. His brain was larger than that of the ape-men, but smaller than that of modern man. For many years those who disbelieved in the theory of evolution persisted in stating that the few very primitive types of remains then known were really nothing to do with human evolution at all—they were the skulls of idiots or abnormal men. But Dubois has been shown to be right, after all, in his insistence that *Pithecanthropus* was a genuine species; for during the 1930s the German investigator von Koenigswald discovered no less than five other specimens of *Pithecanthropus* and related types in Java.

Then, in the period between 1927 and the outbreak of the last war, pieces of fifteen skulls and other bones were discovered in a cave near Peking. The discoverer was Franz Weidenreich, and the species was named Peking man or *Sinanthropus pekinensis*. Like *Pithecanthropus*, he was a full-sized man with a half-sized brain.

Full-brained Men with Ape-like Faces.—A more advanced type of man is represented in certain species, which, while in body development not unlike *Pithecanthropus*, possessed a modern-sized brain. The main species of these fossil remains are the following:

(1) *Homo rhodesiensis*, or Rhodesian man, found at Broken Hill, Rhodesia, in 1921. Another specimen was found in 1953 in Cape Province.

(2) *Homo soloensis*, or Solo man, eleven specimens of which were found some years ago in Java. Solo man and Rhodesian man were really the same species, having gorilla-like faces but human bodies and brains. They existed in South Africa and Indonesia towards the end of the Pleistocene.

(3) *Homo neanderthalensis*, or Neanderthal man lived in the northern limits of human or semi-human habitation, and his remains have been found in Western Europe, North Africa, and the Middle East. He was short and stocky, but otherwise pretty similar to Solo man.

Where Early Man Lived.—If we chart on a map of the world the places where the various types of man have been discovered, we find that the more primitive types are found on the areas towards the periphery, the more advanced ones in the centre. This is in accord with a zoological principle that more advanced species tend to push the less advanced outwards towards the edges of inhabitable territory. Thus the types of sub-men we have so far discussed lived mainly in China, in South Africa, in Java, and in those areas of Europe and the Middle East just out of reach of the ice. The real centre of development through the Ice Ages was therefore in the Sahara desert (as it now is), in Arabia, and in East Africa, with some outposts in Western Europe. These are, in fact, the areas where the earliest remains of *Homo sapiens* are found.

Conflicting Theories.—Now up till fairly recently it had been held that *Homo sapiens* had not been very long upon the earth and was a later development of the types of ape-men and half-brained men we have just been discussing. But it now seems probable that we must push back in time the origin of modern man to the very outset of the Middle Pleistocene. Also, it is not now believed that Neanderthal man and his predecessors (except possibly Peking man) were in the direct line of descent of modern man. In fact, his line of descent is completely unknown, although we must assume that such a line exists.

Two specimens, Swanscombe man and Galley Hill man found in the Thames valley, certainly date back to the Middle Pleistocene and are genuine examples of *Homo sapiens*, but the main bone of contention (in both senses of the word) is a jaw-bone and several teeth found by Dr. Leakey in Kenya in East Africa about 1932. Dr. Leakey, by considering the geological levels in which the bone was found, the stone tools laying near by, and by chemical tests, estimated that it belonged to the very beginning of the Pleistocene. In 1959 Dr. Leakey and his wife found in the fossil-rich gorge of Olduvai in Tanganyika a skull and crude tools of a human-like creature dating back about 600,000 years, which Dr. Leaky believes to be the connecting link between ape-men and true men.

PHYSICAL ENVIRONMENT.

Environment and Culture.—It is clear that no people could enter a Bronze or Iron Age unless bronze and iron were, in fact, available in their environment. Hence the Eskimos, who have no metals available to make into weapons or ornaments, still use stone, ivory (from walrus tusks), and bone. In short, their environment does not permit a higher degree of culture. Africans and Australian aborigines do not wear many clothes, not because they are stupid, but because in the places where they live it is more comfortable to live without clothes—indeed, the supposedly backward aborigines have kinship and religious systems so complex that the poor white man's head reels at the attempt to comprehend them. The primitive races or "backward" peoples have evolved ways of life which are often well adapted to the environments in which they live, and, after all, it is by no means self-evident that a civilisation which has devised atomic warfare, a high degree of economic frustration, and concentration camps, is a "superior" one, however we choose to define superiority. The second point, again an obvious one which is almost invariably forgotten, is that great advances are only made upon the foundations erected by others. The scientists of ancient Greece, Newton, or Copernicus could not possibly have evolved Relativity Theory, not because they were less intelligent than Einstein, but because every innovator can only progress a little beyond what he has received from his predecessors in many different lands and times. The house of science is not built top floor first, but slowly upon the bases laid by earlier thinkers. In the spheres of art, literature and religion, we can hardly speak of progress at all. The great Greek dramatists are still great, and the work of the Aurignacian painters of thousands of years ago is still lovely today. Who was the great religious genius who, extending the concept of "neighbour" beyond the mere confines of the tribe, wrote in the Book of Leviticus: ". . . the stranger that dwelleth with you shall be unto you as one born among you, and thou shalt love him as thyself; for ye were strangers in the land of Egypt"? We do not know. Nor do we know who it was who first pictured a tolerant, loving, and understanding God who could take pity upon the wicked city of Nineveh and ask himself: "Should not I spare Nineveh, that great city, wherein are more than sixscore thousand persons that cannot discern between their right hand and their left hand; and also much cattle?" There are many "primitive" tribes in existence today who cannot imagine anyone beating a child; some in which suicide is unknown; and a few who have never waged war. "Civilisation" is not such a simple concept as we once supposed, and technological advance does not necessarily imply high moral standards. However, the fundamental point is that all scientists are agreed that there are no significant intellectual differences between any of the races in existence today, and that the reason why some peoples are relatively backward is either because the raw materials necessary for technological advance have been lacking in their environment, or because by a historical accident their country has been out of contact with the general flow of civilisation, so that the spread of new ideas did not reach within their boundaries. Those who are inclined to look down on the so-called backward races should remember that it is not so long ago since the British looked just as backward to the Romans as other peoples do to us today. It was Cicero who, in the first century B.C., wrote to a friend: "Do not obtain your slaves from Britain, because they are so stupid and so utterly incapable of being taught that they are not fit to form a part of your household."

PATTERNS OF CULTURE.

Cultural Traits.—But if inherent biological differences such as race are incapable of explaining the observed differences between, say, a Frenchman, an Englishman, and a Japanese, how can such quite real differences be explained? Or, to come nearer home, what of the differences between English, Scots, Irish, and Welsh which undoubtedly exist? What of the Celtic, Saxon, or Norman blood in which some people take such pride? Well, to begin with, the English are such

a mixed "race" that it is quite impossible to pick out any pure strains; we are all mongrels, as Daniel Defoe realised when he wrote:

"This from a mixture of all kinds began
That heterogeneous thing, an Englishman."

For the matter of that, we do not have to go very far back in history to see that the English character has changed a great deal. In Elizabethan times, for example, England was the most musical nation in Europe, whereas in Victorian days the Englishman's lack of musical sensitivity was a universal joke in other countries. Today many foreigners laugh at our sentimental fondness for animals, but in the seventeenth and eighteenth centuries, bull-baiting, cock-fighting, and so on were universal sports. In Elizabethan times, again, the ideal man was gay, fond of play-going, amorous, passionate, and quarrelsome—can we recognise in this the Englishman of today? It would be wrong to suppose that no continuity of tradition exists, and doubtless there are many ways in which the Englishman of Elizabethan times, or even of Norman times, resembles the contemporary Englishman. But equally there can be no doubt that there have been fundamental changes. Why this should be so will be considered later.

Definition of Terms.—Anthropologists, then, are agreed that, although it may be quite correct to speak of "national character," we cannot explain this in terms of race or heredity. The true explanation is that such traits are cultural rather than biological in origin, and, since the "culture concept" is immensely important in modern social science, we must first of all define our terms:

> A *society* is a group of people who live and work together, regarding themselves as members of the group, and feeling towards it an emotion best described as "belonging."
> A *culture* is the way of life followed by such a group—that is to say, its written or unwritten laws, its religious beliefs, its ideals, its art, technology, and even its pots and pans.

Without written records we are left to deduce the record of prehistoric man by the culture to which he belonged—Azilian, Magdalenian, Chellean, and so on—and here the archæologist, who knows very little of the ideals and religious beliefs or laws of these bygone peoples is generally thinking in terms of their *material* culture. The material culture, as we have seen, includes such objects found during excavations as pots and pans, knives, weapons, needles, and ornaments. But when we talk of culture in relation to present-day peoples, although such objects are included in our definitions, we are more often thinking of the way of life of the group—its ideals, incentives, and unwritten laws. Culture is what has been described as the "cake of custom," and its importance lies in the fact that it is the cement which binds the members of a group into a living organism.

Sub-cultures.—It should not be thought that the word "group" necessarily refers to the national and tribal groups with which we have so far been concerned. Any semi-permanent collection of people within which the members have a sense of belonging together and possessing common beliefs and customs is a "group." All of us are members, not of one group only, but of many, and each group, however small, has a culture of its own, a way of life to which we must conform if we wish to retain group membership or, at any rate, the respect of the other members. As an example, let us take an imaginary individual with the name of George Campbell, who happens to be a Lowland Scot, a Presbyterian, a Socialist, a coal-miner working at the coal-face in a particular pit, a pigeon-fancier, and a follower of Newcastle United football team. The interesting thing is that, knowing these facts, we already know a great deal about Mr. Campbell; for we can be sure that his membership of these groups (national, religious, political, sporting, and so on) will strongly influence his behaviour. One of the serious defects of classical psychology and of much popular thought is that it failed to notice how much of the individual's day-to-day behaviour arises, not from the depths of his unconscious or from what is ordinarily described as his "character," but simply from his need to conform to the, often unwritten, rules of his membership groups. If anyone suggested to our Mr. Campbell that he was not an entirely free agent, that he was not as independent as he prides himself on being, he would, no doubt, be very annoyed. Nevertheless, this is merely a commonplace statement of fact. Campbell has all the prejudices of the Lowland Scot—he thinks that education is a "grand thing," that Roman Catholics are a dangerous and superstitious sect, that the English are a somewhat inferior nation over the Border who regrettably lack stamina and intelligence, and that money, although the root of all evil, is a good thing to have and be careful about. But, had he been born in the South of Italy, he would have regarded education as the exclusive possession of wealthy landowners, Catholicism as the only true religion, the English would have meant little to him at all (until the last war), and his goods would be exchanged by barter rather than money. Mr. Campbell enjoys his morning porridge and bacon and eggs, but his enjoyment of them is only a prejudice learned in childhood and his opposite numbers in Africa and France enjoy locusts, frog's legs, and snails, which it has never struck him to regard as "food" at all. His grandfather might have worn a beard, but if Campbell came to work wearing one, he might find himself in difficulties; this is one of the many quite innocuous things which are "not done" in certain groups. Campbell might, on special occasions, wear a kilt, but Mr. Smith over the Border would find himself under considerable social pressure to stop doing so if he ever had the temerity to start. There is no law saying that Scots or Englishmen may not strip to the waist in a hot cinema or theatre, but they do not do so, although a miner may do so at work and other people at the seaside. In short, Mr. Campbell, like the rest of us, is for the most part a creature of custom.

Personality and Culture.—The influence of culture upon the members of a society is not restricted to the sort of things we have mentioned above: to food, clothing, and etiquette. It is now certain that human personality itself results in large measure from the interaction between biological inheritance and the particular culture into which the individual happens to have been born; personality is the subjective aspect of culture. Psychologists are all in agreement, whatever the nature of their other differences, that the personality is created in the first five years of life as the result of parental training, and this training, it is clear, is strongly influenced by the attitudes which society inpresses upon the parents.

Patterns of Conduct.—If we take the usual analogy of the clay, the potter, and the design, then it will be seen that the newborn child (the clay) is modelled by the parents (the potter), not at random, but according to the approved pattern of a particular society (the design). Everyone, into whatever society he is born, is brought up to have specific attitudes to women or men, to sexual relations, to cleanliness, to aggressiveness, and to competition, and these attitudes are unique to each society at any given time. Most middle-class Englishmen feel that they ought to "get on" and have ambitions, that one should not strike a woman, that one ought to have a daily bath, and that it is rude to argue in public with shopkeepers, waiters, and public servants. Frenchmen and Italians have no such inhibitions about arguing in public, and Americans have a much stronger desire to succeed. Such differences in national or class character may often cause difficulties through misunderstanding. For example, the average British worker attaches more importance to sticking together with his mates than to getting

on, and he rather despises the middle-class attitude that one must succeed at all costs, regardless of whom one has to overcome in order to get there. Then the average American is brought up to feel that when he has made more money than someone else, he should be proud of his achievement and make no secret of his opulence, however temporary, while on the other hand the Englishman feels that it is impolite to discuss money or speak of one's achievements. Therefore to the American the Englishman is a queer, reticent, and "stodgy" individual; to the Englishman the American is noisy and boastful. Neither accusation is true—both are judging each other in terms of how they have been taught people ought to behave. Dr. Margaret Mead, investigating the problems arising from the relationships between American Servicemen and English girls during the last war, pointed out that American men are brought up to be assertive in their attitude to women, to ask for more than they expect to receive—an attitude which is perfectly understood by American women, but not by the English, who, used to a more cautious approach, take it as indicating more than was actually intended. Both sides were equally shocked at the "immorality" of the other, the Americans at the readiness of English girls to yield, the English at the assertiveness of the Americans in sexual matters.

Interaction of Group Influences.—Although we have so far spoken of the national character of such large groups as the British, American, French, and Italians, it is obvious that when dealing with groups of this size composed of many subgroups, the resulting picture will be far from clear. Our Mr. Campbell is, to the foreigner, simply "British," but he is, as we have seen, also a Scot, a Protestant, a member of the working-class, and a miner. So, although he shows many traits which are "British" in the widest sense, he differs in obvious ways from another Britisher who was born in London, is of the middle-class, belongs to the Church of England, and works as an accountant. It is not only national, but also regional, religious, class, and occupational groups which influence personality, and there are other factors also at work which we must shortly discuss. Before doing so, however, we must mention some important researches into the relationship between personality and culture in more primitive peoples, where the picture, for various reasons, is much clearer. Primitive peoples are more suited to anthropological studies, because, in the first place, they can be separated into small tribal communities which are, for the most part, not subdivided into regional, class, or religious subgroups. Secondly, they are much less subject to social change (for reasons which will later be made clear), and have remained closely integrated, undivided, and in varying degrees static for considerable periods of time. The people belonging to these groups are not nearly so individual in their outlook as most of the people we are accustomed to; for the strongly individualist character is typically a product of the large society with many subgroups. The member of a tribal community is more at the mercy of public opinion than the member of a large industrial nation with its many subgroups within which the eccentric, the brilliant, or the perverse can find themselves at home. In the small community (and this applies even in this country to the small village community) conformity to the rules is much more strictly enforced, and, as Professor Harding has pointed out, it is the multi-group modern society which is the basis for personal freedom. As we have suggested, this is because the non-conformist in the small homogeneous community is at a serious disadvantage in that he lacks the support of minority groups and courts disapproval which, in such circumstances, may be a real threat to livelihood and happiness.

Primitive Tribes.—Ruth Benedict and Margaret Mead carried out anthropological surveys of many primitive tribes in the South Sea Islands, New Guinea, and Central America, with results which are of the first importance to anyone who wishes to understand human nature. They show, in particular, the immense influence of cultural factors in moulding personality, and demonstrate clearly how many traits which Europeans all too readily assume to be part of basic human nature are not "natural" at all. In Samoa, for example, young girls pass through adolescence without any of the "storm and stress" accepted as inevitable in the West. In New Guinea, amongst tribes living in neighbouring areas and belonging to identical racial groups, Dr. Mead found that characteristics of men and women believed to be fundamental in Europe were often radically altered. In the Arapesh tribe, both men and women are mild and gentle; in the Mundugumor, both sexes are violent and aggressive; and amongst the third tribe, the Tchambuli, the "normal" sex-attitudes are completely reversed. Tchambuli women are dominant, managing, and impersonal, whilst the men are "flighty," less responsible, and emotionally dependent. There can be little doubt that many of the traits believed by Europeans and Americans to be definitely feminine or masculine are not biologically but culturally determined. Amongst the Zuni Indians of New Mexico, Ruth Benedict found a people who were gentle, non-aggressive, and non-competitive to a degree quite unknown in industrialised countries. The Zuni *try* to lose races, try not to be superior to others, have nothing but contempt for those who wish power and authority, and would have no chiefs at all were it not that certain individuals are compelled to assume chieftainship under threat of imprisonment. On the other hand, the Mundugumor of New Guinea far outdo the industrial West in competitive spirit, aggressiveness, and in their dominant attitude of "each man for himself and devil take the hindmost." The Kwakiutl Indians of Puget Sound, unlike ourselves, spend all their time giving away wealth instead of accumulating it; at their cermonial feasts or *potlatches* they tear up money and compete with each other as to who can burn or otherwise destroy most of their riches. The Dobu, another New Guinea tribe, are so suspicious that, were a Dobuan transported to England, he would probably be certified as suffering from persecution mania—yet this trait is "normal" within that community. In Bali, the "normal" attitude, says Dr. Roheim, is one which elsewhere would be regarded as schizophrenic; for there, "we have that unthinkable thing, a schizophrenic culture." Yet every one of these traits is acquired by the individual during childhood—and, indeed, Dr. Mead has shown how varying methods of child-rearing lead to the results observed in the adults of a culture. "Systems of child-training," writes Erik Erikson, "represent unconscious attempts at creating out of human raw material that configuration of attitudes which is (or once was) the optimum under the tribe's particular natural conditions and economic-historic necessities."

Summary.—From these recent observations and researches we may make the following deductions:

(1) That the culture of any society represents an attempt to adjust to a particular environment, using the word in the widest sense to imply not only the physical environment, its raw materials, and climate, but also the past traditions of the society, its technology, and so on. We can see, for example, how American history, with its background of an expanding frontier and its awareness of having escaped from the old traditionalist societies of Europe, has strongly influenced American national character. Similarly, the glorification of "free enterprise" amongst the English middle classes, and the equal and opposite insistence upon collective action amongst the working classes, are both the result of historical necessities. In the processes of bringing up families parents hand on these attitudes to their children.

(2) Human nature is more adaptable than has hitherto been thought. It is *not* "natural" to want money, to compete, to have ambitions, to be warlike, nor for that matter, to be gentle, non-aggressive, and non-competitive. Women are not naturally "feminine," maternal, and dependent, nor men "masculine," assertive, and independent.

All these traits are acquired by learning and growing up in a particular culture. There is, in short, no such thing as a "fundamental human nature."

(3) Human beings have no "instincts" as is the case with animals; all one finds in the infant at birth are certain *drives* or *needs*—the need to eat, to drink, to excrete, to be protected from the rigours of climate, the beginnings of sexual needs, and so on. One need, however, although not strictly speaking innate, is universal because of the inevitable fact of dependency in childhood: this is the need for approval or, in the widest sense, love. As Ruth Benedict has said: "Man is a highly gregarious animal and he always wants the approval of his fellows. First, of course, he has to get the means of keeping alive, but after that he will try to get approval in forms which his society recognises. His society may recognise conquest, and he will engage in conquest; it may recognise wealth, and he will measure success by dollars and cents; it may recognise caste, and he will behave in all things according to the position to which he was born."

(4) Without socialisation, without parental upbringing, human beings could not become anything at all. There is no such thing as the "natural" individual, the "noble savage" of Rousseau. In the few reported cases where a child has survived without any sort of attention other than receiving food and drink it has not been appreciably different from one of the higher apes. One child of eight years born of a deaf and dumb mother and reared in an attic in complete seclusion from other people, could not even appreciate sound. It had been accustomed by its mother's deafness to ignore noises, and even the loudest sound produced no reaction, although the ears were quite normal.

Most of a person's actions, therefore, are carried out either to satisfy the innate biological drives mentioned above, or to satisfy the deep-seated, universal, although probably not innate need for emotional security and approval. Men seek wealth, position, knowledge and so on, not out of a primary desire for these things, but because they are the roads to approval within the frame-work of a given society.

Individual Differences.—Now, as we can readily observe, individuals differ quite considerably from each other, even within the same social group, so we must now consider what factors give rise to the individual variations upon the theme set by culture; several, in fact, have already been mentioned. These are, the subgroups to which the individual belongs, his status and role, and his particular upbringing and inheritance. Social change, too, gradually brings about changes in the "basic personality type" of a society, as, for example, the changes in attitude which took place between Elizabethan and Victorian times and have already been mentioned.

1. *The Influence of Subgroups* in bringing about particular attitudes in the individual has already been discussed, and need not be further elaborated here.

2. *Status and Role.*—An individual's status is his position in society, not only in respect of social class, but also in occupational, marital, professional, and other spheres. His role is the behaviour which is associated in that society with a given status. Perhaps these concepts are most simply explained if we regard social life as a sort of stage-play in which each individual is an actor in particular roles: a parson has to act as a parson, a doctor as a doctor, a father as a father, and a manager as a manager. Parsons are expected to talk and dress in a particular manner, fathers to behave in a certain way (which differs in each society), and although every parson or father is an individual in his own right, many of his acts can be understood only when we realise that he is acting in the way society expects of parsons and fathers. When people break these unwritten rules, difficulties may arise. There is no law which says that a parson may not play the saxophone, but one who did would be looked on somewhat askance by his parishioners, and, although patients sometimes complain that their physician puts on an exaggerated "bed-side manner," they are often even more distressed when he does not. Gordon Rattray Taylor tells of a factory manager who went about in a shabby old car, and who, far from being thought endearing and democratic for doing so, was regarded with disapproval by his employees, who felt that he was "letting down the side" by not behaving in a manner appropriate to his position. This is what is described as "*formal status*," since managers, parsons, fathers, and so on occupy formal positions recognised by society as at present constituted. There is also *informal* status—that is to say, the type of status allotted to individuals in a small and intimate group such as the working group in the factory. For example, we have George, who is the one who defies management and takes the lead when complaints are to be made; Alf, the one who tells dubious funny stories; Bill, the one who knows all about First Aid; and Harry, the amiable idiot who is always teased by group members but protected from the jibes of the members of other groups. All these individuals have been allotted a certain informal status, and are supposed to act "in character," although each man in another group may play a quite different role. Alf, the joker, may be henpecked at home—a sad little man; Bill, the knowledgeable First Aider, may be a very insignificant member of the local St. John's Ambulance Brigade, to whom he may be the "silly ass"; George, the resentful, may be the kindly father. But within each group their roles are fixed and difficult to evade. Status and role, therefore, have a powerful influence upon behaviour.

3. *Differences due to Upbringing and Heredity.*—Although we have already indicated that the influence of heredity, so far as personality is concerned, has been grossly exaggerated, it does indeed play some part. What is inherited, however, is not specific behaviour but temperament, and temperamental differences, being based on glandular and structural nervous factors, are fairly permanent features of the personality. By and large, upbringing determines *what* we do, temperament *how* we do it. Hippocrates, the ancient Greek "Father of Medicine," suggested that temperaments could be divided into the choleric, the phlegmatic, the sanguine, and the melancholic, and at least one modern psychologist uses the same terminology, so we may fairly safely assume that whether a person is quick and passionate, slow and phlegmatic, quiet and pessimistic, or cheerful and hopeful in his actions these are temperamental traits which, however much they may be modified by training, are basically inherited.

But clearly the most important differences between one individual and another in the same culture arise from the vagaries of upbringing; for, even apart from such accidents of fate as the loss of one or both parents, illness in childhood, and natural calamities, the obvious fact is that no parents ever pass on the cultural design to their children without many individual variations. If we picture the cultural design as a rough mould which supplies the main outlines of the pattern, we can also picture the parents as adding individual touches of their own (whether knowingly or otherwise) to a material which already varies for biological reasons. At this point it is necessary to say something of the work of Freud, for it is he who has given us some of our closest insights into what one might describe as the microscopic anatomy of the individual personality. Unfortunately to do so is by no means easy because Freudian theory is extremely complex, and has, furthermore, been considerably modified by later writers of the psycho-analytic school. What is given here must be taken only as a very rough outline of what Freud and later psycho-analysts have been trying to say.

FREUDIAN THEORY

The newborn child is a young animal, with no morals or sense of reality and no "instincts" as we understand the term in the lower animals. It has only two great drives which Freud takes

to be fundamental—sex and aggression. Although Freud described sex and aggression as "instincts," the word is nowadays reserved for a particular form of behaviour which, if it exists at all in man, is certainly a dying category—it should be used solely for behaviour which is inborn, relatively fixed, and automatic. Ants, bees, and wasps, for example, carry out the most detailed acts: nest-building, caring for the grubs, or food-collecting and storing; but there can be no doubt at all that none of these acts are in any way intelligent. They are based on the insect's nervous structure, and could not occur otherwise than they do. Amongst the higher animals, the birds and mammals, such instinctual behaviour comes to be increasingly modified by intelligence, but it is only in man that intelligence assumes its full significance, and all behaviour is modifiable and no longer automatic. The drives of sex and aggression in man do not involve any elaborate type of fixed behaviour pattern; they are simply the raw material of action, to be modified in many different ways as the child learns from its parents and others. Briefly, all animals in varying degrees (more so in the lower animals, less so amongst the higher) are like tram-cars moving upon fixed rails, and however complex the route they take, it is largely what has been laid down from the beginning. Human beings, on the other hand, are like motor cars, which, although making use of the same source of energy as the animals, can utilise it to drive where they please.

Sex.—Freud used the word sex in a rather specialised sense to apply, not only to sexual behaviour in the ordinary meaning of the word, but also to such behaviour as eating and drinking, excretion, and, at a higher level, to love and friendship. It might almost be said that in Freudian terminology sex and aggression are words used to describe the two poles of desire, positive (love, lust, hunger, longing, wanting) and negative (hating, fearing, avoiding, killing, getting rid of things).

The Id.—The problem of society is to modify this primitive creature which can only need and desire, hate or fear, want pleasure and avoid pain, into a civilised being, and this is the problem it delegates to the parents, who, in the long run, utilise the child's need for security or protection and care to compel it to act in approved ways. The baby learns, by imitation, by trial and error, by punishment or the threat of punishment, by love or fear of the loss of love, to conform more or less to social standards. The primitive aspect of the mind, which includes not only the innate drives of sex and aggression but also all those thoughts and emotions which, in the course of development, the individual comes to accept as forbidden, is described as the Id, and just because it contains this sort of material, thoughts and emotions within it become or remain unconscious.

When the infant is born, its mind is all Id, but sooner or later the child is confronted by stern reality when it comes to realise that desires are not satisfied automatically. Sometimes it is hungry and food is not forthcoming, sometimes it is wet and uncomfortable and has to wait to be "changed"—all these events occur even to the most fortunate baby.

The Ego.—So a part of the mind comes to be separated off from the primitive Id, whose function it is to deal with reality, and this part is known as the Ego—the conscious mind as we know it in adult life. The basic function of the Ego is to deal with life as it really is, not as we should like it to be.

The Superego.—Still later, perhaps about the age of three or four, the child is faced by another problem; for it has to start conforming to the ethical dictates of society, to what is ordinarily described as the moral code. It has to learn what is done and what must not be done, and so a further division in the mind takes place and part of the mind begins to specialise in moral control. This part is known as the Superego. The Superego arises in two distinct stages—firstly, the child comes to realise that, under penalty of punishment or disapproval, it must obey its parents; at this stage, then, compulsion comes from outside. Later, however, the child by a process of what Freud describes as "introjection" takes the parental standards within itself. One part of the mind, as it were, plays the role of the moral parent in relation to the rest. This is the fully-fledged Superego.

Character.—An individual's character is the result of a three-cornered struggle between the primitive biological drives (represented by the Id), the hard facts of reality (represented by the Ego), and the moral dictates of society (represented by the Superego). The Superego is the censor which forbids thoughts or actions not allowed by society or, more accurately, thoughts or actions which were forbidden by the parents in early childhood. As one writer says, the Superego is a sort of psychological gyroscope which places control within the mind and avoids, in varying degrees, the need for outward compulsion. When the dictates of the Superego are transgressed the individual has a sense of guilt and feels himself more or less a social outcast.

Expression of Primitive Impulses.—But the primitive drives are very powerful and cannot be totally repressed—they demand some sort of outlet, and are given it on condition that they are suitably modified or appear in socially acceptable forms or at least at socially acceptable times. Most societies, for example, permit the expression of primitive emotion at certain periods or under certain conditions; the sexual drive is permitted expression in marriage, and naked aggression in warfare. But more often the drives have to be modified by one or other of two fundamental mechanisms known as reaction formation and sublimation. In the case of reaction formation the energy of the forbidden impulse is utilised in emphasising its opposite; it is as if the individual were saying: "Of course I don't have such wicked desires—you can see I am quite another sort of person." Perhaps this mechanism will become clearer if we give some examples.

(1) Even the layman is aware that people who are excessively puritanical are frequently by their very puritanism demonstrating quite the contrary aspects of their character. We laugh at the elderly lady who is afraid of finding a man under her bed precisely because we are aware consciously or unconsciously, that she would not have the fear if she did not also have the hope. Similarly, when we read in the papers of a gentleman who so disapproves of obscene books or magazines that he buys hundreds of them to find out whether they are suitable or not for others to read, we may suspect that his own motives are not entirely devoid of suspicion. In short, the character-trait of puritanism is sometimes a reaction formation against strong sexual desires; the individual is fighting in the outer world the very problem he is unable to deal with in his own mind.

(2) The above examples are fairly obvious to the normal individual, who has little difficulty in observing them in his own surroundings, but it is less often realised that aggression may be modified in the same way. Some people, in other words, are compulsively gentle, non-assertive, and disposed to hate cruelty precisely because they are so full of aggression themselves. (This does not mean to imply that there are no genuinely pure or gentle people, but merely that many supposedly pure and gentle people are really quite the opposite.) When, for example, someone tells us that he would flog a man who illtreats a horse, it is obvious that, whatever else he may be, he is not basically gentle. This is an extremely important problem; for if gentleness and kindness sometimes arise, not from a genuine love of all living things, but from fear of one's own

aggressiveness, then sooner or later the real motive will become evident.

The second method of dealing with primitive impulses is by sublimation—that is to say, by making them socially useful. A butcher, a surgeon, or a prize-fighter are all expressing in modified form their latent sadism, but in a way which is recognised by society. Women who have wanted children and failed to have them may become teachers, helpers in nursery schools, and so on in a valuable attempt to satisfy a frustrated need. If Freud is correct, the frustrated sexual curiosity of childhood may later take the form of a desire to know, causing the individual to become a scientist or a bookworm. Art, sculpture, and painting may all be sublimations of the infant's natural dirtiness and pleasure in messing about with mud, water, or even its own excretions. The reader may or may not accept these latter assumptions, but it is only fair to say that those who are in a position to know have found a great deal to support Freud's theories.

Mental Mechanisms.—Even in adult life the individual's adjustment to reality—the "hard facts of life"—and to moral problems is never complete, and self-deception is common. In this connection Freud describes various mental mechanisms which even those who do not accept the Freudian theory in its entirety have found valuable in understanding human behaviour. We will conclude, therefore, by describing some of these forms of self-deception here and giving examples of their influence upon human behaviour.

1. *Displacement.*—An emotion, when conditions do not permit its being directed towards a particular object, may be directed against another which originally had nothing to do with it. "Love on the rebound" is an example of this in which, when the original object of love has disappeared, another is quickly found, not because of any real qualities possessed by the new object, but rather because the emotion demands some outlet. Aggression, too, is very often displaced: for instance, an employee, angered by his foreman or boss, but unable for obvious reasons to retort in kind, may quarrel with his wife over some triviality when he gets home. In Nazi Germany Hitler permitted the displacement of economic and other resentments felt by the Germans after the Treaty of Versailles on to the Jews and Communists, who were thus made scapegoats for the convenience of the Nazi party. It is important to understand that this is one of the commonest types of mental mechanism which is universally, although unconsciously, used by us all.

2. *Projection.*—This is an example of a mechanism which has already been demonstrated. In brief, it means the tendency to project the objectionable qualities we refuse to recognise in ourselves upon others. "It is not I but he who is thinking and doing these wicked things." Thus, as we have seen, people who will not admit to their own impure thoughts accuse others of possessing them; those who are aggressive believe that everybody else but themselves are aggressive; the greedy accuse others of greed, and so on. Carried to an extreme degree, this is the mechanism behind persecution mania or paranoia, as the psychiatrist calls it. Projection is another very important trick of the mind, and its social effects are often all too evident.

3. *Compensation.*—Alfred Adler, one of Freud's pupils who later founded a separate system of psychology, was the first to draw attention to this important mechanism.

Briefly, Adler pointed out that those who suffer from a deep-seated sense of inferiority (whether due to physical or mental defects or to lack of affection in childhood) have a strong tendency to compensate for this either by overcoming the actual defect or by becoming superior in some other field.

Wherever we look we can see examples of this mechanism; Sandow the strong man and many other athletes have been puny and weak in childhood, many individuals with speech defects have made themselves into great orators, many musicians or composers (Beethoven, for example) have been deaf, and many famous painters have had defective eyesight. These forms of compensation are harmless and even useful, but it is quite otherwise in those cases where inferior individuals try to obtain superiority by gaining power over others. It is significant that Hitler, Mussolini, Napoleon, and many other delinquent types who have made a nuisance of themselves to a long-suffering world, were all men of below normal stature who felt their inferiority keenly. Another interesting observation is the fact that many of those who have attained eminence in a particular nation have not been members of the nation they aspired to rule or fight for, but were members of what was regarded as an inferior national group. Napoleon was, of course, an Italian born in Corsica; Hitler, an Austrian born at Braunau near the German frontier; Stalin, a Georgian; a large number of English generals, Irish or Scots; de Valera, an American, and so on. The significant thing about power-seekers is that they naturally tend to go where power rests; hence we find many of them becoming turncoats in a crisis. William Joyce, better known as "Lord Haw-haw," was an Irishman whose early passion in youth was to be a loyal Englishman and an officer in the British Army; when he felt himself rejected he turned to the Germans, who were ready to accept his services as a traitor. Not a few working-class politicians have, as they progressed up the social tree, become more and more conservative in their outlook; Saul the persecutor of Christians became Paul the Christian leader, and Mussolini the socialist, a fascist.

In a free society one of the problems we have seriously to consider is the possibility that those who win in the scramble for power tend to be the unbalanced people who need it because of the power-loving drive based upon an inferiority complex.

4. *Rationalisation.*—This, as Bradley said of philosophy, is "the giving of bad reasons for what we do upon impulse." Nowadays, for example, nobody ever goes to war in order to kill a lot of people or take their country from them; they go to war for the other nation's own good—because they want to help them. Criminals are hanged, not because we as citizens are at a primitive stage of development which still demands "an eye for an eye and a tooth for a tooth," but because "hanging prevents further crimes" (of course, there is excellent evidence to show that it does not). Rationalisation is too familiar to most of us to need further discussion.

5. *Conversion.*—This is the mechanism which most people find it least easy to understand. Whereas the other mechanisms are, in their milder forms at least, almost normal, conversion is always abnormal, and implies more or less serious disturbance of the mind. There are two types of conversion: hysterical and psychosomatic.

In the first case, a state of mental conflict produces symptoms of physical disorder which, however, are not due to any underlying physical disease. Such cases may show symptoms of blindness, deafness, complete or partial paralysis of the limbs, double personality, or loss of memory, all of which can be shown to be purely psychological in origin, and, in fact, occur because the individual in some sense does not want to be able to walk, see, hear, or remember. In short, the symptom occurs because it gets the individual out of some difficulty which he is facing at that particular period. A very simple example of this is the so-called "writer's cramp," in which someone whose job depends upon his ability to write suddenly finds that he cannot write at all; whenever he attempts to do so, his hand muscles go into a state of spasm. An actual case of this sort which shows the underlying mechanism may be quoted from Dr. J. A. C. Brown's *The Distressed Mind*: "A spoilt 'mother's darling' of a man was working as a clerk in a recruiting office before the war. He had got the job with difficulty and was the only support of his mother. In the office were several N.C.O.s who shocked him constantly by their obscenity. He hated the work, and yet felt that it would be unfair to his mother to give it up. One day he found that his

hand would not work and whenever he tried to write, it went into painful cramp and the muscles became rigid. He had solved his conflict by falling ill, as he could then evade his work and, at the same time, feel he had done his duty to his mother. He was, of course, unaware of the cause of his trouble." Such cases are (although this is somewhat of an over-simplification) a sort of unconscious malingering in which the individual solves a mental conflict by developing symptoms which remove him from the difficulty, at least temporarily. Again, a neglected wife who feels herself starved of affection may develop a vague and unspecified sickness which takes her to bed, there to be fussed over and given the attention which she had lacked when behaving normally. Such people, of course, really feel the symptoms they complain of, and their blindness, lameness, and so on are just as much " there " as they would be in a hypnotised person; in fact, it is not incorrect to say that such people are self-hypnotised. They certainly require psychological treatment.

6. *Psychosomatic Conversion.*—Psychosomatic conversion is a very different state of affairs; for, whereas the cases we have so far discussed have been those who had lost the *will*, and thus the ability, to carry out certain physical or mental functions, people with psychosomatic disorders suffer from actual physical disease as a direct result of mental stress. Within their bodies actual physical damage has resulted from prolonged exposure to emotional tensions. Elsewhere something has been said about the autonomic nervous system which prepares the organism for relaxation or emergency, and we saw that, when one of the higher vertebrates finds itself in a threatening situation the sympathetic division of the autonomic nervous system is stimulated, producing changes which are useful in fight or flight For example, extra sugar secreted into the blood-stream from the stores in the liver is necessary for the fighting or escaping animal as emergency fuel; removal of blood from the internal organs to the muscles, a rise in blood-pressure, and cessation of digestion are similarly useful; and dilated pupils, erect hair on the back of the neck (in dogs and cats, for instance), or tense muscles all serve various functions in aiding clear vision, scaring the enemy, and preparing for blows or for running. But human beings differ from animals, (*a*) in that they are scared or made angry by things which are no real danger to life but only to self-respect (*e.g.*, sitting an examination, snubs, or imagined insults), and (*b*) in that, unlike animals for whom out of sight is out of mind, man is cursed with imagination and memory which keep his emotions alive for long periods of time. In this way it happens that bodily changes produced by sympathetic stimulation in a time of crisis may continue, not for minutes, but for years. The frustrated worker, hating his job and resenting his boss, has the raised blood-pressure normal to the angry animal; but it continues day in and day out until his arteries become thickened and the pressure can no longer return to normal. The ambitious business-man, mentally on the attack for years at a time perpetuates the associated physical changes normal to an attitude of attack; his stomach-wall is drained of proper blood-supply and the digestive juices, ordinarily neutralised by anti-enzymes in the blood, digest the lining of the stomach itself, causing an ulcer. Chronic states of anxiety or excitement may cause the thyroid gland perpetually to overact, leading to exophthalmic goitre. Muscle tensions appropriate to aggressive attitudes when prolonged may in others lead to fibrositis and rheumatoid arthritis. The changes produced by emotional states in the skin may cause skin disease, and migraine, asthma, angina pectoris, and coronary thrombosis are other diseases of varying degrees of severity due basically to fear, insecurity, and hate. Of course, what has been said here is inevitably over-simplified; for no disease is due to a single cause, nor is it at all clear why one patient gets one type of psychosomatic disease and a second another. But there can be no doubt that the outlook in medicine has become revolutionised by these discoveries, and can never return to the old mechanistic views of the nineteenth century.

In summary, this is how views have altered:

(a) To a considerable extent we must discard the old view that sickness is always something that happens to an unsuspecting individual, like being hit on the head by a falling slate. Patients usually go to a doctor in much the same frame of mind as they would go to a watch-maker—" Here, there's something wrong with this watch—what are *you* going to do about it? " But from now on it has to be realised that the patient and the illness are one, that it is because he is the sort of person he is that he has become ill in a particular way. It is quite literally true that today we are entering a stage in the development of medicine which will look on crime as social or mental sickness and much disease as the result of the individual's wrong attitude to life.

(b) There are, of course, diseases in which psychological factors are at a minimum so far as causation is concerned, although psychological factors always play a major part in determining the course of the disease. Smallpox, malaria, cholera, natural calamities (like the slate falling on our unsuspecting head), and diseases due to malnutrition (where food has not been available) are examples of such conditions. These are the diseases which are serious problems in the more backward areas of the world, and are, on the whole, less important in the civilised areas. Psychosomatic factors, however, play a considerable part, in the case of the less-virulent infectious diseases, in determining whether the patient succumbs to the infection or not. For example, Dr. Wittkower has shown that psychological factors play a large part in determining resistance to tuberculosis and the subsequent course of the disease. Sir William Osler, the great physician, used to say of tuberculosis that what the patient has in his head is more important than what he has in his chest. The psychosomatic diseases already mentioned and the neuroses are, of course, examples in which the psychological factor is at a maximum.

(c) Fear and hate or anxiety not only cause unhappiness but also sickness and death. Hate and fear can kill.

(d) The psychosomatic diseases and the mental disorders generally are social diseases. They are strongly influenced by the stress of modern life and are on the increase. The present position is that, as Dr. J. L. Halliday has shown in his *Psychosocial Medicine*, although such diseases as smallpox, typhoid, rickets, the conditions due to dirt, faulty hygiene, and malnutrition, are well on the way to disappearing in the more advanced communities, *in these very same communities* the rate of neurosis, gastric and duodenal ulcer, heart disease, glandular diseases, high blood-pressure, suicide, infertility, and delinquency is going rapidly up. It is not only going up, but the diseases are attacking younger and younger people in each generation. As an example showing the relationship between social stress and psychosomatic disease we might point to high blood-pressure, which is even more frequent amongst the Negro population of the United States than amongst the Whites (who have probably the highest rate in the world), whereas primitive Negro tribes in Africa do not suffer from this condition at all.

(e) Finally, mention must be made of the body–mind problem which these observations bring to the fore. Ultimately, of course, this problem is a philosophical one which cannot be decided by observation or experiment, but today psychologists and doctors are inclined to make use of the working hypothesis that body and mind are one—that " mind " is only a useful word to refer to certain processes occuring in the body. Curiously enough, it was the mechanistic outlook of science which necessitated the hypothesis of a separate mind; for, if we begin by assuming that the body is a machine (which it is not), then we require some explanation for the fact that it sometimes acts as if it were something else. It must be realised that living things are not dead matter *plus* something else—they are simply living things with their own laws which cannot be described in the same terminology as those of physics and chemistry. Each of the spheres we have dis-

cussed—the inorganic, the biological, and the social, have their own laws, and one cannot be fully described in terms of the other. Scientists have discarded the mechanistic view, which implied that the whole was nothing but the sum of its parts and that we could best know the whole by studying each of the parts separately and then adding up our impressions, but they have not necessarily discarded materialism. This, however, will be discussed at a later stage.

SOCIAL CHANGE.

We have already seen that the culture of a society—that is to say, its way of life—results from the interaction of many different influences. The physical environment obviously plays a considerable part and when we consider the differences between tribes living in hot, and those living in cold, climates, it is evident that, to some extent, their way of life is a form of adaptation to the physical surroundings. A second factor is the past traditions of the tribe; as we saw in the case of the New Guinea tribes, societies can live in the same surroundings and be of the same stock biologically, and yet differ widely in their usages. What is different is the past history and traditions of the tribes. Similarly, we can see that many industrialised countries at the same level of material culture and living in very similar environmental conditions, can vary considerably in their outlook on life. But here we have to ask ourselves the important question: what brings about cultural change? Why, for instance, did the Englishmen of medieval times differ so greatly in their culture from the Victorian or present-day ones? Many sociologists believe that new technical developments (inventions) have played a major part in initiating social change, and in the case of Europe perhaps the most important factor has been the discovery of the steam-engine.

Mediaeval Culture.—Society in the Middle Ages in Europe was relatively static, so that there was less change in two centuries than in twenty years in our own times. People lived in small village communities, and in their whole lives might never move more than five or ten miles from the place where they were born. They lived on the land, and their main sources of power were wind and water. Under such circumstances, industry, for the most part, was on a very small scale, and was carried out in the home of the craftsman, who was aided by his apprentices. Society was arranged in a hierarchy, with the king at the top, then the barons and lords, then the priests, the merchants, the soldiers, and the commoners; each individual was born into a certain level of society, and there he was destined to stay (although in the priesthood some promotion did occur). Learning was something one acquired from the books of the great writers of the past, and especially the great Greek and Roman writers and the Fathers of the Church; astronomy, medicine, and biology, not to mention philosophy and theology, were learned from these authorities, and nobody ever thought of studying nature itself to verify the conclusions reached by Plato and Aristotle 1,500 years earlier. Yet within this hierarchy there was a certain spirit of democracy—for men were regarded as equal in the eyes of God, and the usual analogy by which the state was described was that of the human body, in which each part has a function to play in relation to the whole. In economic affairs usury was forbidden, (*i.e.*, the lending of money for interest), and the price of goods was determined by what was known as the "just price"—that is to say, a price which seemed to bear some relation to the intrinsic value of the goods. Poverty was regarded as inevitable, but, so far from feeling that the poor should be ashamed of their state, it was thought that the poor were especially close to God. It should not be supposed that the Middle Ages were as ideal as some writers, such as Belloc and Chesterton, have made out—there was dirt, malnutrition, plagues, and discomfort; but there was also great literature, great architecture, and great philosophy. Above all, people living in these small communities could feel that sense of belonging which we have seen to be so important. Families were large, grandparents lived as an integral part of the household, and illegitimate children (then more kindly called "natural" children) were looked after along with the rest. The Church and those who were better-off took care of the poorer, for charity was a religious duty. There was, in fact, during the early Middle Ages, no such thing as a Poor Law—partly, at least, because it was unnecessary.

The Influence of the Steam-engine in England.—The steam-engine has really quite a long history, beginning with the very elementary type devised by Hero of Alexandria several hundred years B.C. But in a form which was capable of being put to practical use, it dates from Watt's invention in the middle of the eighteenth century. To begin with, the use of the steam-engine as a source of power had five implications; (1) that the use of man-power was increasingly superseded by the use of steam power, and, of course, water and wind-power were gradually given up; (2) that wood was no longer used as a fuel, and less and less as a construction material; (3) that industry tended to congregate where there was an adequate coal supply, namely in the North and West of England; (4) that foods began to be produced in ever-increasing quantities; (5) that men and women were required to tend the machines and to do work in which craftsmanship was of little importance, and large numbers of workers were needed. A steam-engine and the rest of the equipment necessary to start a factory were expensive both to buy and to run, and individual ownership had to give way to joint-stock companies managing large amounts of capital. In these ways there arose the "dark satanic mills" situated mainly in the coal-bearing North, and craftsmen and agricultural workers from the "deserted villages" such as the one described by Goldsmith, flocked to the new towns, there to live under conditions of incredible filth, disease, and misery. This, of course, was the beginning of what we now know as the Industrial Revolution.

Changes in Social Institutions and Beliefs.—The vast majority of sociologists have taken the view that social change in the psychological and moral spheres is based upon changes in the material culture due to inventions and discoveries which alter the character of the powers of production; These inventions may reach a society by spread from another culture or by the scientific discoveries of its own men of science. What, in effect, this theory implies is the following: (1) the most important thing to a society is its means of livelihood and its methods of production; (2) it will, therefore, tend to organise its social structure around its means of production, and its most important men will be those expert in that field; (3) it will also tend to organise its thoughts and even its religion and philosophy and science with a bias in favour of the outlook of its most important men—those who own the means of production.

Wherever modern industry goes, it modifies the existing institutions of a society and brings about social change, just as it did in our own country. In China the large peasant family is gradually disappearing as industry spreads, in India the caste system is breaking down (since one cannot bother about caste differences at a factory bench), the other-worldly religions like Buddhism come to mean less, the birth-rate gradually (if too slowly) goes down, the growing cities resulting from industrial expansion necessitate the giving-up of traditional attitudes in many things, notably in the field of hygiene and public health. It is, therefore, primarily invention and the spread of inventions that brings about social change.

The Theory of Cultural Lag.—Dr. W. F. Ogburn of the University of Chicago has made a special study of the technological basis of social change and has pointed out two facts which are of primary importance in understanding modern problems. First, there is the fact that, once social change has begun, it goes on at an ever-accelerating rate; each generation learns more, and invents more, than the preceding one because they have more facts and discoveries to work on. A Greek in the third century B.C. could have dreamed of

making steam do work, and as we have seen, Hero of Alexandria invented a very simple engine but in order to make an engine that would really work he would have had to invent by himself: the wheel, the piston, the blast-furnace to produce the temperature necessary for melting and casting iron, the water-wheel to produce the mechanical blast, and so on. All modern discoveries and inventions depend upon pre-existing inventions and discoveries, and therefore the more inventions a society possesses, the more it can make in the future. This is why progress in the technical field goes on at an ever-increasing speed.

Summary.—Now we have noted that social change occurs in three stages: (1) men produce new inventions; (2) these inventions influence human behaviour; and (3) finally, social institutions and beliefs are changed to allow for the new inventions. Recently, for example, a sociologist has shown how in Italy the production at a reasonable price of the "motor-scooter" devised during the war to be dropped in parachute landings has revolutionised the life of the peasants in the areas distant from the large cities. The scooters are cheap enough for the peasants to buy (as motor-cars are not) so that they can now easily travel into the towns from which they were formerly isolated, where they come into contact with city life with the cinema, books, modern "comics" and so on—new ideas which shatter their once simple beliefs. Similarly, the motor car in other countries brought distant places close, revolutionised sexual morals, produced ribbon development, brought about the spread of housing estates beyond the original boundaries of the large cities, led to an entirely new problem as mounting casualty lists resulted from the use of a new machine upon old roads intended for horse traffic. Dr. Ogburn points out that there is always a "cultural lag" between stages (1) and (3), and that this is the cause of many of our modern difficulties. We have vehicles travelling at fifty or more miles an hour on roads intended for horse-traffic, and the daily papers talking of the importance of "private enterprise" and free competition when these have long ago become an impossibility—*not* because of the spread of "socialism," but because businessmen found "private enterprise" and unrestricted competition so unpleasant that they began to form combines and trusts precisely in order to avoid it. In short, the old ways of thinking tend to persist long after the situation which was their justification has changed.

SOCIAL AND PSYCHOLOGICAL PROBLEMS OF MODERN LIFE.

1. Insecurity.—The principal reasons for the psychological insecurity felt by many people today (and also, of course, for the current emphasis upon economic security) arise essentially out of the way of life which displaced the peasant society in medieval times. Medieval society was, as we have seen, closely integrated; each man knew how he should behave and what were his duties and obligations. The earth was the centre of the universe, heaven was above and hell beneath, and through the medium of the Church he knew exactly what he had to do—the world, in a word, was *comprehensible*. In relation to his fellow-men things were equally clear; "Not only civil authority, but God in heaven, had ordained that one be a butcher, a baker, a candlestick-maker, or a villein or serf. From the earliest days of life the individual knew where he stood; he had the security of firm group membership. His father and mother, brothers and sisters, would move neither up, nor down, nor away from him, and the bottom could not drop out of his own world. He had many obligations, but his own rights were likewise well defined. But with vertical mobility came the opportunity not only to rise but to fall, the dispersion of families to seek new adventures in other parts of the world, the loss of group-membership status, and the uncertain compensation offered by a chance to make an individual name for oneself" (Gardner Murphy, *Personality*). By basing its structure upon competition, or, at any rate, upon unrestricted competition, the new way of life cut the individual off from society and set him upon his own two feet; he was now fighting for himself and had to regard the rest of mankind as potential enemies or competitors. The rise of capitalism led to the rise of the isolated individual.

2. Loss of Social Control.—Modern industry demands greater mobility of labour, and modern inventions have made transport cheap and speedy. The small permanent village community of people bound together by primary relationships (whether of love or friendship, resentment or dislike) is therefore broken up, and people become increasingly "rootless." It is as easy for a West Indian worker to come to Britain as it once was for a Scot to move to London. Now, an individual's moral behaviour is controlled: (*a*) by the Superego or conscience acquired in childhood, which is not always effective, partly because it is concerned only with the more fundamental matters, and also because of parental defects in upbringing; (*b*) by the social control of the groups to which the individual belongs—in short, by fear of the opinions or ridicule of others. Amongst the vast majority of people (*b*) is much more important than (*a*) in controlling behaviour. But when people are scattered far and wide, living amongst strangers, the small face-to-face group no longer influences their actions, and their conduct tends to deteriorate; in fact, not only morals but also mental health is strongly influenced by membership of small groups, and in the absence of such membership neurosis becomes more probable. This is why groups of immigrants from other countries present a social problem quite other than the superficial ones which usually cause concern; torn between the old standards which they are rapidly losing, and not yet indoctrinated with the ways of their adopted country, such people are likely to find themselves in difficulties.

3. Social Conflicts.—Society itself, so far from being all of a piece, is riddled with irreconcilable conflicts. One government will encourage "private enterprise," and the succeeding one cheerfully announce that people who engage in private enterprise are scoundrels. We are taught by religion (in the case of America it is stated in the constitution) that "all men are equal," and yet we persecute Negroes and Jews. We are told to "love one another" and in the same voice to "never give a sucker an even break." We stimulate ambition and yet live in a state of affairs in which promotion is increasingly improbable; for example, about thirty years ago it was quite possible (if not as common as might be supposed) for an employee to work his way from the shop-floor to the board of directors. Now, such jobs are increasingly filled by university graduates who have had little to do with manual work. Even in America, once the land of hope, the social classes are tending to become fixed and promotion less likely than before. The cinema depicts people living lives of luxury as a natural state of affairs, and yet we expect people to be uninfluenced by such experiences. An eminent sociologist has pointed out that gambling is the result of stimulating people's desire to achieve wealth whilst failing to devise legitimate means of obtaining it. It is almost always forgotten that frustration is a relative concept—that people are frustrated, not in some absolute sense, but in relation to what they have been led to expect. Thus, miserable as is the lot of many peasants in Asia and elsewhere, they may be much happier than the senior factory manager who expected to be taken on to the board and was passed over. Material goods are important aids to happiness, but in themselves they are not enough; for almost everyone is unhappy, no matter what his possessions, if he feels that what he had is not in accord with what he is entitled to. But what is he entitled to? The plain fact is that in spite of much talk of "fair shares" or a "fair wage," we have no idea what a man is entitled to because it is nothing but a social convention that a doctor should be paid more than a miner, and the old social conventions of this sort, good or bad, have disintegrated.

4. **Racial Conflicts.**—It need hardly be pointed out that this is an increasingly difficult problem which cannot be solved by asserting, no matter how often, that there are no superior races or nations. The real dilemma of such a country as South Africa should not be underestimated, however it may be oversimplified on both sides of the fence; for the fact is that in such a country there are only two possibilities, both of which would lead to equally unpleasant results for the White minority in power. Either (1) they hold the Black peoples down, in which case there will sooner or later be bloody rebellion, or (2) they give the Black peoples equal parliamentary rights, in which case, since the Blacks vastly outnumber the Whites, the ruling minority automatically hand over control to the Blacks. In justice to the White minority, it is only fair to remember that no group in history has ever willingly surrendered power, and that the problem is vastly more difficult than most people realise.

5. **The Problem of War.**—Psycho-analytic writers have always asserted that aggression is an innate drive in man, and therefore that war is inevitable. To this attitude there are three answers; (1) that, if this is so, the human race is irrevocably doomed—for with modern weapons it would be difficult to survive one war, let alone an indefinite series; (2) that it is by no means certain that aggression is innate—most modern psychologists other than psycho-analysts state that aggression is the result of frustration, from which supposition it follows that, although aggression could never be entirely removed, it can be very considerably reduced by removing frustrations as far as possible; (3) that the problem of war has really nothing to do at all with whether aggression is, or is not, innate—what matters is not *whether* we are aggressive, but what we do with our aggression, and war is not at all the most obvious means of getting rid of aggression.

At one time it was thought natural for Scotland to fight England, or, at an even earlier stage, for the various kingdoms into which England was divided, to fight each other. Now such an idea would appear fantastic—not because the Scots learned to love the English, not because morals have improved, but simply because the countries concerned became one world economically and administratively. There can be no doubt that modern discoveries and technology have made it essential for the whole earth to become one economically and administratively—not only essential but inevitable. And, given time, this will quite certainly happen, whether we are willing or not, provided, of course, that we do not blow ourselves up first. When that day comes, we need not bother about the problem of aggression, for, as we have already seen, there are more than enough evils to fight and more than enough problems to tax the best brains for centuries to come, and when we have dealt with these we shall probably find that we have grown up.

6. **Religion and Science.**—In the nineteenth century religion took a good beating from science because it had rashly chosen to discuss matters of scientific fact, such as the theory of evolution. The war between religion and science is over—not, as many people seem to suppose, because one side or the other has won, not because the new scientific theories support religious beliefs (for they certainly do not)—but rather because each has come to realise that their respective spheres of influence are largely separate. The scientist *as* scientist looks at the universe without emotion and as objectively as possible whereas in the sphere of religion we are concerned about how we *feel* towards it. We look on it with awe, fear, or love, as in some sense our home. "Religion," said William James, "is a feeling of being at home in the universe."

No doubt religion is also a great deal more than this, but James' statement contains a fundamental truth, and in this sense we are all religious; for there is nobody living who is capable of regarding the universe with complete impartiality except for relatively brief periods of time, as the scientist does when carrying out an experiment. As we have seen elsewhere, one of man's deepest needs is to have a feeling of emotional security, a sense of belonging, and the consciousness of understanding his relationship to his environment. Erich Fromm, a psychologist who has made a special study of religion, describes the need we have just mentioned as the need for a "frame of orientation and devotion." Whereas Freud considered religion to be a universal neurosis based upon the need to conciliate the father-figure God—a projection of the child's view of its family into the celestial sphere—Fromm reverses this statement and tells us that, on the contrary, neurosis is a private religion. Whereas religion is a public frame of orientation and devotion, each man's neurosis is a private one; or at least, one aspect of a neurosis is the development of a private set of attitudes to life which is in conflict with those of society as a whole. Franz Kafka's novel *The Castle* is a modern parable of the neurotic's isolation from society and life which explains more about the individual's need of a frame of orientation and devotion, and the results of the lack of it than many volumes of psychology.

Summary.—It should be pointed out that in psychology today there are two different points of view which here we have tried to reconcile: (*a*) the psycho-analytic view, which holds that personality is fixed, and is determined in the first four or five years of life, and (*b*) the sociological view that personality, although strongly influenced by these factors, is also influenced by the roles the individual has to play and the situations he has to face in adult life. The views are not necessarily contradictory; what we have to ask ourselves is not whether this view or that, but *how much* of each view, is true. Freud largely ignored the influence of culture, firstly, because all the people he was dealing with belonged to the same culture, and, secondly, because at the time he produced his theories it was assumed that "human nature" was the same all over the world.

Nevertheless, whatever we think of Freud, the one aspect of his work which is beyond doubt is that for most of their lives people are influenced by motives which are unconscious, and of which they are completely unaware. The individual has a picture in his mind of the sort of person he supposes himself to be, and uses the mental mechanisms we have described to maintain this picture; impulses which he cannot reconcile with his ego-ideal are simply rejected. The importance of this fact is evident—for it means that rational persuasion is not nearly so potent in influencing behaviour as has often been supposed.

THE MODERN VIEW OF MAN AND SOCIETY.

There are three types of individual who are in rebellion against society: the neurotic, the criminal, and the genius. The differences between the three are that the neurotic rebels in secret or unconsciously, the criminal openly, and the genius by his creative work is able to sublimate his conflicts in art or literature or even to change society nearer to his heart's desire. (It will be understood that this is a very loose formulation of a very complex problem.)

Now it is the modern view that such conflicts are not private and individual as has hitherto been thought (notably by Freud); for it is the conflicts latent in a particular society which are fought out in sensitive minds. Briefly each society is now regarded as a sort of electro-magnetic field in which the neurotic, the criminal, and the genius are areas of high tension—in them the conflicts suffered by the society as a whole are magnified to the point of breakdown. Whereas, as was realised long ago, such diseases as cholera, typhoid, or smallpox are due to material defects of society in respect of hygiene and the application of medical knowledge, the behaviour of neurotics, criminals and those with psychosomatic disorders is due to cultural defects of the society in the psychological sphere.

Modern psychology and sociology are showing more clearly than ever before that, in the words of Donne, "no man is an island," and that for the misery or unhappiness or badness of the few we are all responsible.

CURRENT SOCIAL PROBLEMS
IN THE LIGHT OF PSYCHOLOGY AND SOCIOLOGY

Some of the major fields in which British and American social scientists have recently interested themselves are the problems raised by our own industrial society. Unlike the industrialism of earlier times, which was a rather haphazard affair, modern industrialism has developed in such a way that the whole society is structured round its needs; we must, we are told, compete in technical advances and productivity with other nations in order to maintain our own high standard of living. Accordingly, education is structured according to social needs instead of to the old-fashioned idea that there is such a thing as a "good" education irrespective of what a man may later wish to do; scientists are attracted by better pay from pure research into industrial technology; people are moving about from one place to another in the interests of industry which also supplies the new aristocracy; and the Welfare State is organised round the problems raised by what the individual can "do." It would be futile to argue the rights or wrongs of this state of affairs because it is here already, but it is wise to see that it raises important issues which, if dealt with rationally, can at any rate mitigate some of our present difficulties which industrialism has brought in its train.

The Main Problems.

Broadly speaking, the four main issues are raised by: (1) education regarded as the *preparation* for work; (2) conditions of work and the problem of the status which work gives both within and without the *working environment*; (3) problems of those who have finally *retired* from work; and (4) difficulties presented by those who have fallen by the wayside in their failure to conform to industrial society—the *delinquents* and the *mentally ill*. Since it would be impossible to deal with all these matters here, only a brief indication can be given of the directions taken by modern social scientists who are studying them.

Education and Intelligence Testing.

It has for long been known that intelligence is an hereditary trait and that, by and large, intelligent parents have intelligent children, stupid parents, dull ones. In the beginning of this century intelligence tests were invented by Binet and Simon working with French schoolchildren and with the wholly admirable intention of separating the dull from the intelligent pupils so that the former would not hold up the work of the class. The tests were arranged in groups of questions which it had been shown were capable of being answered by the majority of children of specific age-groups; thus a normal child of five would be able to answer all the questions in age-group five plus perhaps a few belonging to age-group six. With six questions to a year, each question answered beyond the individual's own age-group counted two months, so if the child answered all his own year's questions plus three more his *mental age* would be five and a half years.

The I.Q. or *Intelligence Quotient* is the mental age divided by the chronological age and expressed as a percentage—in this case 110. Modern intelligence tests may, like Binet's original tests, be verbal or, like Raven's Matrix and others, non-verbal using "picture puzzles" in place of words. Such tests are devised to test "g" or general intelligence irrespective of education and irrespective of "s" or special abilities (such as mathematical or musical ability), which are independent to a large extent of general intelligence. An intelligence quotient of between 90 and 100 is regarded as within normal limits, although one of 75 is quite consistent with efficiency in unskilled work and one of not below 120 is necessary before one can benefit from higher education in a university.

Today the scope of intelligence-testing has been greatly extended so that few people in the more technically advanced countries can go through life without being tested on several occasions. For children it forms a major part of the "eleven plus" examinations which determine at this comparatively early age the form their future education shall take—whether they go to a grammar school or a secondary modern one; for workers in many of the larger industries tests may influence their chance of promotion or even of getting a job at all; and in the Army intelligence tests influence promotion, even more particularly in officer selection.

The Validity of Intelligence Tests.

There can be no doubt that intelligence tests are valuable in predicting the people who are *not* capable of doing certain jobs or following certain careers. What they cannot do is to predict the people who *are*—for example, a man, although highly intelligent, may be emotionally or temperamentally unsuited for industrial management. Nor does anyone now believe that what the tests measure is some absolute intelligence which appears in all that a man does; they simply test those abilities which are useful in industrial society. We know too that, although the non-verbal tests are "fairest" in that they do not discriminate against people whose natural language is not English or who, while intelligent, have not acquired the ability to express themselves well, they are also the least accurate. On the other hand, verbal tests are more accurate but discriminate against working-class children who have had less experience of handling words and concepts than middle-class ones. This is of little importance at both ends of the scale of intelligence (the very dull or the very bright), but it may be extremely important in that middle group where a mark or two either way may make all the difference, and these, after all, are the ones for whom the tests are most needed.

The results of an intelligence test can be considerably influenced by a child's nervousness, indifference, or impulsiveness, and the school records of many great men have been poor, whereas those with good records at school by no means invariably have good records in later life, so even this is by no means an infallible criterion. But once we admit that these are the best methods we have for weeding out the less capable and that it is only just that the most capable should succeed, another problem presents itself, because, as some writers have pointed out, the end result of the process may be a society stratified according to intelligence with what virtually amounts to a class of those who are *known* to be at the lowest level and have been judged to be capable of only menial tasks. Now, in the past the lowest social class has always contained a number of intelligent men who could not only lead the others but could justly claim that they were unfairly held down—but what, these writers ask, will happen when members of this class have to admit that they are *really* inferior in respect of a quality that their society regards as all-important? Instead of becoming more classless, is our society moving towards a new kind of stratification which is even more rigid than the old?

The Managerial Society and the Status-Seekers.

Some sociologists, such as James Burnham in *The Managerial Society* and Peter Drucker in *The New Society* and other books, have pointed out the development in all technically advanced societies (including the Soviet Union) of a managerial class which is the new centre of power. Management, it is argued, is no longer a matter of men who know about the technical processes within their own industry but rather of men who know how to manage as a technique in itself. A man who runs a shoe and boot firm in this view is interchangeable with a man who runs an armament firm, because his skill is in management, not in making arms or shoes. As the man who mediates between the scientist or technician who invents new processes and the workers who have to carry them out, he is the man who gets things done and the core of the new *élite*. Without his aid the scientist and the worker alike are helpless, and industrial society

depends on his ability to produce the goods which make the country prosperous. Yet he is not a capitalist in the old sense but in effect a salaried worker selected (as army officers are now selected) by the most careful scientific techniques, which include not only intelligence tests but also a detailed scrutiny of his past record and a personality test.

Personality Testing.

It is impossible to discuss here the details of personality testing. Suffice it to say that these tests can reveal, without the individual being aware of it, the most intimate details of his personal life—his neurotic tendencies, his adjustment in marriage, his sexual problems. In fact, all those matters which were once thought sacrosanct and the business of nobody but the individual himself. That this is not without its dangers is clear, as has been pointed out by W. F. Whyte in his book *Organisation Man*, where he notes that being able to show that a man is "good" does not necessarily tell us what makes him good or what he is good for, because there is no general agreement as to what qualities make a good manager. Many great industrialists of the past have been far from mentally well-balanced, and the types now selected tend to share the two traits of driving ambition and extreme conventionality, neither of which the unprejudiced would be inclined to regard as particularly desirable in themselves.

Stratification and Society.

Vance Packard's *The Status Seekers* suggests that American society has moved far from the old ideal of "from log cabin to White House," and is on the contrary settling down to a society of fixed levels between which there is very little mobility. There are the two top levels of capitalist and the highest levels of management, a middle group of "fixed-status" men who as junior management or technicians can move down but rarely up, and the large groups of semi-skilled and unskilled workers who are unlikely to progress even so far as the fixed-status group. Having little chance of changing their real status, all groups engage in a frenzied struggle to compete in the outward signs of success measured in terms of the make of one's car, the position of one's home, the names and standing of one's clubs. Packard believes that American society is already more stratified than the older class societies of Europe, and whether or not his analysis is correct, there can be no doubt that in many British firms (since an assessment of "personality" naturally includes social background, education, and social graces) top management is often drawn in "horizontally" from those who have been at the old universities instead of "vertically" from the lower ranks of those who have served the firm for some time in more humble positions.

The Importance of Status.

During the 1930s the Australian industrial psychologist Elton Mayo, investigating the effects of temperature, lighting, noise, and other physical agencies upon working efficiency, found by accident that other factors than those of the physical environment were the most important in determining the worker's attitude to his work. These were his relationship to his working group, the attitude of his management, his knowledge of what he was doing and why he was doing it, and above all his status.

Everyone, in however modest a way, has to feel that what he is doing is of some value and is regarded as such by others; hence many strikes, ostensibly about wages, are really about "differentials" when the higher groups (*e.g.*, engine-drivers) feel that their status has been lowered, not by a real inadequacy of their wage, but by a relative inadequacy when the wages of lower-paid workers have been raised, thus increasing their social status in relation to the higher-paid ones. Psychiatrists, too, have pointed out that many neuroses have as their *immediate* cause conflicts over status which, when it is felt to be absolutely or relatively lowered, leads to a reduction of self-esteem, one of man's most potent drives. This is perhaps the most obvious connection between neurosis and unhappiness in a society which, if it "never had it so good," continues to stimulate ambition in a situation where ambitions are ever less easily attained. As was remarked elsewhere (**F42**) neurosis and delinquency are related in the sense that both are a form of revolt against society, the one open, the other concealed.

The Working Environment.

Modern industry has other important effects upon society which arise: (*a*) from its bigness; (*b*) from the geographical and social mobility which modern methods and concepts of production entail; and (*c*) from rapidly accelerating technical change. Bigness and bureaucracy increase social distance so that communication between various levels becomes a problem and, unless special steps to improve communications are taken, the worker may have little idea of the real nature and end of his work and even less idea of who is responsible for such difficulties as arise during its performance, since it is the nature of bureaucracy to "pass the buck" from one level to another, and thus to reduce individual responsibility. He begins to feel insignificant and a mere pawn in the game. So, too, modern production methods require frequent shifts of man-power from one process to another, and hence the inevitable breaking-up of the small working-groups which once gave the worker a sense of emotional security and significance, and the speed of technical change acts to make a process or a whole industry outdated within a brief period of time (consider, for example, the position of the miners, who ten years ago were being told to produce more coal to save the country from disaster and are now told that there is too much coal and too many miners in areas where the only industry is coal). These, too, increase the ordinary man's sense of puzzlement and his feeling of insecurity in his social status; not unnaturally, they also increase his resentment and nervousness.

The "Angry Young Men" and the "Beats."

Perhaps it is against this background that we must understand our "angry young men" and the young Americans who, in revolt as it would appear against civilisation itself, are described as the "Beat generation." At the lower end of the scale, although associated with the others in the public imagination, are the juvenile delinquents who (we are assured by the more respectable members of society) are increasing in number. Why, respectable citizens ask in despair, should the young show these signs of revolt at a time when we have never been more prosperous and opportunities have never been so good?

This is a very facile way of regarding a serious problem which may well indicate that at least as much is wrong with the attitudes of our self-appointed moralists as with the attitudes of those they condemn, since it is hardly an estimable quality to acquiesce in the values of a society which, it would appear, has somewhere taken a wrong turning. It is the moralists who value social position as a criterion in the upper ranges of society while condemning the fuss made about differentials by an engine-driver, and it is they too who have set up prosperity as a badge of success while complaining that too much money is turning youths into delinquents. Yet the novelist John Steinbeck, in a letter to Adlai Stevenson, suggested that if one wanted to bring a society to its knees one had only to grant it unlimited prosperity, when it would shortly become luxurious, selfish, and "sick, sick" at heart. Perhaps the Angry Young Men and the Beats may some day be regarded as the true moralists who rejected the values of a sick society—at any rate it would be wise to consider the possibility.

The problem, then, is not a simple one, nor has it been adequately explained by the rebels themselves, who, one is apt to feel from their books, are prone to attack without analysing what they are attacking. Indeed, it is likely that they do not fully know themselves, and therefore give the impression of futile rage and, in the case of the American "Beat" intellectuals, an equally futile turning

away from traditional values in art and literature similar to that of the Dadaists after the First World War (G61).

But some things are fairly clear. It is clear that in Britain many of our young writers feel that the working-class boy who has made use of the new facilities in education to go to a red-brick university and obtains as good a degree (or so he thinks) as one from Oxford or Cambridge passes out into a world which is not prepared to assess him on his intellectual abilities alone. Even the working-class man at the old universities soon learns that the student who will get the plum jobs in industry is in fact the member of the old upper-class who has the social graces and the right name as well; he has "the same face at the top of a new suit of clothes" because those who carry out the all-important personality tests will quite rightly hold that these are important facets of personality. So, unless one is a near-genius in atomic physics, the chances of advancement are strictly limited.

The true intellectual and the odd genius are in much the same position because, although people of this type have contributed much to England's greatness in the past, it is increasingly difficult to carry out pure research on one's own, and scientists, like others, have not only to take work in industry in order to earn a living but have to conform to its dictates both as regards social behaviour and the subjects they are permitted to investigate. In many cases this means either getting a very poorly paid job or getting a very well-paid one much below their intellectual capacity, so that expert chemists are working on cosmetics, expert biologists on pet-foods when it is difficult to get public funds for the sort of research that really matters. Since in a complex society it is less easy to assess people at their true worth, people are increasingly judged in terms of their position and salary, and those who fail to fit into this scheme are often regarded as either failures or abnormal—even the psychiatrist has come to see "adjustment" as the ideal of his treatment without asking too earnestly "adjustment to what"?

Disillusionment.

Now the working-class intellectual who has taken the opportunities offered by the new society to improve his position is likely to find two attitudes which are traditionally foreign to his way of thinking: the notion that money is not only desirable but must be sought individualistically and at almost any cost to comfort and peace of mind, since it represents not only security but status, and the notion that literature and art is essentially an upper-class manifestation which, in so far as it treats of the working-class at all does so in a highly romanticised way. The reading or listening public does not want to be bothered with books and plays of working-class life unless they represent it as dramatic or sordid from a basically middle-class point of view. But traditionally the workers have attained what advantages they possess through co-operation rather than competition, and most of them have quite pleasant recollections of a life which was neither dramatic nor particularly sordid. Secretly they despise the type of society within which they, like everyone else, are expected to compete and find that it is not to their liking nor are their works dealing with what they regard as "ordinary" people to the liking of the public who read books or go to the theatre. They, as the most vocal members of their class, are as disillusioned as the scientific workers and raise their voices in protest only to find that their audience wonders with impatience what on earth they are angry about.

Reflection of Social Values.

In America, on the other hand, the pure scientist and the intellectual have always been regarded with suspicion as "egg-heads," and have had either to conform or openly defy society. Previously, they could turn away from society and lead some sort of life of their own on a basis, if not of liking, at any rate of mutual toleration. But now, as everyone is inexorably dragged into the whirlpool of what is graphically described as the "rat-race," it is increasingly difficult even to live without some degree of conformity—as we have seen, even their psycho-analysts will regard those who do not like existing social values as "maladjusted." The response of the "Beat generation" has been to reject social values *in toto*, to write nonsense poetry, to talk a private language, to assert indifference, to ignore conventional morals on the grounds that those who run the rat-race and make hydrogen bombs have no right to criticise anyhow. Such conduct not unnaturally is prone to lead at one extreme to mysticism, at the other to delinquency based either on indifference to social demands or positive revolt, which says in the words of one Beat: "Sure, I knocked out a guy's front teeth, broke a window and a coupla chairs. Sure, I take drugs. But *your* last little piece of delinquency cost twelve million dead and smashed up the half of Europe." To the "Beats" and the "Angry Young Men," as to delinquents, society is not "us" but "you."

Juvenile Delinquency: A Social Problem.

It would appear from statistics that juvenile delinquency is on the increase. Like most statistics, these have to be taken with a grain of salt, but that there has been some increase seems incontestable. Seventy per cent of all crimes are committed by those who are under 21, and the vast majority of these are working-class youths. The real problem is not merely what these figures mean in legal terms but what they mean in scientific and particularly sociological and psychological ones.

"Delinquency," like "insanity" and "crime," is a legal not a scientific concept, because crime is not necessarily synonymous with moral wickedness and a person who to the psychiatrist is suffering from a severe neurosis may be legally "insane." Hence as we increase laws we automatically "increase" delinquency and other forms of crime—*e.g.*, a law forbidding the purchase and carrying of flick-knives (which may be perfectly justifiable socially) will automatically bring to the attention of the courts many youths whose intentions were no different from that of the Boy Scout with his beloved scout-knife. Furthermore, the attitude of the police has changed over the years, so that minor forms of naughtiness, which at one time might have been rewarded by a boxed ear, are more likely to be dealt with otherwise and more officially, and the attitude of the authorities to specific forms of delinquency such as homosexuality or prostitution is undoubtedly influenced by periodic attacks of morality on the part of the public which leads to more arrests quite independently of any real increase.

The term "juvenile delinquency" therefore includes all sorts of cases, ranging from those with serious mental aberrations, through the rebellious and callous, to the merely unduly high-spirited and the puzzled émigré who cannot for the life of him see that marijuana is any more immoral than tobacco or alcohol. What the law disapproves of is not necessarily what society in general disapproves of or what a particular group considers to be wrong, as can be seen from the example of prohibition in America.

Poverty in itself has no direct relevance to delinquency and, in fact, delinquency is less common in the traditional type of society where the poor accept their position and look upon luxuries as "not for the likes of us"; but the situation is entirely changed in a competitive and mobile society where material failure means social death and those who are unable to climb the ladder they have so often been told about are prone to attempt the back door. Nor have television or films any direct influence—people did not become pirates because they had read *Treasure Island*—although, of course, television may supply ideas to those who have already decided on a life of crime. But there is no doubt that both films and television, together with cheap literature and magazines, have a *general* influence, not in making people do specific things, but in giving them a totally false picture of what life is really like and an exaggerated notion of the pleasures of wealth and ease.

IV. RECENT DEVELOPMENTS AND DISCOVERIES

SPACE RESEARCH.

Definition.

By space research we mean scientific research work which can only be carried out by means of equipment carried to otherwise inaccessible observing locations by rocket propulsion. Such propulsion does not rely on the presence of an atmosphere to provide oxygen so that it is capable in principle of conveying objects to unlimited distances. The subject of space research is, therefore, one which is concerned with scientific applications in various fields of a single highly specialised and powerful technique. It is not a single discipline, but can provide data of great importance for many, such as the physics of the earth, the sun, moon, and other bodies of the solar system, astronomy, geodesy, and the study of gravitation. The prospect of investigating the biological conditions on different planets such as Mars and Venus is also opened, as well as that of experimental biological studies under conditions of zero gravity. Although the results of many aspects of space research are vital for those concerned with the practical realisation of manned travel in space, space research is largely a branch of pure science, independent of any applications which may stem from it.

Scientific Applications.

The Earth's Upper Atmosphere.

The greatest altitude attainable by balloons is about 20 miles. Much of great scientific interest remains to be investigated at greater altitudes. The ozone layer, which absorbs ultra-violet radiation which would be lethal to plant life if it reached the ground, is concentrated about the balloon limit but extends upwards to about twice that height. Near the 60-mile limit a number of important atmospheric phenomena occur. Above this level the oxygen becomes predominantly monatomic in contrast to the normal diatomic form at lower altitudes. The ionosphere, a region in which concentrations of free electrically charged particles—electrons and positive ions—occur in sufficient concentration to affect substantially the propagation of radio waves through the region, extends upwards from a height of 60 miles to several hundred miles. It is in fact most concentrated at an altitude of over 200 miles. Meteors are mainly burnt up near the 60-mile level though very small micrometeorites—fine dust less than 10^{-3} mm. diameter—do not heat up sufficiently through atmospheric friction to evaporate, and gradually settle on the surface.

The bright atmospheric glows which are observed in the sky near polar latitudes—the northern aurora borealis and the southern aurora australis—are most frequently observed at altitudes near 60 miles but do extend at times to much higher altitudes. There exists also a much weaker glow—the night air-glow—which does not depend strongly on geographical location. Some of the light in this glow comes from photochemical reactions occurring at altitudes of 40–50 miles, some from much higher altitudes.

The behaviour of the upper atmosphere is strongly influenced by the sun. The electromagnetic radiation emitted continually by the sun is responsible, through its effect on atmospheric atoms and molecules, for the production of the ozone layer, the dissociation of diatomic to produce monatomic oxygen, the ionosphere, and the air-glow. When in a disturbed state the sun also emits streams of electrically charged particles which produce the auroral displays and a number of associated effects. These include disturbances of the compass needle which, when great enough, are known as magnetic storms, and disturbances of the ionosphere, particularly in polar latitudes. The marked concentration of the effect near polar latitudes is due to the influence of the earth's magnetic field on the streams of charged particles which produce the phenomena.

The frequency with which the sun is in a disturbed state and the intensity of the disturbance varies in a roughly periodic fashion over an 11-year cycle.

Although most of these atmospheric phenomena have been investigated for many years prior to the introduction of space research techniques, using ground-base equipment only, there are many important aspects which can only be studied if measuring instruments are sent up to the high altitude concerned. The most important is the measurement of the intensity and wavelength distribution of solar radiation before it enters the atmosphere. Those constituents of the radiation which produce the upper atmospheric phenomena are absorbed in the process and so do not penetrate to ground level. This includes ultra-violet light, X-rays, infra-red rays, and long radio waves, as well as charged particles when the sun is in a disturbed condition.

Many other aspects of the upper air can only be studied through space-research techniques. These include the composition of the charged particles in the ionosphere, the location of the electric currents in the ionosphere which produce the regular variations of the compass needle, as well as those which circulate during magnetic storms, the variation of the intensity of different radiations in the air-glow with height, the composition of the air at heights above 20 miles, and so on. In addition, the pressures, density, temperatures, and wind distribution can be studied more directly, in much greater detail, and up to much greater altitudes than is possible if one is confined to the use of equipment on the ground.

Meteorological Studies.

Instruments outside the atmosphere can make systematic observations on a world-wide basis of the atmospheric circulation, through observation of cloud cover and of the thermal radiation into space from the atmosphere. Such observations are of great importance for meteorology.

Study of Interplanetary Space around the Earth.

Direct observations may be made of the distribution of magnetic field, and of the composition and energy distribution of the neutral and charged matter present in the space outside the earth's atmosphere. This region is by no means empty, and includes a zone or zones of high concentration of particle radiation, extending out to distances of several earth radii. The systematic study of these radiation zones, which are connected with solar variability through the emission of solar corpuscular streams, forms an important branch of space research. In fact, the very existence of these radiation zones was discovered only through space research.

The Figure of the Earth.

The orbit of an artificial satellite vehicle is determined by the gravitational pull of the earth, together with the effect of air resistance. As the latter effect may be separated out, it is possible, from precise observations of the orbit, to obtain information about the earth's gravitation. This in turn depends on the shape of the earth, which may therefore be studied in a new and effective way.

Study of the Physics of the Moon and Planets.

Many important questions can be answered by means of probes sent to the neighbourhood of the moon and planets. These include the measurement of the magnetic fields, if any, of these bodies and, for the planets, the study of their atmospheres, much of which can be done without

actually penetrating to the surface. With instruments landed gently on the surface it is possible to investigate surface conditions and composition by many methods. Information on these questions can be obtained by photography and subsequent transmission of the picture back to earth by some form of television scanning.

Further Applications in Astronomy.

The possibility of observing solar radiation at all wavelengths from outside the atmosphere applies also to the radiation from other celestial objects, such as stars, nebulæ, and interstellar matter. Astronomical observations from the ground are confined to a study of the increase in visible light or in terms of the emission of radio waves with wavelength between 1 cm. and 30 metres. No other radiation can penetrate the atmosphere. With instruments operating outside the atmosphere the choice of radiation in which to observe is, in principle, unlimited, so that X-ray and ultra-violet astronomy becomes practicable.

The Nature of Gravitation.

The nature of the force of gravity is not properly understood. This is partly due to the fact that gravitational forces are very weak unless at least one of the interacting bodies is very large. The scope for experiment in this direction is extended very much if test bodies can be launched to come under the influence of different bodies in the solar system. It is possible also to test certain predictions of the General Theory of Relativity, which is the only theory at present extant which attempts to interpret gravitational forces in terms of more fundamental concepts.

Biological Studies.

One of the key problems in general biology is that of the uniqueness of life. Does anything which can be called life exist in the universe elsewhere than on the earth? It is very unlikely that anything remotely resembling life can have developed on the extremely hostile environment of the moon, but this does not apply with such force to the nearer planets, Venus and Mars. By using space vehicles launched into orbit which pass close to, or land on, these planets it is possible to investigate this important question. The problem is complicated by the need for complete sterilisation of the equipment used so that evidence of life does not stem from terrestrial organisms. It is also most important that the first material to reach the surface from the earth does not spread contamination from micro-organisms so as to make it impossible to study the natural biological conditions on the planet concerned.

In addition to this work, it is likely that use can be made of the environment within a space vehicle to study biological phenomena under conditions of zero gravity. Most other conditions which prevail in space can be simulated sufficiently closely in terrestrial laboratories.

Techniques of Space Research.

The major technical problems involved in space research are:

(a) Launching of the instrument-containing vehicle with the necessary velocity.
(b) Guidance and control of the vehicle so it pursues the desired path.
(c) Tracking the vehicle to determine its actual path and the position on the path at any time.
(d) Transmission of the data, recorded by the instruments, back to the earth.
(e) Satisfactory operation of scientific instruments in the environment within the vehicle.
(f) Provision of adequate power supplies to operate the equipment within the vehicle for sufficiently long periods.

Types of Vehicle.

It is important to distinguish three distinct types of vehicle—the vertical sounding rocket, the artificial earth satellite, and the deep space probe. The track of a vertical sounding rocket is mainly vertical, and the whole path to the highest point and back is traversed in a few minutes only. An earth satellite circulates in an orbit round the earth in the same way as does our natural satellite, the moon. If it approaches the earth at any point within 100 miles of the surface the air resistance causes the path to spiral in so rapidly that the vehicle is burnt up by air friction within the dense atmosphere after the lapse of a few months only. It follows that artificial satellite vehicles are only useful as instrument containers if the distance of closest approach (the perigee distance) is not much less than 100 miles. For the study of the properties of the atmosphere at lower altitudes down to the limit (20 miles) attainable by balloons, vertical sounding rockets must be used. It is a great advantage for work at higher altitudes to use satellites, as it is then possible to make systematic observations for months at a time from a great number of positions relative to the earth.

Deep space probes include vehicles which pass out to great distances from the earth and may leave the neighbourhood of the earth for ever to become artificial planets. Such probes might pass close to the moon or planets or may merely pursue paths well out into interplanetary space.

Launching Velocity.

The provision of sufficient launching velocity involves the use of rocket motors with adequate thrust. To launch a satellite into an orbit circulating within a few hundred miles of the surface a velocity of 18,000 m.p.h. must be imparted. This may be done by using a multi-stage launching system. When the first-stage motor has burned out it drops off, so that, when the second-stage motor ignites, it does not have to support the weight of the first-stage, and so on.

If the launching velocity is increased to 25,000 m.p.h. the vehicle will not return to the neighbourhood of the earth but pass out of the range of the earth's gravitational pull completely. Unless the launching velocity reaches 100,000 m.p.h. it will not escape from the sun and will become an artificial planet.

It is possible in principle to continue to guide a vehicle along a chosen path, after all the launching stages have operated, by utilising radio command signals from the ground to operate controls within the vehicle. In practice, this has been little used up to the present, the guidance and control being built into one of the penultimate stages so that the vehicle is finally launched not only at a speed, but also in a direction, falling within prescribed limits. To launch a near artificial satellite, the direction of projection must be correct within 1° or so.

It is possible in this way to launch a body to make contact with the moon, though the tolerable launching errors are rather smaller—½° in direction, 60 m.p.h. in speed, and a few minutes in time. The problem of guiding vehicles to the near neighbourhood of the planets is much more difficult still, particularly as the distances of the planet from the earth at any particular time are not known to within 10,000 miles or so.

It is not possible to launch a body so that it becomes a satellite of the moon unless braking rockets are included which fire at a suitable point within the moon's sphere of influence (a sphere of radius about 40,000 miles centred on the moon) so as to reduce sufficiently the speed relative to the moon.

Tracking Methods.

Tracking the path of a space vehicle, such as a vertical sounding rocket or near earth satellite, is carried out by optical and by radio means. For

the latter purpose a radio beacon is included within the vehicle so that radio direction-finding may be used. Radio methods are particularly important for acquisition in the case of earth satellites—the initial observation of the vehicle after it has been placed in orbit. Once this has been achieved, optical methods are more accurate.

It is very difficult to follow deep space probes out to great distances by optical observations, as they become extremely faint objects. Attempts have been made to overcome this by causing the vehicle to eject sodium vapour on suitable occasions when sunlit. The vapour stream fluoresces a comparatively bright yellow in the sunlight and assists visual detection. Most reliance must be placed on radio methods, but, even with these, the range of observation is limited by the faintness of the signal compared with background noise. It has, however, been possible to follow the paths of probes passing near the moon out to distances as great as 300,000 miles, by radio direction-finding.

Radio methods are also vital for the transmission of observed data back to earth. This is done by converting the observations into electrical pulses which actuate a suitable radio transmitter so that it radiates a signal, in coded form, which can be received at a ground station and decoded. Problems of the range over which this can be done are at least as severe as for radio-tracking, but on several occasions data has been successfully received from vehicles in the neighbourhood of the moon—240,000 miles from the earth—and this is by no means the limit.

Instruments.

For satisfactory operation of the instruments within a satellite or space probe the internal temperature must be maintained within fairly narrow limits. This may be done by suitable coating of the surface of the vehicle, as the temperature is largely determined from a balance between the adsorption and emission of radiation. Automatic thermostatic controls may be used as an alternative, in which shutters are opened or closed to include or exclude solar radiation. Instruments must be robust enough to withstand launching shocks and vibration and be capable of operation, without maintenance, for long periods.

Conventional batteries may be used as power sources, but for a long lifetime their weight becomes excessive. Solar cells, which convert solar radiant energy into electrical power, are now being introduced, but some form of storage battery is still needed in order that power should be available when the vehicle is not in sunlight. (*See* **F53 (1)**).

Scientific Results Obtained.

The Solar Radiation.

In the visible region the sun radiates as if it were a black body at a temperature of 6,000° K. (Absolute zero on the Kelvin temperature scale is approx. −273·15° C.) It has been found from observations with equipment in vertical sounding rockets that the intensity of solar radiation in the near ultra-violet is less than would be expected for such a body. Thus, at a wavelength of 2,400 Å. (Angstrom = 10^{-8} cm.), the intensity is that which would be indicated by a body of the size of the sun at a temperature of 5,000° K. This tendency becomes more marked as the wavelength decreases until wavelengths of about 1,200 Å. are reached. For smaller wavelengths there is evidence of an increased effective temperature. This becomes very marked for X-rays with wavelengths below 50 Å. The intensity of these rays emitted by the sun very greatly exceeds that which would be emitted if it were a body at the effective temperature of 6,000° K.

Much work still remains to be done before the normal intensity emitted by the sun at all ultra-violet wavelengths has been accurately measured. The study of the variability of the radiations has only just begun. When a violent disturbance or flare occurs on the sun there is an increased emission of short X-rays.

Particle radiation from the sun is discussed below under the heading of "Radiation Belts."

Atmospheric Structure.

The pressure, density, temperature, and wind distribution in the atmosphere up to altitudes of 100 km. or so has been investigated at White Sands, New Mexico, at Fort Churchill, Canada, at Woomera, Australia, and at several locations in the Soviet Union, using vertical sounding rockets.

Pressure and density have been measured using pressure gauges located at suitable places on the shell of the rocket. Soviet investigators have made direct temperature measurements using resistance thermometers, but in other countries the temperature distribution has been obtained indirectly by deriving the speed of sound as a function of height. This is done by a sound-ranging method in which grenades are ejected at regular intervals from a rocket, to explode at a distance of 50 ft. or so from its trajectory. The grenade explosions are located in space by photography and in time by recording the times of arrival of the light from each flash at photoelectric detectors on the ground. Finally, the times of arrival of the sound pulses from each explosion are recorded by an array of microphones. From this information it is possible to derive not only the mean speed of sound through the atmosphere between successive grenade explosions but also the mean east–west and north–south wind speeds.

Results have confirmed the general nature of the variation of temperature with height which had been deduced from ground-based or balloon-assisted studies. Much more detail has been obtained, but it is still not certain whether daily or seasonal effects can be discovered. Many more observations are still required.

Direct measurements at higher altitudes are much fewer in number and limited almost entirely to use of pressure gauges for determination of density. Information at altitudes above 200 km. is available from observation of satellite orbits.

Air resistance causes the period of revolution of a satellite to decrease gradually at a rate which depends on the air density at the perigee (the closest point of approach to the earth's surface). If the dimensions of the satellite are known it is possible to derive the air density from the observed rate of change of period at any time. Results have been derived in this way out to altitudes of 700 km., where the density is about 2×10^{-13} of that at ground. The associated temperature comes out to be as high as 1,000° K. Marked irregular variations of density seem to occur, one component of which seems to be correlated with solar activity. No diurnal and seasonal effects are clearly distinguished. This seems to be in conflict with the highest altitude, vertical-sounding rocket data, which exhibits strong diurnal and seasonal variations.

The Ionosphere.

A great deal of new information about the ionosphere has been obtained by the use of instruments in vertical sounding rockets. The variation of electron concentration with altitude has been studied in detail on many occasions, even under conditions in which no radio transmission over long distances from the ground was possible. Such conditions occur quite frequently in polar regions due to downward extension of the ionosphere.

Information about the way the ionosphere fades off at heights above 200 miles from the earth, which cannot be obtained from ground-based observations, may be derived from precise observations of the radio signals from a transmitter in a satellite which is circulating in an orbit extending to distances greater than 200 miles from the earth.

This is only possible if the frequency of the radio signals from the satellite is not too high. The first Russian satellites used transmitters at suitable frequencies, and a great number of observations have been made of these radio signals, from which data have been obtained about the high ionosphere.

The nature of the free positively-charged particles in the ionosphere have also been studied using mass spectrographs—instruments which determine the masses of the particles—flown in vertical sounding rockets. The rather surprising result has been found that, at altitudes below 100 miles, the main positive particles are ions NO^+ of the molecule nitric oxide, rather than ions (O^+, O_2^+) of oxygen or (N^+, N_2^+) of nitrogen. At much greater height the chief positive ion is that of atomic oxygen, according to observations made with instruments in the third Russian satellite.

Many more investigations are in progress using instruments in vertical sounding rockets and in satellites which are designed to study every aspect of the ionosphere, including the mean energies of the electrons.

The Figure of the Earth.

Much more detailed information than hitherto has become available about the shape of the earth from precise observations of the orbits of the first satellites. This is because the force exerted by the earth on a satellite depends on the figure of the earth. Although it has been known for a long time that the earth is not exactly spherical but is flattened at the poles, satellite studies have shown that the amount of flattening is not exactly that previously assumed. It is usually given in terms of the ratio, $(a - c)/a$, of the difference between equatorial and polar radii to the equatorial radius. The value of this ratio was taken to be 1/297·1, but analysis of the data obtained from satellite orbit observation shows that it should be 1/298·21.

It has been found also that the earth is slightly pear-shaped, with the stalk towards the north pole. The scale of this effect is such that the south pole is 100 ft. nearer the centre of the earth than the north pole.

Much more detailed information will be obtained from further, more accurate, observations of satellite orbits.

The Radiation Belts.

The first two satellites launched by the U.S.A., *Explorers I* and *III*, carried counters to observe the intensity of cosmic radiation. Although this radiation is composed of very energetic positively-charged particles, the counters were also responsive to much less energetic particles. The first results were perplexing. When the satellites were within a few hundred miles of the earth's surface the counters recorded just the intensity expected of the cosmic rays at that height, but no particles were recorded when the satellite receded to distances of 600 miles or more. This behaviour was repeated through many cycles of revolution of the satellites. As nearly all the cosmic rays originate outside the solar system, their intensity could not have fallen to zero at the greater distances of observation. Instead, van Allen suggested that the intensity of radiation is actually so high at these distance that the counters were unable to follow it. He verified by laboratory experiment that this would indeed happen if the intensity exceeded that of the cosmic rays by more than 10,000 times.

This explanation was confirmed by including in the next American satellite, *Explorer IV*, counters which could respond to the high intensity. Meanwhile, equipment for studying particle radiations was included in the third Russian satellite *Sputnik III*. The orbit of the satellite passed over rather higher latitudes than did those of the *Explorers*, and evidence was obtained that at these latitudes the region of intense radiation penetrates close to the earth. It was also established that the particles involved were much less energetic than cosmic rays.

The next big discovery was made with counters in *Pioneer I*, the space probe launched by the U.S.A., which reached a distance of 71,000 miles from the earth before returning to burn up in the atmosphere. Here counters showed that there were two zones of high intensity of particle radiation, one concentrated at a distance of 1,000 miles, the other at a distance of about 15,000 miles. There seems no doubt that a close relation exists between the shapes of the regions and the earth's magnetic field. The inner zone is confined to relatively low latitudes, while the limits of the outer zone follow closely the magnetic lines of force of the earth's field, so that at high latitudes it approaches much nearer the surface. The closest approach is at latitudes where auroral displays are most frequently seen.

Trapping of electrically charged particles by the earth's magnetic field was predicted as long ago as 1913 by Störmer, on the basis of theoretical calculations. Such particles can be released by collision with other particles or by fluctuation of the magnetic field. It is therefore necessary that a source or sources of charged particles be available to make up for loss in this way. It is considered that the outer zone is maintained through replacement by irregular emission of charged particles from the sun. This is consistent with the observations from the counters in *Pioneer IV*, the American space probe which passed the moon to become an artificial planet. This vehicle was launched during a period of solar disturbance, and the intensity in the outer belt was found to be much greater than during the flight of *Pioneer I*, which took place during a quiet phase of the sun. It is also consistent with the observations from Russian equipment in their first lunar probe, which showed that the charged particles in the outer belt are of relatively low energy compared with those of the inner belt.

This belt is considered to be maintained by secondary particles shot outwards from the atmosphere due to impact of cosmic rays on the nuclei of atmospheric atoms.

Artificial radiation belts were created on three occasions during 1958 by exploding rocket-borne atom bombs (of conventional type) at a height of 300 miles in the atmosphere above the South Atlantic. Charged particles produced in the explosions were trapped by the earth's field to form a belt about 60 miles or so thick around the earth between the two natural zones. These artificial belts lasted for five days or so, during which time they were observed by the counters in the satellite *Explorer IV*.

The Moon.

The second Russian lunar probe, which succeeded in hitting the moon, contained a magnetometer to observe any lunar magnetism. This operated to within 50 miles of the surface, but recorded no magnetic field, suggesting that the moon cannot have any appreciable magnetism. Supporting evidence is provided by the failure to observe any zones of intense particle radiation around the moon due to trapping by a lunar magnetic field.

The third Russian lunar probe passed behind the moon and took photographs of that part of the lunar surface which is never visible from the earth. These photographs were automatically processed and then scanned for electrical reproduction. The results of the scan were transmitted by radio signal, on command from the earth, at the next point of closest approach of the vehicle to the earth. From these data the picture was reconstructed on the earth, showing for the first time some of the hidden features of the moon.

Rocket Astronomy.

The first observations of the northern sky in ultra-violet light were made in 1957 with instru-

ments in a rocket launched to a height of 90 miles from the U.S.A. It was found that the regions of greatest intensity of the ultra-violet rays concerned (wavelength 1,300 Å.) did not all coincide with the brightest regions in visible light.

SOURCES OF POWER.

In twenty-five years time four thousand million people will inhabit the earth. How many will there be a century from now, how much power will they need and where will it come from? To people with a speculative turn of mind these questions are interesting, if not disquieting.

There is no way of making energy out of nothing. Energy in a useful form is obtained by converting it from some less useful form. In many parts of the world the chief agents for this are the muscles of men and beasts. In more developed countries these are helped by machines which derive their energy from the burning of fuels like oil and coal. In both cases the useful energy comes from the chemical energy stored in the food or the fuel.

Hydro-electric generators are driven round by the power of falling water. This is the extraction of useful energy through the indirect agency of the sun and the atmosphere, for it is these that provide the rainfall and the rivers. This source of power is therefore virtually inexhaustible.

However, energy has not only to be generated, it has also to be taken where it is needed. This means fleets of oil tankers and millions of miles of electric cables. There must be much unexploited hydro-electric power in, for example, Canada and Siberia, but suitable rivers and valleys are not necessarily near concentrations of population. Similarly, if (it is quite a big if) the sun's heat could be turned directly into electricity, the obvious places to do this would be the hot, cloudless deserts like the Sahara, which are far from the industrial areas where power is needed. Much, however, can be expected from new developments in power transmission. New ways of conveying electricity by high-voltage D.C. systems instead of the usual A.C. are being tried out in Russia and Sweden; and the considerable engineering feat of carrying high-power cables across long stretches of water has been performed in Sweden, Italy, and elsewhere. In due course the electrical power systems of whole continents will be linked together, with a consequent gain in efficiency.

Nevertheless, however perfect the *distribution* system, *generation* comes first. No doubt there are still vast reserves of coal in, for example, China; and the French have this year (1959) tapped the great Saharan oilfield. But, sooner or later, the combustible minerals will be exhausted. Meanwhile power demands will increase. In a modern city, when a district is rebuilt, its electricity demands are trebled. The people of underdeveloped countries, *i.e.*, the majority of the world's population, need vast amounts of power. Furthermore, as the richer deposits of fuel and metals are used up, it will take more and more power to extract chemicals and metals from the poorer ores, *i.e.*, we shall have to spend more power simply to maintain a given standard of living, let alone to advance it.

It is therefore clear that attention must be turned to sources of power that are, for all practical purposes, inexhaustible. Hydro-electric sources are an obvious example, and it has been estimated that when coal and oil are exhausted hydro-electricity will supply about 5% of the world's energy requirements.

The winds and the tides are other possibilities. Projects for using tidal water flows to generate electricity have not generally been regarded as very economic, but they are certainly possible technically, and the French are building such a scheme at present. A scheme for the Severn estuary has been discussed for years. Winds are obviously not very reliable for continuous large-scale power generation, but wind-driven electricity generators can be very valuable for local small-scale work like pumping, battery charging, milling, and so on. There is a 100-kW wind-driven electricity generator operating in North Africa, and the Soviet Union has many thousands of small wind engines at work. However, the main hope for the coal-less and oil-less future lies in nuclear energy, and to that we now turn.

Power from Nuclear Energy.

In this section we try to explain where nuclear energy comes from. It is widely appreciated that an atom is a very small system made up of electrons surrounding an even smaller nucleus (**F10**). The movements of electrons are the key to chemical behaviour. For example, when coal burns, heat (and therefore tractive power or electricity) is obtained because the electron systems in the products of combustion contain less energy than those of the original coal and oxygen; the difference has, at least in part, been made useful. The electrons, and chemical reactions, are not essentially involved in nuclear energy, and we therefore focus attention on the nucleus itself.

Nuclei consist of protons and neutrons joined in various proportions (**F10**). The heaviest naturally occurring nucleus contains 238 particles (92 protons, 146 neutrons) and is uranium 238 (U^{238}); the lightest is hydrogen, which consists of 1 proton. Neutrons and protons attract one another by very strong forces which are not at all well understood; they are called *nuclear forces*. Consequently it requires energy to be supplied if a nucleus is to be pulled apart into its constituent particles. The energy is required to overcome the attractions of the nuclear forces. Conversely, when the particles rush together to form a nucleus, energy is released in the form of heat or radiation. From an energy point of view the situation is analogous to the production of hydro-electric power. For, in that case the gravitational attraction of the earth means that energy must be supplied (by the sun) to lift water (rain) up to a mountain-top. It then rushes down (a river) under gravity, releasing the energy which turns the hydro-electric generator. Here gravitational forces act instead of nuclear forces but the idea is the same.

Binding Energy.

The energy released when protons and neutrons coalesce to form a nucleus is called *Binding Energy*. The binding energy of a nucleus divided by the number of particles involved is called the binding energy per particle, which we will call B. It is very difficult to overestimate the importance of B to the human race. B varies from nucleus to nucleus, and the exact form of its variation is only roughly understood at the present time. But the most significant thing is that B is greatest for elements of medium atomic weight and lowest at the heavy (uranium) and light (hydrogen) ends of the periodic table. This means that if middle-weight nuclei can be formed either from heavy ones or from light ones, B increases and *energy is released in either case.*

Nuclear Fission.

The first of these alternatives is called nuclear fission and the classic case is the fission of U^{235} first demonstrated by Hahn and Strassman in 1939. U^{235} (92 protons, 143 neutrons) is about 0·7% of natural uranium, of which the bulk is U^{238}. Nuclei readily absorb extra neutrons and, if U^{235} does this, it forms U^{236}, which instantly explodes into roughly equal fragments. The fragments are middle-weight nuclei, and there is a consequent energy release, which is detectable in several ways and ultimately convertible to heat. This is the basic source of useful nuclear energy at present.

It would not be so useful but for the circumstance that in the explosion several neutrons are emitted besides the two large fragments. The emitted neutrons can *in principle* enter other U^{235} nuclei and repeat the process, which therefore becomes self-propagating like ordinary chemical

burning. This is called a *chain reaction*. Whether a chain reaction actually occurs or not is a matter of technical design, and this brings up the question of the *nuclear pile or reactor*.

Nuclear Reactors.

Nuclear reactors are pieces of apparatus designed to permit nuclear chain reactions to occur under controlled conditions. (Uncontrolled chain reactions are dangerous, *e.g.*, atomic bombs.) The success of a reactor depends on the neutrons reaching the U^{235} nuclei to produce more fissions and not being wasted in irrelevant processes or simply escaping through the wall of the apparatus (neutrons are quite difficult to contain). The neutrons leaving the scene of fission are rapidly moving, and they stand more chance of causing another fission if they are slowed down. Consequently a material other than the uranium has to be present to facilitate this, and it is called a moderator. A useful moderator is pure graphite. Thus a reactor may consist of alternate blocks of uranium and graphite. If the reactor is too small so many neutrons escape that there are not enough to keep the chain reaction going. The reactor must therefore be greater than a certain *critical size*. In order to intensify or damp down the chain reaction, it is arranged for pieces of neutron-absorbing material, such as cadmium, to be inserted or withdrawn as required.

While the chain reaction is proceeding countless numbers of fissions are occurring, each one liberating energy which turns into heat. The temperature therefore increases, and to prevent a catastrophic rise, cooling has to be provided. The reactor therefore has cooling pipes through which a fluid coolant is pumped. The coolant carries the heat away and, in a reactor designed to produce electrical power, the heat is taken to steam-raising boilers and the high-pressure steam is led to turbines which drive the electric generators.

What we have thus briefly described is the type of reactor first used for serious power production at Calder Hall. This is a graphite-moderated, gas-cooled reactor using as fuel natural uranium (*i.e.*, fissile U^{235} greatly diluted with U^{238}). It produces 46 Megawatts. There is no space to deal with the technical problems, which, over the last two decades in several countries, have been overcome by technological effort which will undoubtedly be remembered for all time. It changed the nature of war and transformed the prospects of material well-being over the whole earth.

Breeding.

U^{235} in natural uranium is the fissile fuel, but the U^{238} is not just inert. It reacts with some of the neutrons in the reactor, ultimately turning into a completely new element, Plutonium (Pu), not found naturally on earth. Pu^{239} will undergo fission and is a possible fuel; it is also of military value. Thus the generation of Pu^{239} from U^{238} in the Calder Hall type of reactor is an important matter, over and above the electricity production. Another fuel is U^{233}, which has similarly to be made artificially from Thorium 232 (Th^{232}). It is possible in a reactor to produce fissionable matter (new fuel) faster than it is being consumed. This process is called *breeding*, and is very important from a long-term power-production point of view because it means that vastly more nuclear fuel is potentially available. In fact, it has been computed that there is enough uranium and thorium in the earth's crust to provide the human race with all the energy it will need for so long as it is likely to survive; and this could be done by mining suitable rocks on a scale similar to our present coal-mining effort. This is a comforting, though necessarily rather imprecise, statement.

Types of Reactor.

The Calder Hall type of reactor is one of many possibilities; theoretically there are over a hundred different kinds. The variety arises because fuel, the coolant, and the moderator have alternatives. Different fuels have already been mentioned. Moderators other than graphite are water, heavy water (*i.e.*, water in which the heavy hydrogen isotope, deuterium, replaces ordinary hydrogen), and beryllium. Gases and various liquids, including liquid metals, can be used as coolants.

It is also possible to make reactors work without slowing the neutrons with a moderator; these are called *fast reactors*. Britain, the U.S.A. and the U.S.S.R. have the fast reactors under observation or construction. The reactor at Dounreay in Scotland began operating on trial in November 1959 after about five years' constructional work. It is a fast-breeder reactor using liquid metal (sodium–potassium alloys) as coolant.

The Americans have had spectacular successes with their nuclear-powered submarines, proving that it is quite practicable to use reactors in propulsion plant. The Russian ice breaker, *Lenin*, has three reactors for motive power. A merchant ship of 22,000 tons is being completed in the U.S.A. and its 20,00-h.p. turbine will be driven by steam from a nuclear heater. This ship, the N.S. *Savannah*, is the first nuclear cargo ship, and it will raise and solve many new problems of marine engineering.

Nuclear-propelled ships, and for that matter, nuclear power-stations, are not necessarily economic propositions. The *Savannah* certainly is not and the British nuclear electricity production, with several stations in operation or under construction, will be hard put to it to compete successfully with conventional methods *so long as coal and oil are plentiful*. It is in the more remote future that nuclear power will become indispensable, and in this context nuclear *fusion* is important.

Nuclear Fusion.

Nuclear fusion is the second of the two alternatives mentioned in the paragraph on binding energy. If light nuclei are hurled at high speeds into intimate contact they sometimes coalesce and release binding energy. This has been studied in laboratories where powerful and energy-consuming machines accelerate small numbers of particles for purely experimental purposes. If useful amounts of energy are to be gained these fusion reactions will have to occur on a bigger scale in an apparatus from which the resulting heat can be extracted in a controlled way. The one "useful" fusion device so far made is the thermonuclear bomb ("H-bomb").

Thermonuclear is the important word. If a suitable gas can be raised to a very high temperature the nuclei are stripped of their electrons and all particles move with very high speeds. The gas is then called a plasma. High enough temperatures will make speeds great enough for fusion reactions to occur and nuclear energy to be released. This is a thermonuclear reaction. For example, in deuterium gas, at temperatures over a million degrees Centigrade, the deuterium nuclei (*i.e.*, heavy hydrogen nuclei consisting of 1 proton joined to 1 neutron) interact to produce helium nuclei. To obtain a net gain in energy from this process, the temperature must be raised to about 300 million degrees C. and maintained long enough; otherwise the energy released is less than that required to heat the fuel and to make up for heat losses.

Many attempts to study the staggering technical problems are being made. In the Harwell machine Zeta the deuterium gas is contained in a metal tube shaped like a tyre 3 metres across. The temperature is raised by passing a huge electric current (about 200,000 amps.) through the gas for a few thousandths of a second. Temperatures up to 5 million degrees were produced, and new apparatus is stepping this up. Neutrons were detected, but the original view that

these were evidence of true thermonuclear reactions did not survive later studies.

Clearly the hot gas must be kept away from the tube wall, otherwise the gas will cool and the walls heat up. The method of doing this is worth noticing.

A current-carrying wire always experiences a force if it is in a magnetic field. This is the well-known electrodynamic force, and electric motors work because of it. If the current is carried in a fluid, *e.g.*, a liquid metal or a plasma, these forces cause bodily movements of the fluid, which are in general very difficult to calculate. The forces are then called *magnetohydro-dynamic forces*. Now magnetic fields are themselves produced by electric currents; so a current flowing in a fluid produces a magnetic field, which then reacts on the fluid itself by means of the magnetohydrodynamic forces. In Zeta this effect acts so as to constrict the electric discharge on to the axis of the tube and thus keeps it away from the walls. This action is assisted by an extra magnetic field produced by a separate current flowing in metallic conductors outside the tube. Thus the hot plasma is contained by magnetohydrodynamic forces and not at all by the material tube wall. In practical devices of the future magnetic forces may have to sustain plasma pressures of 60 atmospheres —a pressure for which a thick steel wall would normally be used!

Zeta is not the only, nor necessarily the most hopeful, approach to thermonuclear fusion. The Russians, French, Swedes, and Americans have experiments in progress, some on quite a large scale. In all the promising cases magnetic fields of one sort or another are relied upon to keep the plasma contained in a small volume of space while it rises to enormous temperatures.

Why is all this effort important? Because if energy could really be extracted from a thermonuclear reaction in deuterium plasma we should have an assured source of energy for all time in the deuterium contained in the sea. 1 gram of deuterium will, in principle, yield about 20,000 kilowatt hours of electricity. The deuterium has, of course, to be extracted by electrolysis, but the cost of this will be a small fraction of the value of the energy gained—once the fusion reactors have been developed. The most optimistic estimates for the development of a useful power producer is ten years; but fifty years has also been suggested.

It is not clear whether nuclear fusion or nuclear fission will ultimately be the best method, but, in either case, the fuel seems assured for ever.

Energy Converters.

Presumably nuclear power-stations will be large concentrated sources of power sending out their power along electrical transmission lines, or they will be for large vehicles like ships. But there are other and smaller energy requirements that are important—for land transport, for portable radios and mobile machinery, for heating and cooking. The petrol- and oil-burning motor will be important as long as coal and oil hold out and, even after that, liquid fuels could be made from timber or from carbon-containing rocks, though the extent to which this would be economic is difficult to predict. Failing this, small vehicles and machines could be driven by electric batteries.

Batteries.

A battery is a device for converting stored chemical energy into electricity, which can then be used for heat, light, traction, or any desired purpose. Primary electrical power, from an oil or nuclear station, must first be available, since batteries have to be fabricated in a power-using factory and the necessary chemicals have to be produced. After that, the battery may need charging periodically like the well-known lead-acid accumulator.

The most well-known battery is the Leclanché dry cell used in torches. It is interesting that today, about a century after it came into common use, it is still the chief source of power in the tactical electronic equipment of the highly mechanised U.S. army. There are, however, many other types of cell, some under active development as space travel and missile warfare call for batteries of lighter weight and utmost reliability.

Fuel Cells.

A recent development is a type of battery into which the active chemicals are fed from external fuel tanks. This is the *fuel cell*, which is being developed in several countries. In August 1959 F. T. Bacon of Cambridge University demonstrated his fuel cell driving a fork-lift truck and a welding machine.

The Bacon fuel cell consists of two electrodes of porous nickel dipping into a solution of caustic potash in water. One electrode is supplied with hydrogen gas from an outside cylinder and the other with oxygen. These gases, forming layers on the nickel, are the active chemicals. The oxygen combines with water to make two negatively charged ions, each consisting of an oxygen and a hydrogen atom joined together (a hydroxyl ion). The hydroxyl ions travel through the solution to the hydrogen electrode, where they combine with hydrogen to form neutral water. Their negative charge (one electron per ion involved) has now arrived at the hydrogen electrode and is ready to flow back to the other electrode through any outside circuit that is provided. This flow constitutes the useful electric current, and it has been provided at the expense of creating water out of the original hydrogen and oxygen. The water can be removed in the form of steam.

What is the advantage of all this? In the first place the fuel gases are easy to make and to store in cylinders. Supplying a new gas cylinder is easier and quicker than recharging an ordinary accumulator. Furthermore, a fuel cell is lighter for a given power than an accumulator; satellite designers may find them useful. The fuel cell is not damaged by heavy overloading, and this is valuable for application to vehicle driving. Fuel-cell-driven buses could combine the advantages of diesel buses and trolleybuses.

Fuel cells are still in the development stage. It is not certain how they will compete with combustion engines or, in the oil-less future, with improved ordinary batteries.

Thermo-electric Devices.

If two wires of different materials are formed into a loop and if the two joins are kept at different temperatures a current flows in the loop. This was discovered by Seebeck in 1822, and the device is called a thermocouple. The electric current could in principle be made to drive some useful machine, and the energy comes from the heat that is absorbed by the thermocouple—if one part of the thermocouple is not hotter than the others it will not work.

It has long been realised that this is a device that converts heat directly into electricity without raising steam and driving dynamos as in a power-station. However, until recently nobody has used thermocouples for much besides temperature measurement, for which they are exceedingly useful. The new development is the manufacture of semiconductors (F17); for the thermoelectric effects of these new materials are much greater than those of metals. A material much studied in this connection is a compound of bismuth and tellurium, bismuth telluride.

It now seems practicable to generate useful electricity from suitably designed thermocouples. For example, the U.S.S.R. produces a thermoelectric device which uses the heat from the chimney of a domestic oil-lamp to produce enough electricity to work a radio. Presumably

this is very useful in remote parts with no electricity supply. But the possibilities do not stop there. Indeed, an eminent Russian authority has stated that thermocouples could produce electricity direct from the warmth of sunlight on a scale and at a cost comparable with conventional fuel-burning power-stations. Even if solar energy cannot be so used, it might be possible to use the heat of nuclear reactors, but this means that the thermoelectric devices would have to stand up to very heavy radioactivity and still work. It is not surprising, however, that many firms are showing great interest in thermoelectricity these days.

Solar Batteries.

Many people are familiar with photo-electric cells—devices which react to light by giving out a small electric current. The variety called *photovoltaic* gives a current whose energy is derived entirely from the light that falls on it. A Swiss firm has used this to make a clock driven by ordinary daylight and nothing else.

A solar battery is a type of photo-electric cell specially designed to give as much electrical power as possible from sunlight falling on it. Once again, we have the possibility of direct sunlight-to-electricity conversion, and again it is semiconductors that have made this possible. The best solar batteries are made of silicon, and they have already proved their worth by providing electricity for apparatus in satellites. Whether large-scale electricity production is feasible this way is still a matter for doubt, discussion, and research.

Thermionic Generators.

A diode radio valve is described on page X8. Essentially what happens is that a hot metal gives off electrons which are collected by another metal electrode, flow through an external circuit and back to the emitter. Provided heat is supplied to the emitter, the current will go on flowing. Here again is a direct method for turning heat into useful electricity. Such devices, considered as electricity generators and not as radio valves, are in their infancy, but theoretically they should be at least as efficient as thermo-electric devices, and would be smaller for a given power. Perhaps they too can use directly the heat from nuclear reactors to give us some at least of the electricity supplies of the future?

Solar Energy.

Many attempts have been made to use sunlight as a power source. Its great advantage is that it is inexhaustible and, at least in suitable climates, it shines every day. The disadvantages are severe; many climates are not suitable, and in any case there is no sun at night; and the intensity is not very great.

Nevertheless, small-scale use is certainly practicable. Mirrors have been used to concentrate sunlight for cookery and for raising steam to drive engines. Solar batteries and thermoelectric circuits have opened new possibilities, certainly for specialised uses and possibly for large-scale power generation.

It has been estimated, however, that if a world population of about seven thousand million were to obtain all its energy from sunlight, then 100,000 square miles of the earth's surface would have to be devoted solely to collecting the necessary rays. Vast installations would have to store the energy overnight, convert it into some transportable form, and deliver it to the centres of population. The capital cost of this would be comparable with the cost of the Second World War, and the scheme is not necessarily impossible. But to quote A. Weinberg, the director of the Oak Ridge National Laboratory, "it does seem extremely unwieldy."

We may therefore conclude that it is just as well for our immediate descendants, and our contemporaries in underdeveloped countries, that there is plenty of oil and coal to get on with, and that there is nuclear power to fall back on in the end. Whatever disabilities the future may bring, an overall lack of power does not seem to be one of them; and who knows what unimagined sources of power remain to be discovered?

CURRENT PROBLEMS IN COLOUR VISION.

A basic problem of colour vision is to find out what enables the retina to make a different response to light of different wavelengths. The light-sensitive elements of the retina fall into two anatomically distinct groups, the rods and the cones. It is usually assumed that colour differentiation depends entirely on the cones. According to the theory proposed by Young and later by Helmholtz in the nineteenth century, which is still the most popular theory, the cones are of three types, each with a different spectral sensitivity. One type is held to be most sensitive in the red region of the spectrum, a second in the green, and a third in the blue. (The graph showing how the sensitivity of a cone varies with wavelength is called a spectral-sensitivity curve.) Except when factors such as contrast enter (see below), the colour seen is presumed to depend on the relative strengths with which three different types of cone are excited by the incident light. On this theory, if the incident light contains a number of different wavelengths (*i.e.*, light from different parts of the spectrum), only a single colour is seen, because the same relative excitations of the three types of cone could be produced by monochromatic light. When appropriate spectral sensitivity curves are postulated for the three types of cone most of the facts concerning colour mixture, variation in the sensitivity to colour (wavelength) change along the spectrum, and similar phenomena can be explained.

Are There Different Types of Cone?

Recently, methods have been developed which provide rather more direct evidence of whether the postulated types of cone exist. In one method, devised by Hartridge, an instrument like a microscope in reverse is used to stimulate an exceedingly small area of the retina. With white light, different colours are seen as the stimulator is moved slowly across the centre of the retina, and this could be due to successive stimulation of different types of cone. But only slight colour changes are seen when the experiment is repeated with monochromatic light. This is difficult to explain if the spectral sensitivities of the different types of cone overlap. Yet unless they overlap, the Young–Helmholtz theory cannot explain the facts of colour mixture, etc. In another method, used by Granit and others, the cornea and lens are removed and a micro-electrode inserted into the neural fibres which emerge from the front of the retina (the rods and cones face inwards towards the brain). The activity in the electrode can then be determined for light of different wavelengths. Occasionally, maximal sensitivity is for a fairly narrow band of frequencies, as though the activity recorded in the electrode originates from a cone with a narrow spectral sensitivity. The position of this band varies, but is usually in one of four regions of the spectrum, corresponding roughly to red, yellow, green, and blue. In a further method, developed by Rushton and also by Weale, light is reflected from the back surface of the retina in order to measure the absorption of the cones of light of different wavelengths. The light passes through the cones twice, and the amount they absorb is revealed by the amount of light emerging from the eye, after allowance has been made for the amount of absorption by the back surface itself. The results so far obtained tend to suggest the existence of two pigments in the cones, one absorbing mainly in the red region and one in the green. The method cannot show whether two different types of cone are associated with the two pigments, or only a single type.

As this brief summary shows, the evidence obtained by these methods does not wholly support nor decisively refute the Young–Helmholtz theory. On one alternative theory, a fourth type of cone is postulated with a maximum sensitivity in the yellow region. Supporting evidence for the existence of this type of cone comes not only from Granit's observations mentioned above but also from other sources. For example, in the two common forms of colour blindness there is an inability to distinguish red and green which is not accompanied by a failure to distinguish yellow from red or green. On the Young–Helmholtz theory, discrimination of yellow should also be lost, since yellow lies in between red and green in the spectrum. However, it should be remembered that there is still no conclusive evidence that more than one type of cone exists, let alone four types. It is usually assumed that any differences between cones in their spectral sensitivity must be due to differences in the pigments they possess. Recently, alternative ideas have been considered. For example, there is the possibility that the internal dimensions of different cones are such that they resonate to light of different frequencies. Although most theorists have postulated different types of cone, Willmer has suggested that all the cones are of one type but that there are two types of rod, each with a role to play in colour vision.

Contrast.

The apparent colour of an object does not depend only on the spectral composition of the light reflected from the object into the eye. For example, a piece of grey paper adjacent to a piece of red paper looks greenish, especially along the border, a phenomenon known as simultaneous contrast. Another example is provided by so-called "hue constancy": the apparent colour of an object in coloured (but not monochromatic) light is usually much closer to its true colour than would be expected from consideration of the spectral composition of the light coming from the object into the eye. Hue constancy seems to depend partly on simultaneous contrast, which is probably due to neural interactions in the retina, but also on complicated adjustments made by the brain. A further example of the complex way in which colour sensations are determined is provided by recent experiments of Land. A scene containing a number of coloured objects is photographed twice, once using a red filter and once using a green filter. Two slides are then prepared from the black-and-white negatives and placed in separate projectors, which are adjusted to cast coincident images. A red filter is then placed in front of the projector with the slide prepared from the "red filter" negative. One might expect this to make the scene look pink, and it does look pink if the image is viewed through a tube so that only a small part is seen at any one moment. But when the image is viewed as a whole the objects are seen in approximately their normal colours. This can be explained as follows. In the composite image the proportion of "red" light at any point will depend on the colour of the corresponding point in the original scene: for example, it will receive relatively more of this light if it was red in the original scene than if it was green. This constitutes a code for indicating colour to the brain provided something in the image can act as a reference point for white. Karp has shown that the highlights on glossy objects fulfil this function and that the Land phenomenon tends to disappear when these are blanked out.

DIGITAL COMPUTING MACHINES.

History.

Digital computing machines are of great antiquity, having first been devised by the Chinese in the form of the abacus or wire frame provided with beads, nowadays used for teaching children. The abacus is, however, by no means dead as a practical computing tool, and is still to be seen in everyday use in banks and commercial enterprises in the East. The first automatic adding machine was invented by Blaise Pascal in 1642, and this in both concept and construction greatly resembled the adding machines of the present day, the chief difference being that modern mass-produced metal gears, shafts, and so on were, in Pascal's machine, suitably carved pieces of wood. The multiplier was invented by Leibnitz in 1671, but this, unlike the adder of Pascal, was not a practical device, not because of any defect in design, but simply because the production techniques of that era were incapable of the repetitive precision which is required to produce a device of this sort. This is shown clearly by the fact that one of the most attractive small modern computing machines, the Curta, is almost identical in principle with that of Leibnitz. The first practical multiplier was produced by Thomas de Colmar in the 1820s, and de Colmar multipliers are still to be seen in one or two of the Assurance offices in the City of London.

Programmed digital calculations were originated by the Englishman Charles Babbage. His first essay in this direction, the so-called "Difference Engine," was based on the idea of J. H. Müller, who, in 1786, suggested that a mechanism could be constructed by means of which a table of logarithms could be built up. Babbage was not content with the Difference Engine, which could perform only the relatively simple operations of addition and subtraction, but went on to design in the 1830s the so-called "Analytical Engine," which in retrospect embodied most of the ideas which find a place in modern automatic computing machines. Babbage, like Leibnitz before him, was prevented from realising his ideas by the crude state of mechanics in his time. He diverted his attention to designing production machinery, for example, the first production gear cutter, and so never constructed the whole of his machine. It is interesting to observe that the input to the Babbage machine was to be on punched cards, based on the idea of Jacquard and later taken up by Herman Hollerith for sorting and other operations of census. The first machine which really embodied the ideas of Babbage on any extensive scale was the Harvard Mark I calculator, completed in 1946 by Howard Aiken. This machine operated by means of electro-mechanical counters and clutches, but was rapidly followed by fully electronic machines, until at the present time it is estimated that there are nearly one thousand of these in operation throughout the world.

The Structure of a Computing Machine.

Probably the easiest way to see what is required to produce an all-purpose computing machine is to consider the way in which human beings perform complex calculations. It is sufficient to observe that, by analysing a large number of extensive calculations, it has been found that out of each minute of computing time only about ten seconds are spent on the actual computing machine. The remaining fifty seconds are spent in consulting tables, deciding what to do next, writing down interim results, and actually depressing the buttons of the machine itself. The implication of this time division is that, by replacing the electrical calculating machine with a faster device using electronic techniques, the maximum saving in time would be only ten seconds out of every sixty. Since electronics, although speeding up operations by factors of up to a million, also increase the cost of the equipment from hundreds of pounds to tens of thousands, it is seen that a system based upon old ideas of man plus machine computing would be hopelessly uneconomical.

To overcome this difficulty mathematicians analysed the different operations which have to be performed. Clearly an electronic equivalent of a desk calculator will be required to perform the operations of addition, subtraction, multiplication, and division. In some early machines more exotic operations, such as square root and cube root, were also built in to the arithmetic unit, as it is called, but nowadays it is rarely, if ever, thought worth while providing these. The next unit which will be required is a replacement for the pencil and paper of the human operator, and also for the mathematical tables and lists of instruc-

tions for the procedure to be followed. The unit which performs these functions is usually called the "store" or "memory." The store in an electronic computing machine can receive numbers and remember them indefinitely, it can emit these numbers later upon request, and stored numbers can be erased and replaced by others. The importance of the last function is that electronic storage media are expensive and cannot, like paper, be thrown away after use.

To replace the human operator a control unit will be required. This interprets the requirements of the arithmetical unit, instructs it as to its course of action, and requests information from the store at appropriate times. In the same way it can cause results obtained by the arithmetical unit to be recorded in appropriate positions in the store. Besides the arithmetic unit, the store, and the control, it is necessary to provide means by which the human problem-setter can communicate with the outside world. These are usually known as terminal organs or simply input and output. The way in which these units are interconnected is shown in Fig. 1.

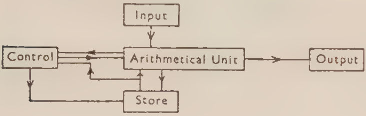


Fig. 1.

Instructing the Machine: Programmes.

It will be noted that there is communication from the store to the control unit. This is because in modern machines the control is not set to perform any specific function, but is arranged so that it can read its instructions from the store itself. These instructions are coded in numerical form, so that, for example, 01 might indicate add, 02 subtract, 03 multiply, 04 divide, 05 write a number in the store, 06 print a number on the output, and so on. The way in which the computing machine decides that a number held in the store is an instruction rather than an arithmetical quantity is quite simple. The human operator always causes the machine to start on a number held in the store which is known to represent an instruction. This number, and each subsequent instruction number, contains data which inform the machine where the next instruction is to be found, as well, of course, as an indication to the machine as to the position of any arithmetical quantities which are to be operated on. For example; the series of numbers 01, 23, 59 might instruct the machine as follows:

the store for the next instruction; if, however, it is negative, then go to position y."

If we regard the store of a machine as a large sheet of notepaper, each line of which is numbered, the way in which a machine follows out a sequence of operations to produce an answer can readily be seen. For example, suppose that we wish to produce a table of the first ten multiples of the number 0·30103. A simple "programme," as it is called, for doing this is as follows, instructions normally being stored in consecutive lines.

Line 1. Clear the accumulator and add line 22 into it.

Line 2. Print contents of accumulator.

Line 3. Add line 22 to accumulator.

Line 4. Print contents of accumulator.

⋮ ⋮

Line 19. Add line 22 to accumulator.

Line 20. Print contents of accumulator.

Line 21. Stop.

Line 22. 0·30103.

It will be seen that this programme generates multiples of 0·30103 by simply adding the number successively into the accumulator. The programme is quite long, requiring twenty-two lines on the electronic notepaper. This is because, although the process is an essentially repetitive one, it has been mechanised by simply writing down the instructions for addition as many times as such an addition is required.

The way in which the branch instruction simplifies the writing of iterative programmes of this sort can be seen by the following example, in which the same set of ten multiples are generated, but this time making use of a branch instruction. The programme is as follows:

Line 1. Clear accumulator and add line 11 into it.

Line 2. Add line 12 to accumulator.

Line 3. Print contents of accumulator.

Line 4. Write contents of accumulator on line 11.

Line 5. Clear accumulator and add line 13 into it.

Line 6. Subtract line 14 from accumulator.

Line 7. Branch. If the contents of the accumulator are positive, proceed in sequence (*i.e.*, to line 8); if not, jump to line 10.

Line 8. Write contents of accumulator in line 13.

Line 9. Return to line 1 for the next instruction.

Line 10. Stop.

Line 11. A temporary store for the multiples, initially it contains zero.

Line 12. 0·30103.

Line 13. Initially 9, decreased by one after each repetition of the process.

Line 14. 1.

It is clear that, as a result of inserting the branch instruction on line 7, the total number of storage positions has been reduced from the twenty-two which were required in the previous programme

$\overbrace{\text{Add to the already accumulated total}}^{01}$ → $\overbrace{\text{the number to be found in position 23 and then}}^{23}$ → $\overbrace{\text{go to position 59 for the next instruction}}^{59}$

Alternatively, instructions can be arranged to follow one another in consecutive locations as in the example given below.

Probably the most important single function in the machine is that of branching, and this has been stated on more than one occasion to enable otherwise inanimate devices to perform operations which are in many ways indistinguishable from the most complicated functions performed by human beings. The nature of the branching process is as follows: most arithmetical units contain a unit known as an "accumulator," which is simply a row of dials, usually in the form of electronic valves, upon which a number can be recorded and into which other numbers can be added and subtracted. The results of any operation on this accumulator is to generate an answer which may be either positive or negative, and the jumping or branching facility of the machine is simply an instruction which says effectively, "If the result of the calculation is positive, go, say, to position x in

to fourteen. This saving becomes even more apparent if the number of multiples required is increased. The former programme simply increases its length proportionately, whereas the latter requires no increase in the number of instructions to be written. To generate the first N multiples it is merely necessary to change the contents of line 13 from 9 to N-1.

Counting on the Binary Scale.

So much, then, for the general operation of the machine. The arithmetical unit, which we have so far ignored, save to say that electronic valves or transistors have replaced the dials of a previous era, has certain features which are of general interest. The first of these is that arithmetic is not performed in the way commonly taught in schools. The decimal scale is convenient for human beings, and has its historical roots in the fact that we have ten fingers and ten toes. An electronic valve, however, is a less subtle device, and can conveniently have only two states, in the first of which it is conducting electricity fully, and in the second of which it is cut off. It turns out that arithmetic can be performed in a scale which uses only two states, on and off, or, to represent them numerically, 1 and 0. Thus, for example, the decimal digits can be encoded in the following way:

Decimal.	Binary.
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

This table can be extended so that any decimal number, however great, can be represented in terms of groups of "binary" digits. The virtue of the binary scale is that arithmetical operations are remarkably simple, for example the addition table is:

$$0 + 0 = 0$$
$$0 + 1 = 1$$
$$1 + 1 = 0 \text{ carry } 1,$$

and the multiplication table:

$$0 \times 0 = 0$$
$$0 \times 1 = 0$$
$$1 \times 1 = 1$$

The simplicity of these is obvious, and some readers will no doubt ask why binary scale is not taught as a replacement for decimal scale in schools. The reason becomes clear if an attempt is made to cast up a set of quantities, each consisting of five or six binary digits. Such a process is quite easy if only two such numbers are added together at a time, as a computing machine does, but if a column of, say, twenty are added in the usual way, starting with the least significant digit and working upwards, the numerous carries which pass from the first column into a number of the higher columns become so great a strain upon the memory of the human being that they cannot be performed accurately. Nevertheless, the adoption of this scale for electronic computing machines has made possible operation at very high speeds.

The second point to be noticed in connection with arithmetical units is that arithmetic can be performed in two different ways. The first, in which all of the digits of the numbers upon which operations are being performed become available at the same time, and the second, in which the digits of interacting numbers appear in sequence, usually starting with the least significant. These two methods of operation, parallel and serial, are the basis for two completely separate systems of machine design. It is easy to see that, because a number of things go on at the same time in a parallel machine, it is intrinsically faster than a serial one. On the other hand, because large numbers of digits must be processed simultaneously, the internal structure is more complicated. It becomes a nice exercise in computing-machine design and logic to decide the most efficient method to use in any given situation, the relevant considerations being such things as cost, desired speed, complexity, and reduction in reliability due to increasing size.

Physical Construction of Computing Machines.

The main electronic components used in the construction of a computing machine are the diode, rectifier, triode, and transistor (*see* **X8–X10**). The latter elements are used to amplify information impulses and also, in pairs, to store information in a circuit known as a "flip-flop." The former two elements are used to decode the numbers which represent machine instructions into unique courses of action, and also to perform the actual arithmetical operations themselves.

Using the latest diode and transistor techniques, it is possible to perform additions at the rate of tens of millions per second.

The chief point of interest in connection with the design of the computing machine is the form taken by the store. Two main storage methods are in common use at the present time, both based

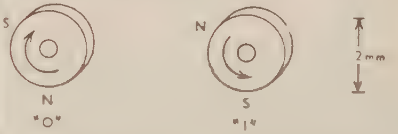


FIG. 2.—Storage on cores of the digits "0" and "1."

upon the fact that certain materials can be permanently magnetised. The first of these devices, the matrix store, is based upon the storage of magnetism in small cores of so-called "ferrite" (*see* **F17**). Ring-shaped cores of the type shown in Fig. 2 can be so arranged that their magnetisation is either in the clockwise or in the anti-clockwise direction, and by means of a suitable interrogation procedure (an electrical test impulse) it is possible to decide what state the internal magnetisation has taken up. Cores are arranged on a

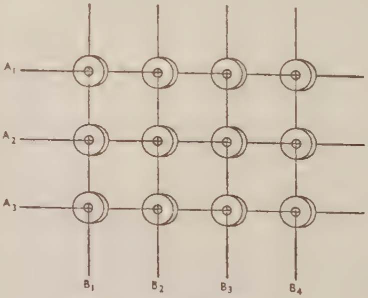


FIG. 3.—Core matrix store.

matrix; *i.e.*, an assembly, of the sort shown in Fig. 3, and information is read out on the lines B1, B2, B3, and so on, by applying a suitable test impulse to an appropriate member of the lines A1, A2, A3. Such core stores tend to be expensive, since one core is used to store each binary digit.

This cost is to some extent compensated for by the fact that core storage is extremely fast, typical speeds being, for example, one-millionth of a second for the insertion or reading out of data from an array of anything up to 30,000 cores. A less expensive but also slower system is the magnetic drum. This consists simply of a cylinder of metal coated with a thin film of magnetic iron oxide. In proximity to this film is an iron core provided with an input–output winding and a gap as shown in Fig. 4. The drum rotates at high speed about its axis. At a given instant a short current pulse is applied to the input winding on the core. This produces a magnetic field in the core which leaks across the gap and thereby magnetises the oxide on the drum. According to the sense of the current at the input point, either a North–South or a South–North magnet can be recorded on the surface. This process is precisely the same as that which is used to record sounds on a magnetic tape-recording machine. The difference, however, lies in the fact that the drum rotates at high speed, so that every fiftieth of a second or so the information recorded at any point on the surface repasses the iron circuit which was used for the recording. As the elementary magnet passes the gap in the iron circuit a change in the flux through the core is produced, and this induces a voltage in the output winding. The sense of this voltage varies according to the direction of the magnet recorded upon the drum circuit, so that here again a North–South magnet can represent the digit 0 and a South–North the digit 1. The volumetric efficiency of magnetic drums is quite high. A typical example is a cylinder 8 in. long and 5 in. in diameter which can store over a quarter of a million binary digits.

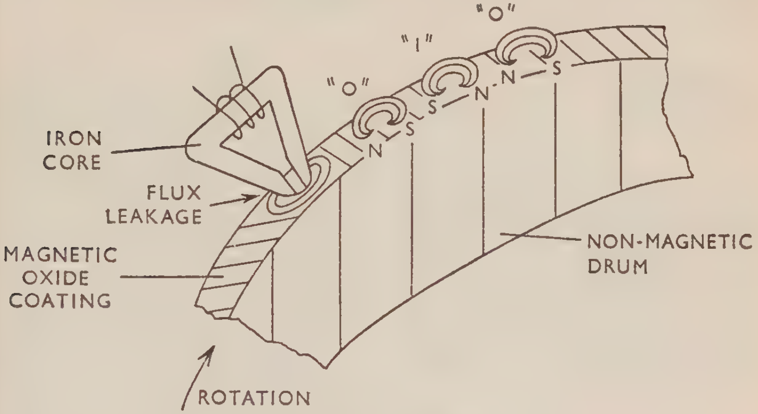


FIG. 4.—Magnetic storage drum.

In the development stage at the present time are far faster and less expensive devices either than the drum or the magnetic core. These are produced by the vacuum deposition of very thin films of magnetic materials upon glass substrates. So-called thin film memories at present in operation in the research laboratories can achieve speeds of a hundred-millionth of a second for the reading or writing of digits in a given place. Transistor circuits of equivalent speed are also being developed, so that it appears that in the very near future computing machines will be available which have arithmetical speeds over 100 million times as fast as those available to human operators of calculating machines.

Applications.

In their earliest form digital computers were suitable only for scientific calculations, and some of their more spectacular applications at this period included the evaluation of π to 3,000 decimal places and the demonstration that $2^{3217}-1$ is a prime number.

After a period of increasing technological application in which the automatic design of power transformers and the evaluation of diesel-electric locomotive performance formed notable examples of machine prowess, the main emphasis passed to business operations of the type exemplified by the calculation of P.A.Y.E. At the present time much effort is devoted to integrated data processing, in which all of the operations of management and accountancy are being carried out within the machine, and human intervention is required only for the higher administrative and policy decisions.

The frontiers of machine application are reached in recent work on the automatic translation of language by machine, and on the simulation of the behaviour of animal brains in recognising shape and pattern.

CHEMISTRY IN THE LIVING CELL.

The cell can be considered as the basic unit of life. Simple forms of life, such as bacteria and protozoa, are unicellular (**F28**, **F23**); with increasing complexity of organic form there is increase in number and specialisation of function of the cells, until in man it has been estimated that there are approximately 10^{14} cells. Ever since cells were first detected by Robert Hooke over 200 years ago with the aid of the optical microscope, the way in which cells grow and reproduce themselves has puzzled scientists. In this century biochemistry has made tremendous progress, and our knowledge of the chemistry of life is very rapidly expanding, due in no small measure to the availability of isotopes (**F10**). With the aid of compounds prepared in the laboratory and labelled with either radioactive or heavy isotopes of elements such as carbon, hydrogen, nitrogen, oxygen, sulphur, and phosphorus, biochemists can now follow the metabolic fate of these substances in living organisms. By these means it has been discovered that life is a dynamic process, that each part of the human body, for example, is continually breaking down and being replaced with new material. It is possible to find out just how each constituent is made and how long it stays in the body before it is replaced, and where and how this takes place. It is also possible to carry out many of the complex chemical reactions of living matter, *in vitro*, by making use of isolated enzyme

preparations. It is becoming increasingly apparent that each individual process of life is a discrete chemical reaction but that life itself consists of many thousands of such reactions, all interdependent and all co-ordinated together within the living cell, which has an average diameter of not more than a hundredth of a millimetre. The complexity of these chemical reactions and their diversity is well illustrated if one considers a single sperm cell, which by chemical reaction alone is capable of giving the necessary information to set in motion all the chain of reactions which will eventually lead to the creation of a replicate form of life.

Pattern of Chemical Organisation.

In the last decade our knowledge of the chemical organisation within the cell has also rapidly and dramatically increased. This has been brought about largely by the intense research into the cause of cancer, which is primarily a disease of abnormal cell growth. Cytochemists have been trying to find out why a cell should change its usual pattern of reproduction and rapidly grow in an uncontrolled abnormal form. The development of the electron microscope has greatly aided them in their understanding of the internal structure of the cell. With this instrument it is possible to obtain sharp images of particles as small as 20 Ångstroms (2×10^{-7} cm.) in diameter, and so, many structures within the cell which were not apparent with the optical microscope are now clearly visible. This, together with recent advances in the techniques of isolating without damage important parts of the cell, has revealed a common pattern of organisation in the majority of cells.

It was originally thought that the cell consisted of three main structures, the cell wall, which surrounded the liquid mass called the protoplasm, which contained a heavier solid structure, the nucleus. It is now known that the protoplasm itself has a very definite structure. When suitable preparations are examined with the electron microscope numerous cylindrical or spherical particles, the mitochondria, together with a finer structure, the endoplasmic reticulum, are detected. On disintegrating the cell, the latter breaks up into a mass of fine particles which are called microsomes. Within the protoplasm there is another non-particulate section called the Golgi apparatus, named after its discoverer. Attempts to isolate these various fractions were for many years unsuccessful; the small mitochondria for example, were very easily damaged, especially by changes in osmotic pressure, and when treated with weak salt solutions much of their biochemical activity was destroyed. These difficulties have now been overcome, and it is possible to isolate nuclei, mitochondria, and microsomes uncontaminated with each other and still in a highly active biochemical state. Rat-liver cells are a very convenient source, although any soft tissue, such as lungs, heart, brain, or muscle could be used. Small pieces of the tissue are ground in a Potter–Elvehjem homogeniser, which is essentially a glass tube with a well-fitting plunger. The liver cells themselves are disrupted, but the smaller particles within the cells, and red blood cells, escape destruction. The homogenate is then centrifuged in sucrose solution. The heaviest particles, the nuclei, are deposited first on the bottom of the centrifuge tube, and the supernatant liquid is then transferred to another tube and centrifuged again at a higher speed, thus bringing down a deposit of mitochondria. On centrifuging this supernatant liquid at a very high speed which exerts a force equal to 100,000 times gravity the microsomes are obtained. These separate fractions after careful washing can then be suspended in suitable reaction media and their biochemical reactions studied separately without interference from other cell constituents.

The Nuclei.

The nuclei are of prime importance to the life of the cell, for if one dissects an amœba, a unicellular organism, so that one half contains the nucleus, this half will continue to live and reproduce normally, but the other half, which is merely a sphere of protoplasm, soon ceases to move and eventually dies. The fact that the protoplasm continues to react biochemically for some time after enucleation can be demonstrated by the way in which it utilises radioactive phosphorus. If, however, a nucleus from another amœba is placed inside this protoplasm, then it will continue to live and reproduce normally. The nucleus therefore controls the normal metabolic processes and is also essential for reproduction.

DNA and Cell Division.

When a cell divides, the chromosomes within the nucleus split into two pairs, one set going to each new cell. These chromosomes must transmit in some chemical form all the information for the new cell to replicate its parent. Chemically the chromosomes consist of deoxy-ribonucleic acid, DNA, which is structurally a long polymer of smaller chemical fragments called nucleotides. Each nucleotide consists of one of the four nitrogenous bases, adenine, guanine, cytosine, or thymine, a sugar, deoxyribose, and phosphoric acid all linked to one another. DNA is the genetic material of the cell, and all the hereditary information that the genes contain is thought to be transmitted by the order in which the four bases are arranged on the long polymeric molecules of this substance. By analysing the X-ray-diffraction patterns of DNA, Watson and Crick at Cambridge have shown that the molecule consists of two long intertwined helices. At cell division it is thought that these two spirals separate, one half going to each cell; there they act either as a mould or a cast, forming a new spiral on their surface which is a replica of the one from which they have just parted. A simple analogy is to consider a toy lead soldier in a mould; if one separates the soldier from the mould and then makes a new soldier in the mould and uses the original soldier to make a new mould, one then has two identical sets of soldiers and moulds.

RNA and the Nucleolus.

The way in which DNA in the nucleus transmits its information to the rest of the cell is thought to be by means of another nucleic acid, ribonucleic acid, RNA, which also consists of chains of nucleotides. In this case the nucleotides consist of one of the four bases, adenine, guanine, cytosine, or uracil, linked with a sugar, ribose, and phosphoric acid. RNA is the chief chemical constituent of the microsomes. When a nucleus is examined under the microscope a portion within the nucleus appears to be different, and this has been called the nucleolus. On studying the nucleolus with the much higher magnification of the electron microscope, numerous small particles are easily discernible, and these are very similar to the microsomes in the protoplasm. Not only are these RNA-containing particles present in the nucleolus but they are also seen to be clustered around the outer membrane of the nucleus. The electron microscope has shown that this membrane contains numerous pores which would thus enable these particles to escape into the surrounding protoplasm and so carry to the rest of the cell the information which has been genetically transmitted.

The Microsomes.

The smallest particles obtainable from a cell homogenate are the microsomes, and the electron microscope has shown that these are really very small fragments of the disintegrated endoplasmic reticulum. They consist chiefly of RNA. By means of very elegant isotope studies, Borsook in the U.S.A. has shown that these particles are in all probability responsible for protein synthesis. Proteins are always associated with life, but in fact they are only complex organic compounds. When pure, some proteins can be obtained in a crystalline state. All the proteins can be split up easily

into their component amino acids: there are about twenty different naturally occurring amino acids. Proteins differ from each other by the sequence in which these simple units are joined together. There are many different kinds of proteins, such as collagen, the structural protein of the skin, and keratin, the protein of hair.

Site of Enzyme Synthesis.

One of the most important classes of proteins are the enzymes. These substances are responsible for bringing about most of the chemical reactions inside the cell; their functions are very varied, each enzyme being highly specific for any particular reaction. Before a cell can grow therefore it has to be able to make enzymes, which are not transmitted as such by the DNA of the dividing nucleus; these enzymes are made by the microsomes. When a synthetic amino acid containing a radio active carbon atom is ingested by a living organism it becomes incorporated fairly rapidly into all the proteins. Borsook decided to study the incorporation of an amino acid as soon as possible after its administration in order to determine the site of protein synthesis. He injected a radioactive amino acid into the tail vein of a rat, and after two minutes removed the liver and isolated the nuclei, mitochondria, and microsomes. He found that the proteins of the microsomes were radioactive, whereas the proteins of the other fractions were not, thus showing that the site of synthesis was probably the microsomal particles. If the microsomes are washed with a detergent-like substance, desoxycholic acid, they are further disintegrated into smaller particles; similar small particles can also be seen adhering to the endoplasmic reticulum when it is carefully studied with the electron microscope. It is these particles which Borsook showed to be the sites of synthesis of protein and, owing to their small size, it is not improbable that each is responsible for the synthesis of one enzyme or one type of protein, which is then discharged into the protoplasm. How, then, do these particles bring about the orderly synthesis of a specific protein? It is thought that the RNA which they contain, acts as a template and that amino acids previously activated or given sufficient energy to combine easily with one another, are orientated in a definite sequence on a molecule of RNA; after all the amino acids have joined together to form the protein molecule this is then released into the cell, leaving the RNA free to repeat the process. Variations in the structure of the RNA molecule would lead to the synthesis of different proteins.

The Mitochondria.

Some mitochondria are visible in a cell when it is examined with an optical microscope, but they become much more readily apparent under the electron microscope. They are usually cylindrical in shape, but this varies with the type of cell, and under certain conditions they are spherical. When seen in a living cell they are in constant motion. They have two outer membranes, the inner one being very convoluted. A rat-liver cell contains about a thousand mitochondria, but in other types of cells the number and distribution of these particles within the cell varies.

The Energy Source of the Cell.

The function of mitochondria is to provide energy for the reactions of the rest of the cell; they are found to be most numerous in those cells requiring most energy and, moreover, are usually grouped within the cell at strategic points for this purpose. Thus in a muscle cell they are grouped around that part of the protein fibre which contracts, and in a sperm cell they are in highest concentration in the neck of the cell where the head joins the vigorously moving tail. How do mitochondria provide this energy? When food, especially carbohydrates, enters the body it is broken down into smaller chemical fragments until some of it is converted to pyruvic acid; this can also be derived from some fats and amino acids. These reactions take place outside the mitochondria, and the pyruvic acid then passes through the semi-permeable mitochondrian membrane to be further metabolised, within the mitochondria, by a series of enzymes. In this sequence of reactions, known as the citric acid cycle, carbon atoms are oxidised one at a time to carbon dioxide, which is then eventually exhaled from the body. In this process energy is liberated not in the form of heat but in the form of an energy-rich compound, adenosine triphosphate, ATP. The mitochondria produce far more energy than they themselves require, and the excess is passed into the cytoplasm as ATP for the use of the rest of the cell. Not all biochemical oxidations are brought about by the direct action of oxygen; the mitochondria contain enzymes for the removal of hydrogen ions and electrons, and these are passed in a series of reactions from one compound to another until they eventually combine with oxygen to form water.

Control of Cell Metabolism.

When mitochrondria are isolated in a pure state from a cell and suspended in solutions of various nutriments they swell and alter shape, this being due to the passage of these compounds through the semi-permeable membrane of the mitochondrial wall. One of the compounds which has a very marked influence on the shape of mitochondria is the hormone, thyroxine. The function of this hormone in the body is to control the rate of metabolism, *i.e.*, the rate at which energy is provided and utilised; it is possible that it achieves this by acting on the mitochondria and so controlling the formation and release of energy. The movement of the mitochondria in the living cell may be an indication of their state of activity. As they alter in shape they expose different parts of their internal structure to the available reactants and also release into the surrounding protoplasm the compounds needed for the metabolism of the rest of the cell. The mitochondria can be broken into fragments by changes in osmotic pressure or by subjecting them to ultrasonic vibrations. It is then found that the different enzyme systems that they contain are associated with certain parts of the mitochondria; some of these enzymes are soluble and escape into solution, while others, especially the hydrogen-transferring enzymes, are associated with the non-soluble fraction. This can be shown, by electron microscopy, to be similar in appearance to the structural membranes of the mitochondria. As more detailed electron-microscope studies of the mitochondria are made it is becoming increasingly apparent that they themselves have a detailed and intricate structure and that the enzymes they contain are arranged in a definite order.

Summary.

From this outline of the functions of the particulate fractions of the cell, it is clear that there is much organisation and division of labour within the living cell. The nucleus, by virtue of its DNA, controls not only the pattern of reproduction but also the general metabolic processes of the cell. It does this by sending out microsomal particles of RNA, which in turn bring about the synthesis of proteins and enzymes. None of this would be possible, however, without the source of energy which is provided by the mitochondria as ATP.

The Golgi apparatus has not been mentioned in detail because nothing is known of its biochemical function. Owing to the ease with which a micro needle will pass through this structure, it is believed to be of a liquid nature, and hence it is not possible to isolate it by differential centrifugation and so study its biochemical functions. It is thought by cytologists to be a collecting area within the cell for the secretion of the substances manufactured within the cell, since this structure is more prominent in those cells which are active secretors. Further studies on the co-ordination of metabolic processes within the cell should lead to a better understanding of the biochemical derangements that occur in malignant cells.

RADIOACTIVITY.

Historical.

Radioactivity is the spontaneous transformation of atomic nuclei, accompanied by the emission of ionising radiations. It was discovered in 1896 by Becquerel, who noticed that salts containing uranium sent off radiations which, like X-rays, can blacken a photographic plate. Two years later Marie and Pierre Curie discovered several new chemical elements which possessed the same property, but many times more intense than uranium, the most important of these was radium. Shortly afterwards it was established, mainly by Rutherford, that three types of radiations called α-, β-, and γ-rays, are emitted from radioactive substances. It was also Rutherford who, jointly with Soddy, deduced that the emission of the radiations is associated with the spontaneous disintegration of atoms which result in the transformation of one radioactive substance into another. A series of such transformations ends when a stable element is produced. All of the heavy radioactive elements can be arranged in three radioactive series, called the uranium, thorium, and actinium series.

Initially, radioactivity was thought to be a property confined only to a few elements occurring in nature. In 1934, however, Irene and Frederick Joliot-Curie discovered that ordinary elements can be transformed into radioactive forms by subjecting them to bombardment with α-particles. Following this, it was found that beams of other fast particles produced in accelerators can also render ordinary substances radioactive.

The discovery of fission in 1939 (**F11** (**1**)) has greatly increased the variety of artificially produced radioactive substances, and the development of nuclear reactors after the War has resulted in very large quantities of radioactive materials becoming available at a reasonable price. Nowadays it is known that radioactivity is a general property of matter; any chemical element can be produced in one or more radioactive forms, or isotopes (**F10** (**2**)). In fact, there are many more radioactive isotopes than stable ones. Whether a given isotope is stable or radioactive is determined by the structure of the nuclei of its atoms.

Nuclear Stability.

The nuclei of all atoms are built up of two elementary particles, protons and neutrons, which have the collective name *nucleons*. The number of protons in the nucleus determines the atomic number of the element (Z), and the total number of nucleons, which is approximately equal to the atomic weight, is the mass number of the isotope (A). Atoms of the same value of Z, but different values of A, are isotopes of the given element.

As we have seen (**F10** (**2**)), protons and neutrons have approximately the same mass, but they differ in electrical properties: the proton carries a unit of positive charge while the neutron has no electrical charge. All nucleons act on each other with specific attractive forces, called nuclear forces, which are much stronger than electrical or gravitational forces. Unlike these, however, nuclear forces are of very short range, which means that each nuclear particle can only attract its immediate neighbours. In a given nucleus, therefore, there exists a mixture of attractive nuclear forces acting between neighbouring nucleons and repulsive electrical forces acting between all the protons.

In certain combinations of protons and neutrons the resultant of all these forces is such as to bind all the nucleons together; such a nucleus is stable. For other combinations the resultant force is disruptive, giving rise to an unstable configuration. For stable nuclei the ratio of the number of neutrons to protons is defined within narrow limits; the total number of stable isotopes is, therefore, limited. Altogether there are 274 stable isotopes among 81 stable elements. In very heavy elements the repulsive forces between the protons are so strong that no stable configuration can exist. Such nuclei tend to break into two, by a process called spontaneous fission.

Radioactive Nuclei.

A nucleus which contains a wrong combination of protons and neutrons is unstable and sooner or later undergoes a transformation, such as to produce a stable form. In most cases this transition to stability occurs through the transformation of a proton into a neutron, or *vice versa*. Protons and neutrons can be considered to be two different states of one fundamental particle; they can interact with each other and exchange identities. If, therefore, we have an unstable nucleus which has too many neutrons, a more stable structure would result if one of its neutrons were to change into a proton. Similarly, in a nucleus which has too many protons, a transformation of a proton into a neutron would lead to a more stable configuration. Since, however, protons and neutrons have different electrical properties, and since an electrical charge cannot be destroyed or created from nothing, the transformation of a neutron into a proton must be accompanied by the production of an electron, while in the transformation of a proton into a neutron a positive electron must be produced. Electrons cannot exist in the nucleus, and they are emitted at the instant of the transformation. We see thus that the result of the adjustment of a nucleus from an unstable into a stable form, is the emission of a fast electron which is called a β-ray; an unstable nucleus can, therefore, be detected by its β-radioactivity.

In the case of heavy elements yet another mode of transformation of unstable nuclei is possible, namely by α-particle emission. α-particles are nuclei of helium atoms; each consists of two protons and two neutrons. Such an assembly is a particularly stable structure and in heavy elements the emission of α-particles turns out to be a more preferable form of disintegration than the exchange of protons into neutrons leading to β-emission.

In addition to the emission of α- or β-particles, some radioactive substances may also emit γ-rays. This happens when not all the energy which becomes available during the transition from an unstable to a stable form is taken up by the emitted particles. The remaining energy is subsequently given off in the form of pure electromagnetic radiation. γ-rays are thus identical with X-rays, but the term γ-rays is employed when dealing with nuclear transitions.

Half-life.

The disintegration of a radioactive nucleus does not take place instantaneously; it is a process governed by chance. In a given substance one nucleus may break up in a very short time, while another may exist for a long time. If, however, the substance contains a very large number of unstable nuclei, simple statistical laws are observed, namely that the probability of a disintegration is proportional to the total number of unstable atoms. The rate of decay then follows an exponential law, *i.e.*, that a half of all the unstable atoms break up in the same period of time. This period of time, during which half of all the radioactive atoms in the substance disintegrate, is called the *half-life*, and is a characteristic property of the given radioactive isotope. Some radioactive isotopes have a half-life of a very small fraction of a second, while for others it is millions of years. Fig. 5 shows a typical curve of radioactive decay for an isotope with a half-life of fifteen hours (sodium-24).

The Curie.

Since the presence of a radioactive substance is detected by means of the radiations emitted, and these signify the breaking up of unstable nuclei, consequently the quantity of a radioactive substance is usually measured in terms of the number of atoms disintegrating per second. The unit of radioactivity is the *curie*, which was originally meant to be the activity of 1 gram of radium; nowadays it is defined as the quantity of a radioactive substance in which $3{\cdot}7 \times 10^{10}$ (37,000 million) disintegrations occur per second. Smaller units, the millicurie (one-thousandth of a curie) and the microcurie (one-millionth of a curie) are frequently employed. Larger units, the kilocurie (1 000 curies) and the megacurie (one million curies) are also used nowadays.

Natural Radioactivity.

Nearly fifty radioactive isotopes occur in nature. Most of these are isotopes of the heaviest elements, from thallium ($Z = 81$) to uranium ($Z = 92$). It is thought that in the process of creation of the universe a very large number of unstable nuclei were produced, but most of them, having short half-lives, have since decayed. Only the few isotopes with half-lives of the same order of magnitude as the age of the earth have survived. Among these are the isotopes of uranium and thorium, which have half-lives of the order 10^9

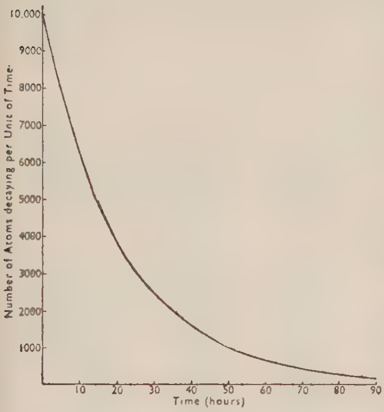


FIG. 5.

and 10^{10} years, and which are the parents of the three series of the natural radioactive elements. There are also a few natural radioactive isotopes among the lighter elements; these, too, have very long half-lives. The lightest of all is the potassium isotope, with mass number 40 (^{40}K) which has a half-life of 10^9 years, and which is a radioactive constituent of the human body. The total activity of radio-potassium in the human body amounts to about 0·1 microcuries. Together with the radiations from the natural radioactive elements in the soil and atmosphere and from the cosmic rays, it produces a natural background of radiation in the presence of which the human species has developed.

Artificial Radioactivity.

Many more radioactive isotopes can be produced artificially from stable nuclei by means of nuclear disintegrations. The structure of a stable nucleus can be altered either by adding to it, or taking away from it, one or more nucleons. In either case this necessitates bombarding the nucleus with some projectile, such as protons, neutrons, deuterons (nuclei of the hydrogen isotope of mass 2), or α-particles. When charged particles are used as projectiles they have to possess a sufficiently high kinetic energy to overcome the repulsive electric forces exerted on them by the positively charged nuclei. This energy is usually measured in units of electron-volts, one electron-volt (eV.) being the kinetic energy acquired by an electron when passing through a difference of potential of one volt. For nuclear disintegrations the energies required are of the order of millions of electron-volts (MeV.). Such projectiles can be produced artificially in special accelerators, notably the cyclotron, in which protons, deuterons, or α-particles can be accelerated to energies of hundreds, and even thousands, million electron-volts. Several hundred radioactive isotopes have been produced by means of such accelerators. Deuterons, in particular, have proved to be very effective in producing disintegrations leading to the formation of radioactive isotopes.

Although in some cases the cyclotron-produced activities are fairly high, a few hundred millicuries, on the whole this method of manufacturing radioisotopes is not economical, mainly because only an extremely small fraction of the bombarding particles hit the target and lead to disintegrations; the majority of the projectiles dissipate their energy in ionising the atoms through which they pass.

Production of Radioisotopes in Nuclear Reactors.

The production of radioisotopes on a large scale became possible only with the advent of nuclear reactors in which radioisotopes are produced by the bombardment with neutrons. A neutron, having no electrical charge, does not experience any repulsive forces when approaching the nucleus, and consequently there is no need to employ high-energy neutrons; in fact, slow neutrons have a higher probability of being captured by nuclei than fast ones when traversing a given thickness of matter. Since neutrons do not exist as free particles, they are bound to be captured by some nuclei in their path, and it is fairly easy to arrange the substance to be bombarded in such a way as to produce the maximum number of radioactive nuclei. On the other hand, since there are no free neutrons in nature, they have to be produced through some nuclear reaction. Initially, the only known way of producing neutrons was through a nuclear disintegration initiated by the bombardment with charged particles; as was shown before, this is a very inefficient process.

The situation changed radically after the discovery of the fission process (**F11** (**1**)), which can be induced by the bombardment of nuclei of the heaviest elements, such as uranium, with neutrons. In this process the heavy nucleus breaks into two nearly equal fragments, and in addition two or three neutrons are emitted as well. These neutrons may in turn cause fission of other nuclei, producing more neutrons and leading to further fission; in this way a chain reaction can be established in which the number of neutrons multiplies in a geometrical progression. If a sufficiently large amount of pure fissile material is assembled, so as to prevent the escape of neutrons or their wasteful absorption in non-fissile material, an enormous number of neutrons can be produced. This is what occurs in the nuclear reactor, for example at Calder Hall (**F51**). Any substance placed in such a reactor undergoes a terrific bombardment with neutrons, leading to the formation of huge quantities of radioactive isotopes.

Apart from the production of radioactive isotopes by neutron bombardment in the reactor, the fission fragments themselves are intensely radioactive. Moreover, each of the fission fragments after breaking up is transformed into another isotope, which is again radioactive; in this way a very large number of radioactive isotopes are produced. Altogether over 200 isotopes, covering thirty-six elements from zinc to thallium, have been identified as fission fragments.

Properties and Applications of Radioactive Isotopes.

By means of the methods described above, it is now possible to produce over 800 radioactive isotopes. There is at least one radioactive isotope to every natural chemical element, and radioisotopes have been produced of elements which do not occur in nature, such as technetium ($Z = 43$) or promethium (61). Several elements have been produced of atomic number greater than that of uranium, which is the last of the naturally occurring elements, namely neptunium (93), plutonium (94), americium (95), curium (96), berkelium (97), californium (98), einsteinium (99), fermium (100), and mendelevium (101). The production of elements number 102 and 103 has also been reported.

Each of the elements which exist in nature can thus be produced in a form which is chemically and biologically identical with the stable element, yet has the property of being radioactive, *i.e.*, of emitting radiations which can be detected in a simple manner and with an extraordinarily high sensitivity. These properties of radioactive iso-

topes make them eminently suitable for the study of chemical and biological processes. They are of particular importance in the study of metabolic processes, since this can be achieved by the addition of an extremely small amount of radioactive substance which does not, in any way, upset the processes to be studied. They have also opened the way to investigation of the dynamics of metabolic processes and are already widely used as an aid in the diagnosis of disease. Besides medicine, there are also numerous applications of radioactive isotopes in agriculture, technology, and industry.

To be appropriate for such applications the radioactive isotope must have suitable properties, such as a convenient half-life and the emission of radiations of the right type and energy. Table I gives a list of some of the most frequently used radioactive isotopes.

TABLE 1.

Isotopes Most Frequently Used.

Radioisotope.	Symbol.	Half-life.	Radiations emitted.	Maximum energy of β-rays, MeV.	Main γ-ray energies MeV.
Tritium	^{3}T	12·26 years	β	0·018	—
Carbon-14 . . .	^{14}C	5,568 ,,	β	0·155	—
Sodium-24 . . .	^{24}Na	15·0 hours	β, γ	1·39	1·37, 2·76
Phosphorus-32 . .	^{32}P	14·3 days	β	1·71	—
Sulphur-35 . . .	^{35}S	87·1 ,,	β	0·167	—
Calcium-45 . . .	^{45}Ca	164 ,,	β	0·25	—
Iron-59	^{59}Fe	45·1 ,,	β, γ	0·46	1·1, 1·3
Cobalt-60 . . .	^{60}Co	5·25 years	β, γ	0·31	1·17, 1·33
Bromine-82 . . .	^{82}Br	35·9 hours	β, γ	0·44	0·55, 0·77
Strontium-90 . .	^{90}Sr	28 years	β	0·61	—
Iodine-131 . . .	^{131}I	8·04 days	β, γ	0·61	0·36
Caesium-137 . .	^{137}Cs	30·0 years	β, γ	0·52	0·66
Cerium-144 . . .	^{144}Ce	285 days	β, γ	0·31	0·13
Thulium-170 . .	^{170}Tm	127 ,,	β, γ	0·97	0·08
Gold-198	^{198}Au	2·69 ,,	β, γ	0·46	0·41
Radium	^{226}Ra	1,622 years	α, γ	4·777	0·19

a neutrino. The latter is postulated to have no electrical charge and practically no mass. Its main function is to share with the electron in the energy released during the β-disintegration. It also serves to preserve the balance of angular momentum. Although the properties of the neutrino make its detection extremely difficult, its existence has been proved recently in a very ingenious and elaborate experiment.

The disintegration energy in β-transformation is also of the order of a few MeV., but due to the small mass of the electron its velocity is almost that of light; the rate of ionisation is consequently about a hundred times less than for an α-particle of the same energy. The range of the β-particle is correspondingly longer, and is of the order of a few metres in air, or a few millimetres in solids. Again, in contrast to α-particles, the scattering of β-rays is a very frequent event, so that the path of a β-particle is very tortuous. Combined with the continuous spectrum of energy, this results in the attenuation of a beam of β-rays in passing through matter being nearly exponential, despite the fact that like α-particles, β-rays lose energy mainly through ionisation.

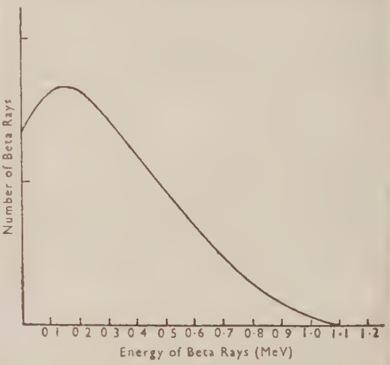


FIG. 6.

Alpha-particles.

Radioactive decay by the emission of α-particles is observed only in heavy elements. All α-particles emitted from a given radioactive substance have the same energy (sometimes several monoenergetic groups of α-particles are emitted, corresponding to different excitation states of the nuclei). Among the natural radioactive elements the energy of the α-particles varies from 4 to 9 MeV. Being a heavy particle (the nucleus of the helium atom) and carrying two electrical charges the α-particle has a very high probability of ionisation, that is of knocking out electrons from atoms encountered; on an average, about 4,000 ions are produced by an α-particle per millimetre of path. The α-particle thus dissipates its energy very rapidly, and its range in air at atmospheric pressure is from 2·5 to 8·5 cm.; in solids the range is of the order of 10–100 microns. Due to its large mass, relative to that of the electron, the α-particle is deflected from its path only in the rare event of a collision with a nucleus. The path of the particle is therefore a straight line until the end of its range.

Beta-rays (or particles).

This term includes both positive and negative electrons. The emission of β-rays is the most common mode of decay of artificial radioactive isotopes (**F10** (**2**)).

Unlike α-particles, β-particles from any radioactive isotope are emitted with a continuous distribution of energies, from zero up to a well-defined upper limit. Fig. 6 shows a typical energy spectrum of β-rays. The upper limit value corresponds to the energy released during the disintegration. The fact that energy is apparently lost in β-decay, without any way of accounting for it, presented a serious theoretical difficulty which was only removed by Pauli's hypothesis of the neutrino (**F12** (**1**)). According to this, at each β-decay two particles are emitted, an electron and a neutrino.

Gamma-rays.

These are electromagnetic waves and are produced if the radioactive transformation leaves the new nucleus in an excited state (**F11** (**2**)). At the transition of this nucleus to the ground state the

surplus energy is given off as a γ-ray. The energy of γ-rays varies from a few thousand to a few million electron-volts.

γ-rays do not ionise directly. They interact with matter by three different processes, all of which result in the formation of fast electrons, which in turn produce ions. The probability of any of these processes occurring is proportional to the intensity of the γ-rays, so that the absorption of γ-rays of a given energy in matter is exponential. The half-value-layer, *i.e.*, the thickness which reduces the intensity of a γ-ray beam to one-half, depends on the energy of the rays and on the atomic number of the absorbing substances; for γ-rays of about 1 MeV. passing through lead it is about 1 cm.

BIOLOGICAL EFFECTS OF RADIATIONS.

As was seen, α-, β-, and γ-rays in passing through matter cause ionisation, the ejection of electrons from atoms. They may also cause excitation of atoms and dissociation of molecules. These processes usually result in chemical changes in the substance along the path of the radiations; in the case of living matter it may result in damage to a cell, sometimes leading to its death. The mechanism of action of radiations on living matter is not yet understood, and in many instances there are not enough data even to establish an empirical relation between the effect produced by radiation and the dose of the radiation.

If the gonads (the reproductive organs) are exposed to radiations, mutations of genes may result (F31 (1)); in most cases such mutations are deleterious. Such action does not produce any harm to the individual exposed, but the bad gene may be transmitted to the next generation and will eventually result in the birth of an individual with a genetic defect. It is believed that the probability of mutation is a linear function of the dose of radiation, so that any increase in dose causes a proportionate increase in the number of mutations. A certain number of mutations always occurs, from the natural background of radiations and mainly from other causes. The doubling dose, that is the dose of radiation required to double the natural mutation rate, is about 30 rad. (The rad is the unit of absorbed dose and corresponds to an absorption of energy of 100 ergs per gram.) The dose rate of the natural background of radiation is about 0·1 rad per year.

If other cells in an organism are exposed, some harm may result to the individual exposed. With a sufficiently large dose symptoms of radiation sickness may occur within a few days after the irradiation. These symptoms include skin burns, loss of hair, temporary sterility, and, if the dose is very large, death within a few weeks. Although there are very few data concerning man, it is believed that a dose of about 300 rads given in a short time to the whole body will result in the death of 50% of persons exposed.

If the irradiation is spread over a long time, or if only part of the body is exposed, no death will occur and, indeed, no other symptoms may be apparent for some time after irradiation. But some effects may appear much later, sometimes after many years. These late effects include cataract, leukæmia, and cancer. It is not yet known whether the probability of these effects is a linear function of dose, or whether there is a threshold dose below which these effects do not occur.

Radiological Protection.

In the absence of definite data about the effects of small doses of radiation, it is prudent to assume that any excess of radiation may be harmful and should be avoided. For people who occupationally deal with radiations, and who cannot avoid receiving some exposure, there have been established certain maximum doses, which, in the light of present knowledge, are very unlikely to produce deleterious effects. The maximum permissible dose for any individual is at present 50 rads during the first thirty years of life and an additional 150 rads during the rest of the life; this corresponds to an average of about 0·1 rad per week. For the whole population the maximum permissible dose is 10–100 times less.

The increase in generation of electrical power from nuclear reactors based on fission, and the growing use of radioactive isotopes made it necessary to establish certain maximum concentrations of radioactivity in water and in air, so that the population will not receive a dose higher than the maximum permissible. These concentrations vary from substance to substance, depending on their radioactive as well as their biological properties, such as the time of their retention in the body. For example, for radium the maximum permissible concentration in water is 4×10^{-8} microcuries per litre, and in air 8×10^{-13} microcuries per c.c.; for radioactive cæsium it is 2×10^{-3} microcuries per litre in water and 2×10^{-7} microcuries per c.c. in air. Special monitoring instruments are available to check the concentrations of radioactivity in water and in air. For workers in the radiation industries, special monitoring devices, such as film badges, are available to record the doses received by them. With these, and other precautions, it should be possible to utilise in full the advantages of atomic energy and radioactivity without causing harm to the population.

ČERENKOV RADIATION.

In 1958, the Russian physicists Čerenkov, Frank, and Tamm, were awarded the Nobel prize for their investigation of a phenomenon which has come to be known as Čerenkov radiation. The following is a brief account of the effects and its applications in research.

Discovery.

One of the properties of radioactive substances, which has been known since their discovery, is that their radiations can cause certain materials to fluoresce. This property was indeed used in much of the early work on radioactivity as a means of detecting the emitted radiations. The amount of light produced depends greatly on the material used and is largest for certain impure inorganic salts, such as those used in fluorescent discharge lamps and television tubes. On the other hand, the light given off when pure inorganic crystals and liquids are bombarded by radioactive particles is very much less, and was at one time thought to be due solely to residual impurities. In 1928 it was shown by L. Mallet that the light emitted by liquids had a different spectrum from that which would have been expected if it were due to impurities, but it was not until the careful and detailed investigations at Moscow of P. A. Čerenkov, 1934–36, that the existence of a new effect was clearly established. The light emitted when fast-charged particles traverse pure transparent materials is now called the Čerenkov radiation.

Properties.

The simple but ingenious experiments of Čerenkov established the main features of this new effect. The light emitted, when examined spectroscopically, has a continuous spectrum which extends into the ultra-violet and is quite different from the line or band spectrum of ordinary fluorescence. There is no emission of light by this process unless the atomic particle has a velocity greater than that of light in the transparent material. (By the Special Theory of Relativity (F14 (1)) no particle can travel faster than the velocity of light *in vacuo*, but light travels more slowly in media other than a vacuum by a factor equal to the refractive index.) The emitted light is not radiated in all directions but at a certain angle, which depends on the particle velocity, with the track of the particle. The light is also polarised in a characteristic way. Its intensity is always very weak, even for the fastest particles, and is less than 1% of that produced by the same particle in a good fluorescent material.

Explanation

I. Frank and I. Tamm, two theoretical physicists working in the same institute as Čerenkov, explained the phenomenon shortly after its dis-

covery. They reasoned that if a particle moves faster than light in the medium, then some of its energy could be radiated in a manner analogous to that in which a fast boat can produce a bow wave or a fast aeroplane the shock wave which is heard as a "supersonic bang" (F70 (1)). They were able to develop this idea mathematically, making use of Maxwell's theory of light as an electromagnetic wave motion (F12 (1)), and thus to account quantitatively for all the properties of the new radiation which Čerenkov had reported. As given by Frank and Tamm, the theory was a classical one in the sense that no account was taken of the atomic nature of the transparent material. Subsequent quantum theories of the effect have shown that allowing for this latter fact only leads to slight modifications in the theoretical predictions.

Applications.

For something like fifteen years after its discovery there were no applications made of the Čerenkov effect. It is only in the last few years, when extremely sensitive photo-electric cells have become available, that it has become possible to detect the passage of a single particle by recording its Čerenkov radiation. This method of detecting particles is an alternative one to the more common Geiger and scintillation counters. The advantage of the Čerenkov detector is that it is the only method which can give direct information on the velocity of a particle; a detector of this sort was used in the first experiment in California which demonstrated clearly the existence of the anti-proton (F12 (1)).

It has proved possible to detect the Čerenkov light emitted by cosmic-ray particles as they traverse the earth's atmosphere. The light emitted by a single particle is too small to be detected, but when large numbers of secondary cosmic rays are generated simultaneously—the phenomenon of cosmic-ray "showers"—the amount of light is proportionately greater. So far it has only been possible to make consistent observations on clear, moonless nights, so that the technique is of only limited value in studying cosmic rays.

One interesting feature of the radiation is that it is distributed uniformly over all wavelengths for which the medium is transparent and has a sufficiently large refractive index. It has been suggested accordingly that a beam of fast electrons could be used to provide a source of radiation in regions of the electromagnetic spectrum where other sources are not available. At the present time work is in progress on the generation by this method of appreciable amounts of power in the spectral region of long infra-red or very short radio waves, but it is too early to say whether the method will be of practical value.

NON-CONSERVATION OF PARITY.

A very surprising addition to our knowledge of the elementary particle interactions was made, following the suggestion of the Chinese-born American physicists Lee and Yang during the summer of 1956, that parity might not be conserved in decay processes such as β-decay (F10 (2)) or meson-decay processes (F12 (1)). This hypothesis was confirmed early in 1957 by the experiments of Wu and others on the β-decay of cobalt (Co^{60}), and almost at the same time by Lederman and others for the decay of π- and μ-mesons (F13). It is probably not an exaggeration to suggest that the discovery of parity non-conservation represents the most exciting revision in our fundamental thinking about space and time since the introduction of Einstein's Special Relativity Theory in 1905.

Invariance of the Laws of Physics.

In order to understand what is meant by parity non-conservation, indeed, it is helpful to recall the main idea of Einstein's Special Theory—that all reference frames in uniform motion relative to each other are equivalent in their description of the laws of physics. Mathematically we say that the laws of physics are invariant to Lorentz transformations. Physically we may say that it is impossible to single out any one frame and say that it is at rest in fixed space—all the frames are on an identical footing. This idea, introduced by Einstein, of finding invariance principles for the laws of physics has been a tremendously fruitful one, and in combination with the quantum theory has been the means of building up our present theoretical picture of elementary particle physics. Typical of such invariance principles, for example, is the idea that the laws of nature should be exactly the same for matter and for anti-matter, *i.e.*, that they should be invariant to the process of the replacement of every particle by its anti-particle (sometimes called charge conjugation and denoted by the symbol C). Corresponding to our world, which we shall define to be composed of matter, we can imagine an anti-world to be constructed by replacing every particle in the world by its anti-particle—proton by anti-proton, neutron by anti-neutron, electron by positron. According to the idea of the invariance of the laws of nature to charge conjugation, this new anti-world is a perfectly possible one, in which all phenomena could occur exactly as in our own. Were we in touch with some distant world by radio, it would be quite impossible to tell merely by interchange of observations whether it was made of matter or anti-matter, for each would report the same result for every measurement.

Parity Transformation.

We now turn to the idea of parity transformations. It was a natural extension from the idea of the invariance of the equations of physics to proper Lorentz transformations, *i.e.*, to transformations to uniformly moving or rotated frames of reference, to add the hypothesis that the equations of physics are invariant also to reflections in space and time. The parity transformation is in fact reflection at a point in space. We are more familiar with the idea of reflection at a plane surface—a mirror. The parity transformation can be regarded as being made up of reflection in a mirror, followed by a rotation through 180° about a normal to the mirror. Thus if we look at ourselves in a mirror we see an image the right way up, but with right and left hands interchanged. Completing the parity transformation means that the image is also turned upside down. Since we already know that the equations of physics are invariant to rotations of the reference frame, we see that invariance to the parity transformation is the same thing as invariance to reflection in a mirror. The most vivid way of expressing this invariance is to treat the transformation as an "active" one. Suppose that we have any physical system in the room with us. We place it in front of a mirror and then study its mirror image. Parity conservation means that this mirror image obeys exactly the same laws of physics as have been established to hold in our room. Looking only at the mirror image, we have no means of telling that it is in fact a mirror image and not "the real thing."

Failure of the Law of Parity in Beta Decay.

Now we know that, at a fundamental level, all atomic processes are controlled by three sorts of interaction: nuclear interactions which bind neutrons and protons in atomic nuclei; electromagnetic interactions, responsible for atomic and molecular structure, and hence for all the chemistry of everyday life; and the weak decay interactions such as β-decay. There is every reason to believe that parity is conserved both in nuclear and in electromagnetic interactions. It was perhaps inevitable that one should assume that Nature always exhibits such a symmetry. However, physics is an empirical science, and feelings of elegance or symmetry must give way to the facts of experiment, which have now conclusively established that parity is not conserved in β-decay—the mirror image of an experiment in β-decay is not one that can occur in accordance with the laws of nature.

Chirality in Nature.

It is clear that parity non-conservation must be related to some "chirality" or "handedness" in Nature. An object is called "chiral" or "handed" if its mirror image cannot be made to

coincide with the original object by translations or rotations in space. As implied by the name, the simplest "chiral" object is our hand. The mirror image of a right hand is a left hand, and to make our left hand coincide with our right we should need to be able to interchange its back and front. To take a homely illustration, a pair of gloves are chiral, but a baby's mittens are identical with their mirror image. Consideration of this example shows what we need to have for an object to be chiral—there must be a plane in the object in which is specified a direction of rotation and there must be a normal direction to the plane (corresponding to the back and front of a glove). In this way the fundamental chiral object can be represented by a screw.

In Nature we certainly find chiral objects—for example, in the inorganic world there are right- and left-handed crystals. These crystals will often form in roughly equal numbers right or left handed, so that in general for the inorganic world the mirror image is not only in principle possible, but actually occurs. In the biological world things are rather different. We are all familiar with "handedness" on the morphological scale. Equally on the biochemical scale enzymes and nucleic acids, like the famous DNA (F58 (2)), may exist only in a single right- or left-handed form. It is interesting to speculate how these right- and left-handed properties of biological systems have arisen, no doubt through the operation of natural selection. However, we need have no feeling that the absence of opposite-handed biological forms has anything to do with non-conservation of parity. The opposite-handed forms could certainly exist in principle in accord with the laws of chemistry, but do not happen to do so.

The Parity Experiments.

We turn now to the consideration of β-decay, of which the typical process is the decay of the neutron into a proton, an electron, and an anti-neutrino (it is purely conventional that we prefer to call the neutral particle an anti-neutrino). The β-decay investigated by Wu and others was that of the isotope of cobalt of mass number 60, Co^{60}, which decays like a neutron to an isotope of nickel, Ni^{60}. Co^{60} has a spin of 5 in the fundamental unit of angular momentum (Planck's constant divided by 2π). Associated with this spin is a magnetic moment, so that at sufficiently low temperatures, and in a strong magnetic field, the nuclear spins in a specimen of Co^{60} can be aligned in a given direction. We shall suppose that the spins are oriented upwards, meaning that the angular momentum of each Co^{60} nucleus has the same sign as that of a top spinning in a right-handed screw with respect to the upward direction as axis. The decay electrons were looked for from Co^{60} aligned in this way, and they were found to be emitted preferentially in the downward direction, *i.e.*, opposite to the spin direction of the Co^{60} nuclei. Suppose now we look at this experiment in a vertical mirror. The electrons in the mirror still seem to come preferentially downward, but the mirror image of the Co^{60} nucleus with right-handed spin about the upward direction is a Co^{60} nucleus with a left-handed spin about the upward direction, or in other words a right-handed spin about the downward direction. Thus the mirror image of a Co^{60} nucleus with spin oriented upwards is a Co^{60} nucleus with spin oriented downwards. The experiment in the mirror thus shows a Co^{60} nucleus emitting electrons preferentially along the direction of its spin. Now we have already noted that Co^{60} in fact emits electrons preferentially opposite to the direction of its spin, so we assert that the mirror-image experiment is one that cannot occur according to the laws of Nature, or in other words that parity is not conserved in β-decay. Looking at the β-decay of Co^{60}, we are able to distinguish between the real and the looking-glass world. It might be objected here that the behaviour of Co^{60} is no different from that of one of the biological systems mentioned earlier, which, in our environment, occur in only one form of handedness. However, this would imply that, say, the neutron was a complex particle with some hidden structure to account for the direction of the electron emission, and such a picture is quite at variance with our ideas of the neutron as an elementary particle.

Interpretation of Bias in Nature.

For an explanation of the handedness occurring in β-decay it is obvious to look at the neutrino (or anti-neutrino) which is characteristic of the process. The neutrino is a spinning particle (actually spin equal to $\frac{1}{2}$ in fundamental units). Handedness will, for example, be introduced if the neutrino spin is invariably aligned, either left handed or right handed with respect to its direction of motion. Related experiments have in fact confirmed that the neutrino always appears as a particle with left-handed spin (anti-neutrino right-handed).

All present evidence on decay processes accords with the above interpretation. We may note some consequences of it. If the neutrino is always to have a spin like a left-handed screw with respect to its direction of motion, then it must move with the velocity of light, and correspondingly have zero rest mass—otherwise it would be possible to make a Lorentz transformation to its rest frame. Again we may consider the mirror image of a neutrino moving parallel to the surface of a mirror. The neutrino spin in relation to its direction of motion forms a left-handed screw. The mirror image is a right-handed screw, *i.e.*, a neutrino with right-handed spin, which does not exist. Equally the charge conjugate of a neutrino would be an anti-neutrino with left-handed spin (since charge conjugation leaves the spin unaltered). Again there is no such particle. However, if we imagine that we simultaneously take the mirror image and the charge conjugate of a neutrino, this produces an anti-neutrino with right-handed spin, which is a valid physical system. Thus though β-decay violates both parity conservation and charge conjugation separately, it may be invariant to the product of these, CP, and indeed appears to satisfy this condition. In plain language, then, the mirror image of a β-decay experiment with ordinary matter is identical with the β-decay experiment for the corresponding anti-matter. Our ability to distinguish between the real and looking-glass world must then be limited by our ability to distinguish between real and ordinary matter. For example, we may solve the old conundrum of conveying to an observer in a distant planet what we mean by a right-handed screw by telling him that it is typified by his anti-neutrinos, only if we are sure that his planet is of matter (not anti-matter). Cosmologists suggest that it is very unlikely that anti-matter in any quantity exists in our galaxy, so this limitation is not, in practice, a very severe one.

EUROPEAN ORGANISATION FOR NUCLEAR RESEARCH (CERN).

A distinguishing feature of this century is the momentum acquired by scientific research expressing itself in rapid advances in knowledge and commerce. The vast changes wrought by these means have in turn affected every phase of our social, political, and economic life, and only those with personal recollections of living in the latter part of the last century can be fully aware of the character and magnitude of the transformation that has occurred.

The gathering of new knowledge, on the one hand, and its application to industry and manufacture, on the other, are two characteristically different activities, for the promotion of which separate and distinctive provisions have to be made. CERN (derived from the initials of the original Interim Organisation—*Conseil Européen pour la Recherche Nucléaire*) is concerned only with fundamental research and the importance of gathering knowledge for its own sake was never more dramatically illustrated than in the field of nuclear physics in which CERN works. There would be no nuclear reactors and no electrical power from atomic energy (to say nothing of other less-attractive developments) if fundamental research had not first revealed the essential structure of the atom and coaxed some of the secrets out of the nucleus.

The changes wrought by science are paralleled by a corresponding change in the means required nowadays by science itself in penetrating certain

frontiers of knowledge, particularly in nuclear physics. The momentous discovery of the electron by Sir J. J. Thomson was virtually a one-man effort with what we would regard today as slender material resources. Fortunately there is still room for the brilliant individual with nothing more than his brains to bless himself, but advances across the frontier in nuclear physics based on controlled systematic experimentation can be made in strength only by teams commanding very powerful equipment. And the tools of the trade have become much more complex and expensive, beyond the single capacities of a great many nations. These inescapable facts of scientific manpower and material resources brought CERN into being to enable twelve European countries to achieve together what they were unable to do alone. The CERN research establishment and administrative headquarters are now being erected at Meyrin, near Geneva, on the site generously presented by the Swiss Government and, when completed in 1960, will cost about £20 million, borne by the member States in proportion to their national incomes.

The basic research tool in nuclear physics is the particle accelerator, in which an electrically charged particle is sped round and round in a circular or spiral path, gathering momentum with each revolution and acquiring ultimately a very high energy. The process may be likened to whirling a ball on a piece of string or elastic according to whether the particle is constrained to move in a circle or spiral. In fact, the constraint is provided by a magnetic field and acceleration by an electric field. The spiral-type machine is known as a Cyclotron or Synchrocyclotron, because of the need to synchronise the frequency of the accelerating voltage with the particle speed in the course of its revolutions. The other type of machine, which accelerates particles in a circular tube, is called the Synchrotron, which, with its magnets disposed about the tube in a circle, is much more economical of steel than the Synchrocyclotron, and for the same magnet weight produces the higher energy level. On the other hand, the design and constructional difficulties are greater.

CERN is building one accelerating machine of each type. Their energy levels are expressed in electron volts, one electron volt (eV for short) being the energy acquired by an electron in moving across an electric field in which the potential difference is one volt. The energy level of the CERN Synchrocyclotron is 6 hundred million electron volts (600 MeV), whilst that of the CERN Synchrotron is 25 thousand million electron volts (25 GeV)—more than forty times the energy level for about 25 per cent increase in magnet weight. The former was completed in 1957, whilst the latter should be ready in 1960. (A thousand million electron volts is abbreviated to GeV in Europe and to BeV in America.)

A large part of this striking economy in magnet weight is due to a remarkable advance in technique whereby the magnetic field can be suitably shaped to sharply focus and control the paths of the particles in the circular tube of the Synchrotron. This idea originated in the U.S.A. at Brookhaven, where a Synchrotron similar to that of CERN is being constructed. When ready to work in 1960, they will be the most powerful accelerating machines in the world. Russian scientists, however, have recently announced their intention of building a 50-GeV Synchrotron, twice the energy of the CERN and Brookhaven machines.

It is not difficult to appreciate the small margins of tolerance allowable in the design and construction of the Synchrotron, in which the accelerating particle is required to make half a million revolutions free from contact with the walls of a tube of 8×15 cm. cross-section. The circle of the tube is of 200 metres diameter, and the particle, before being discharged at a speed near that of light, will have travelled a distance comparable to that between the earth and the moon. Much experimentation has been needed to finalise the magnet design and constructional details, and the greatest care taken to ensure the reliability and positioning of the ring tube and magnets by supporting them on concrete pillars sunk into the solid rock below.

The high-energy particles on being discharged from the machines are used to bombard and disintegrate the nuclei of atoms placed in their path. The object is to gain information on the particles existing in the nucleus, their physical properties—rest mass, charge, spin, parity, lifetime, modes of decay, interaction with the particles—and how they are held together in the nucleus. The paths of the products of disintegration are made visible by allowing them to travel through a chamber consisting of super-cooled water vapour which condenses as water droplets on the charged particles. This well-established technique is based on the original "Wilson cloud chamber" invented over thirty years ago, and is being used by CERN staff on the Jungfraujoch to study nuclear interactions produced by cosmic rays. Recently a similar technique ("Bubble chamber") has been developed in the U.S.A. using liquid hydrogen. Much of CERN's work at present consists in adapting these and other research techniques to the stringent experimental requirements of today to enable the machines to be put to use, after construction, with a minimum of delay.

THE TRANSISTOR.

The transistor was invented by Bardeen, Brattain, and Shockley of the Bell Laboratories in America, for which they were awarded the Nobel prize in 1956.

In one decade the transistor has grown from a scientific curiosity to an accepted electronic component, around which a new technology and a new industry have been built. Enormous funds have been poured into research and development, and large numbers of scientists have devoted years of work to the solving of the problems created by its invention.

Structurally it is a relatively simple device; it consists of few parts, and its operation is remarkably well understood.

Basic Ideas.

The heart of the transistor is a small piece of semi-conductor, usually germanium or (more rarely) silicon. Germanium and silicon are elements noted for their characteristic electrical properties. Chief among these is the ability to behave either as a conductor or as an insulator, depending on the conditions.

Thus a piece of pure germanium at the absolute zero of temperature (−273° C.) would be an insulator. This is because a supply of free electrons is needed before a substance can conduct a current of electricity. At absolute zero all the electrons in pure germanium are fully engaged in orbits around the germanium atoms and cannot be spared. If we raise the temperature some of these orbiting electrons get shaken off and do become available. In this way pure germanium at room temperature (20° C.) is no longer an insulator but conducts to an appreciable extent.

Solids that change their electrical conductivity with temperature in this way are called semi-conductors.

It is however rather inconvenient to rely upon this temperature mechanism to make germanium conduct. A better way is to substitute a few impurity atoms for germanium ones. For example, the addition of a little arsenic to the germanium results in the provision of extra free electrons—one per added arsenic atom. Antimony and phosphorous have the same effect. Since electrons by convention bear a *negative* electric charge, germanium "doped" with arsenic (or antimony or phosphorous) is said to be *n*-type.

The action of an *n*-type impurity atom is due to its having one more outer (valence) electron than the germanium atom.

There also exist elements whose atoms contain one fewer (valence) electron than germanium. Examples of these are indium, gallium, aluminium, and boron. Substitution of a few indium atoms for germanium atoms results in a deficit of electrons—one per added indium atom. This deficit of *negative* particles (electrons) behaves like an excess of *positive* ones. Germanium doped with indium therefore conducts by positive charge carriers and is said to be *p*-type. A missing electron leaves behind an empty space or "hole" into which another electron can move. In a sense therefore a hole can be regarded as a positively

charged particle moving through the germanium. At any moment, of course, a free electron may meet such a hole and both will disappear, the energy appearing as heat or light. The proper operation of a transistor relies on our preventing this from happening too frequently.

The *p-n* Junction.

Two kinds of conducting germanium can therefore be prepared: *n*-type, containing arsenic, antimony, or phosphorous and in which (negative) electrons carry the current; and *p*-type, containing indium, gallium, or boron and in which (positive) holes are the carriers.

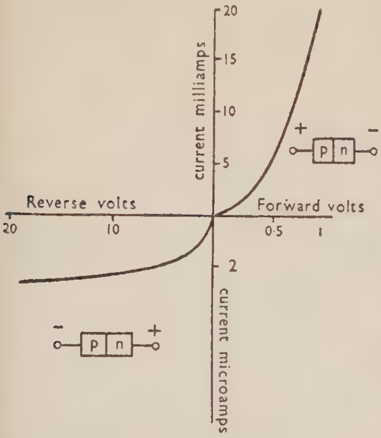


FIG. 7.—THE *p–n* JUNCTION DIODE CURRENT-VOLTAGE CURVE SHOWS THE RECTIFICATION EFFECT. NOTE DIFFERENT SCALES.

Interesting effects occur if an *n*-type region is formed next to a *p*-type region in the same piece of germanium. Across this boundary or *p–n* junction, as it is called, rectification occurs. That is a current flows easily in one direction but only with difficulty in the other (see Fig. 7). Very large numbers of *p-n* junction diodes are used for D.C. power supplies for radio detection and as switching elements in computers.

The Junction Transistor.

Even more interesting effects occur if two junctions can be contrived close together in the same piece of germanium. If we arrange for a *p–n–p* system, for example, as shown in Fig. 8, we can observe transistor action. Let us pretend that

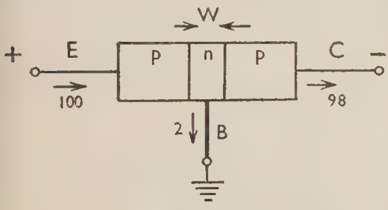


FIG. 8.—*p–n–p* JUNCTION TRANSISTOR.

the left-hand junction does not exist and consider first the right-hand one. If C is negative with respect to B only a very small current flows between them, since the BC junction is " biased " in the reverse direction (see Fig. 7).

We therefore have a small current flowing in a high-resistance circuit.

Let us now consider the left-hand junction. Here we have made E positive with respect to B, and so this junction is biased in the easy-flow or forward direction and an appreciable current flows.

We must make two further assumptions: (*a*) that our EB junction is so made that most of the current across it is carried by holes, only a little by electrons; (*b*) that the width of the middle *n*-layer is very small. Both these things are easy to arrange.

If we now think of both junctions operating at the same time we have the following picture. The left-hand junction " emits " a sizeable current, mostly holes, which then diffuse across the middle *n*-layer (the base) and are " collected " by the right-hand junction. However thin we make the base region, some holes will be lost (because electrons fall into them), but in practice this loss can be made small—say not more than 2%.

Thus if 100 units of current flow into the emitter, perhaps 98 units will reach the collector, and the other 2 must flow out through the base.

This arrangement of junctions, biased in this way, is called a junction transistor.

It can be operated in a number of ways. If we feed an alternating signal, say a radio-wave signal, into the EB path, then a replica of this signal will appear across CB. Since EB is a forward-conducting junction, it has a low resistance, whilst BC is a high-resistance circuit. Although the *currents* in EB and BC are almost equal, this large difference in resistance means that the signal *voltage* in BC has been *amplified* in passing through the transistor. Since the B terminal is common to input and output, this mode of operation is termed common-base.

It is also possible to operate the device in common-emitter connection. In this mode we insert the signal into the base and take the output from the collector. Suppose we make the base current change by 2 units. Then we see from Fig. 8 that the collector current changes by 98 units, giving a current amplification of 49 (= 98 ÷ 2).

Advantages of the Transistor.

Of course a thermionic valve can also amplify and has been used for many years for this purpose (*see* X8). One might therefore ask why such great interest has been shown in the fact that the transistor can do what valves already do. The answer is that the transistor has certain advantages, *viz.*, low power, low voltage, small size, long life, robustness, and low cost. The thermionic valve needs a great deal of electrical power merely to heat the cathode and provide electrons, even when there is no signal being amplified. The transistor uses a quite different principle and needs no heat to function. Also high voltages are normal in valves, say more than 100 volts; transistors, on the other hand, work well in the region below 10 volts. The small size of the transistor can be illustrated by saying that the germanium piece used may be about $\frac{1}{10}$ inch square (the size of the F at the top of this page) and about 3 mils (a mil is $\frac{1}{1000}$ inch) thick (*i.e.*, the thickness of this paper). The long life of the transistor is still to be completely achieved but good progress has been made already—the absence of a hot cathode slowly ageing is the secret of success here. Transistors are robust because they are made of solid materials—there is no vacuum to preserve and no finely spaced electrodes which can vibrate. Finally, because it is simpler, the transistor should be cheaper to produce. So far this promise has not been realised, largely because the rapid sequential development of new types has made stabilised mass production a risky venture, but the ultimate cost should be well below that of valves.

There are, however, compensating snags to the transistor. One is the relatively low power which can be handled. This problem arises because to handle power a device must get rather hot, and as we have seen a rise in temperature affects the electrical conduction properties of semi-conductors. The solution is expected to come from two approaches: (1) to devise better ways of getting rid of the heat, and (2) to use semi-conductors

which can stand a higher temperature without becoming too conducting. Among the latter, silicon is very promising. Whereas a germanium transistor will cease to operate efficiently above about 100° C., silicon can go up to 200° C. Newer, compound, semi-conductors can go even higher, *e.g.*, gallium arsenide up to 350° C., but this work is at present of an experimental nature only.

The other main deficiency of transistors is the relatively poor frequency response. If we were to increase the frequency of the signal being amplified by the transistor in Fig. 8, for example, we should find that above a certain value (called the cut-off frequency) the amplification fell off rather sharply. The reason for this is that the holes which carry the current from the emitter to the collector have to cross the base region (width W) by diffusion, and this takes time. Furthermore, they do not all take exactly the *same* time. If the emitter current changes rapidly it may happen that the collector current will be quite out of step with it and the device no longer operates well. It turns out that in order to amplify a 1-megacycle signal (a typical medium-wave radio frequency) one needs a transistor which has its frequency cut-off at about 10 megacycles. This implies a very small value for W—in fact $\frac{1}{2}$ mil, or $\frac{1}{6}$ thickness of this paper. It is fairly difficult to achieve base thicknesses much lower than this, unless special techniques are used.

How Transistors Are Made.

Most transistors available commercially at present are of the germanium-alloy type. Two small dots of indium are placed in contact with a small, thin wafer of n-type germanium and the whole assembly heated to about 600° C. in an oven for a few minutes. During this heat-treatment the indium dot forms an alloy with the germanium underneath it, and on cooling down a heavily doped p-region is found to have been formed (see Fig. 9a). Contact wires are then attached to the two indium dots and to the n-type wafer—giving

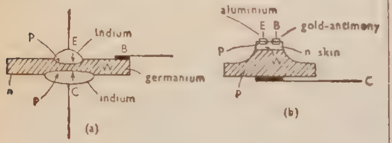


FIG. 9.—(a) ALLOY, (b) DIFFUSED GERMANIUM p–n–p TRANSISTORS. THE CROSS-HATCHED PORTIONS SHOW THE STARTING MATERIAL.

the emitter, collector, and base electrode connections. This type of transistor is easy to make and is quite suitable for medium frequencies, up to a cut-off of 20 megacycles or so, which corresponds to a base width (W) of about $\frac{1}{3}$ mil.

The demand for transistors operating at higher frequencies is satisfied by using the "solid-state diffusion" method of transistor fabrication. To illustrate this technique we shall describe the construction of the germanium diffused transistor which was used in the radio transmitters carried by the American satellite *Explorer I*. The starting-point is a slab of p-type germanium, 3 mils thick, which is placed in a furnace containing antimony at about 800° C. At this high temperature atoms of arsenic slowly diffuse into the solid germanium to give an n-type "skin" of thickness $\frac{1}{20}$ mil. This skin is destined to be the base region of the final transistor. The next step is to evaporate two fine lines on to the surface of this skin—one of aluminium, the other of a gold–antimony alloy. These lines or "stripes" as they are called may be 6 mils long, 1 mil wide, with a separation of $\frac{1}{2}$ mil. The complete device is shown in section in Fig. 9b. The gold–antimony stripe serves as an electrical contact to the base, and the aluminium stripe, when alloyed in, becomes the emitter. Because of the very narrow base W, about $\frac{1}{20}$ mil in this case, the frequency cut-off of these diffused transistors is commonly of the order of 500 megacycles, and oscillator circuits using them operated at 200 megacycles in the satellite *Explorer I*.

Applications of Transistors.

The first large-scale application of transistors was to battery-operated hearing aids. This is a field where the low power requirement and small size of transistors has been fully exploited, and the valve hearing aid is now virtually obsolete.

The transistor radio set, too, is now quite common. Its ability to run off a small, cheap low-voltage battery makes it the ideal portable or personal receiver. This economy of operation is at present offset by the rather higher price of the transistor set compared with its valve counterpart, but it is confidently expected that this difference will disappear as the production of transistors at low cost gets under way. When this happens there does not seem to be any reason why all portable radios should not use transistors, rather than valves.

A large number of cars are now fitted with radio sets. Hitherto these have, of course, been valve radios, and a serious problem has been the stepping-up of the 12 volts supplied by the battery to the 200 volts or so required by the valves. This stepping-up has been carried out by a mechanical converter which is noisy, expensive, and rather unreliable. Transistors, on the other hand, are quite happy to work off a 12-volt battery, no converter is needed, and so a cheaper set can be made. There is the added attraction that a transistor set comes on immediately the switch is turned—there is no warming-up period as in a valve set. Both this and the hearing aid use the alloy germanium type of transistor.

It is also possible to build a transistor television set. A recent experimental exercise with this aim resulted in an extremely compact instrument about 8 inches high, 9½ inches wide, and 14 inches long, which weighed only 19 lb., including the 12-volt battery. It contained twenty-four transistors, twelve diodes, one rectifier valve, and, of course, the television tube. In order to keep the battery drain down, a small (9-inch) tube was used, and this accounted for 1·8 watts out of a total set consumption of 8·5. A truly portable receiver of this kind, with such economical power requirements, could have many applications—it could easily be operated in a motor car, for example. It is believed that many American manufacturers are at present actively developing transistor television sets. Because of the high frequencies used in television, the transistors employed here are of the diffused type.

Future Prospects.

In order to make transistor production a feasible commercial proposition, numerous problems had to be solved. One of the most difficult was the preparation of germanium sufficiently pure for the electrical properties to be under control. Typical impurity levels in such material are around 1 part in 10 million, and to reach this value consistently one starts with germanium fifty times purer than this. The methods used to achieve these incredibly pure materials are finding general application in other fields remote from transistors. Great progress has also been made in the handling of very small dimensions, which may prove of general usefulness in time.

The remaining problems are reliability, on the one hand, and low cost, on the other. With the improvements expected in the possible life of transistors their use in all forms of telecommunications will increase. Various selected applications have been evaluated and put into service in telephone systems, and we look forward to the day when transistors are incorporated in submarine cables. A great future lies before the transistor in all types of electronic-computer use, where low power, small size, and reliability are important. Finally, the manufacture of transistors on a large scale at low cost is the main aim of the many companies now engaged, and this will lead to the extensive use of transistors in telecommunication industry generally and in the home—not replacing valves entirely, but rather supplementing and complementing them.

THE FUTURE OF AIR TRANSPORT.

Speed for Sale.

In speculating upon the future course of air transport it is well to begin by glancing at its past and its present. The spectacular rise in aeronautics in this century has largely been produced by the impetus of two wars, which have carried air transport on their back. Designers and operators of air-liners have relied to an inestimable extent on experience accumulated in the military field; the air-liners of the past decade were clearly fathered by the bombers of the last war; and the uncertain future of the British civil aircraft industry springs in part from the realisation that a feather bed has perhaps disappeared. From this connection flows the pure milk of the speed doctrine. No one would deny that in air warfare speed is paramount. From this it is an easy step to the proposition that since air transport's first asset is speed, its most profitable line of advance is to sell ever-increasing speed to those who will buy it. This is not as self-evident as the basic fact that the air, in contrast to all other transport media, has no speed-ceiling if costs are disregarded. Thus its unique asset is its flexibility in operating speeds, which at present range between 150 and 600 m.p.h. This admirable feature could open the way to satisfy the needs of widely different sections of the travelling public. This seems unlikely to happen under a policy which appears to be set upon devoting its major effort to extending the upper limit of the speed band and discarding its lower limit, and so continually increasing the gap between air speeds and surface speeds. Such a course makes sense only if the journey is so long that increased speed brings the traveller a significant saving in time. A glance at the routes of the world's most highly developed air-lines is illuminating in this context. The U.S. air-lines have a circle of roughly 2,500 miles diameter in which to operate; B.O.A.C. stretches west to San Francisco and east to Sydney; B.E.A. reaches out to the Levant. Thus air transport has already ensured its most obvious gains by establishing a very-long-range facility; and given this pattern there may be profit in its policy of reducing times until a London business-man can get to Australia and back comfortably in three days. The reasons for this concentrated attack on speed are to be found in the social, economic, and political trends of our time. A national air-line is a chosen instrument, it almost carries the flag; the Atlantic crossing is the recognised arena for contests of prestige; the speed of sound (about 650 m.p.h.) is becoming the unit of air speed; Mach numbers are passing into common parlance.

It is therefore very likely that the next few decades will see the appearance of the supersonic air-liner. This project is of great scientific interest. To view it we must take a summary glance at what it is that makes an aeroplane work.

The Energy Account.

Consider first the aeroplane's energy account. The energy released by burning the fuel is directed to one end, the production of the aeroplane's kinetic energy of forward motion. Most of it is lost on the way, in imparting kinetic energy, heat, and sound waves to the air through which it passes, and in energy of heat and vibration in the aeroplane itself.

Any aero engine works by giving a backward kick to the air, in essentially the same way as a swimmer kicks his way through the water. In the piston engine it is the propeller which it turns that provides the kick. The turbo-jet engine does its own kicking by swallowing some air and ejecting it as a hot high-speed jet after compression and combustion; its power can be partly used, as in the turbo-prop engine, to turn a propeller as well. And for the highest operating speeds there is the simplest air swallower, the ram-jet engine, which achieves its compression without moving parts. In all cases the engine designer's problem is the same, to minimise the energy left behind in air which has received a given amount of backward momentum. He is doing very well except in one respect, noise. The most pernicious component of an aeroplane's noise arises at the edge of a jet, and increases formidably with its speed, as any visitor to the festival of decibels at the Farnborough Air show will realise. The step to supersonic speed may produce air-liners which will not be tolerated by those who have to live near air-ports.

While it is the function of the engine to push air backwards, it is the fate of every part of the aeroplane to drag air forwards. The wing, for example, cannot slip through the air without disturbing it. On the contrary, it continually drags air forward with it as it proceeds, and thus sheaths itself in a thin covering of moving air, the boundary layer, which leaves a sheet of air in disturbed motion, the wake, behind the wing. At the outer edges of the boundary layer the air is at rest; at its inner edge, on the surface of the wing, it is moving with the wing's speed. The boundary layer problem, the most famous in aerodynamics, is to make the air flow as smooth and regular as possible between these limits. The most orderly regime—that which produces the thinnest boundary layer and contains the least energy—is the laminar flow in which the air moves in planes parallel to the wing's motion, like a pack of cards sliding over each other. It is, however, unstable and nearly always breaks down towards the rear of the wing into turbulent flow, for which the boundary-layer thickness and the energy left behind in the wake are magnified many times. The maintenance of laminar flow under practical flight conditions without undue cost would constitute a major advance in aeronautics and might bring down air fares with a bump. One way of doing it is to perforate the wing surface, suck away the boundary-layer air, and discharge it to the rear. This is not as simple as it sounds, and the method, though potentially of great promise, has still to be established.

Besides this, the aeroplane has another energy leak which is unique to itself. Its wing must pass through the air in such a way that the pressures on it supply a lift to support the vehicle's weight. It can do this only by making the air through which it passes rotate about axes in the direction of motion; the energy of this vortex motion passes into the wake. A simple rule governs this loss. The vortex energy left behind a wing of given area supplying a given lift decreases as its span increases. Thus if the wing is a rectangle, its aspect ratio, the ratio of its span to its chord, is what matters: the larger this is, the better. But to increase the aspect ratio means that the wing must weigh more if it is to be strong and stiff enough. The designer's job is thorny with compromise: this is a simple example.

Supersonic Conditions.

Air, like any other gas, is compressible, and the sketch so far made of the pattern of disturbance left behind the aircraft applies only when its speed is so small that the air it energises can be treated as incompressible. As the speed approaches that of sound, density changes in the disturbed air begin to count, and at supersonic speeds there is a radical change for the worse in the energy pattern. This is now no longer confined to the wake, for the shock waves themselves, springing from the supersonic body, are thin sheets of energy, which interact with the boundary layer, increasing its energy and that of the wake. In this regime, temperature changes in the disturbed air become very important. The boundary layer is now a depository of heat created by the viscous forces which are necessary to maintain the high-velocity gradients in its interior. It becomes so hot at quite moderate supersonic speeds that heat conduction through the aeroplane's surface would if left to itself convert its interior into a flying oven. Hence

arise the insulation and cooling problems of kinetic heating, and ultimately the use of materials more heat-resistant than the light alloys now used.

Aircraft designers have for long been fighting a delaying action as they approach the speed of sound. There are two effective tricks for dodging the onset of strong shock waves. The first is to decrease the thickness of the profile of the wing (its section by a plane perpendicular to the span). The second is to sweep the wing back, and there is now little doubt that increase of the angle of sweep to upwards of 60° will be a key point in the design of supersonic air-liners.

However complex it may be in its detail, the energy account amounts to this, that the better the aeroplane is, the less commotion it leaves behind in the air. The passenger on board ship, when he watches its bow wave and its wake, has a beautiful visual demonstration of the naval architect's problem. It is a pity that neither the air traveller nor the designer of his craft can see what is going on around and behind it.

The Lift/Drag Ratio.

The energy account can be brought up against the hard facts of practical design by noticing that every packet of energy that the aeroplane leaves behind in the air turns up as drag, *i.e.*, resistance to its motion. This gives the designer his measure of aerodynamic efficiency, the lift/drag ratio. In cruising flight the lift balances the aeroplane's weight and the drag is balanced by the engine thrust, and so the reciprocal of the lift/drag ratio is the fraction of the weight that must be supplied as thrust. It has taken much effort to maintain the lift/drag ratio at the level of about 17 as the speed of sound is approached, for example, in the 600-m.p.h. jets. In passing through the speed of sound, a steep rise in drag is sooner or later inevitable. As the supersonic speed rises the lift/drag ratio falls steeply to a much lower level, and the current aerodynamic problem is to discover aeroplane shapes that will reduce the steepness of this downward slope. Supersonic travel at a reasonable cost depends a good deal on the success of this search.

The Designer's Job.

This brings us to the designer, who nowadays has to be a jack of all trades and the master of the integrated airframe–engine configuration. In essence his job is to provide the lightest wrap in which to move a certain number of passengers through a certain distance at a certain speed. The wrap consists mainly of structure, engines, fuel, and equipment for the flight. In working it out he is deeply involved in balancing one good feature against another. The shape he chooses must be aerodynamically good. But if he goes for a very high lift/drag ratio what he saves in fuel and engine weight may be more than lost in the increased weight of the structure. He has to use the most efficient engines for the chosen speed, and he has to work them into his chosen shape so that his provision of thrust does not bring a lot of drag in its train. He would use fuels of higher energy and materials of higher strength per unit of their weight if he could find them, but there is no sign of a breakthrough in these directions. The compromises in his problem grow more critical as the range of his vehicle is increased. As an example of what he achieves, the weight of the wrap to carry about 100 passengers from London to New York at 600 m.p.h. turns out to be about 100 tons, at least ten times as much as its payload.

The Aeroplane Family.

It is instructive to look at the monoplane shapes that line the road to high speed, and to note that they constitute a well-defined family with significant variations. The family make-up consists of a cigar-shaped body, to which wings and tail are attached. At the lowest speed the glider, with its dragon-fly proportions, is a beautiful but fragile thing, as aerodynamically perfect as may be. It takes on power and speed for its transport job. Its wings are reduced in span; they grow engines. In a long range of speed they are still straight; at about 400 m.p.h. they begin to fold back and become thinner, but at 600 m.p.h. the sweep hardly exceeds 30°. The only break with family tradition in the high subsonic speed range occurs in the delta, a successful compromise which, after folding its wings back to at least 45°, fills in the space between them and the body to form a triangle. What will happen next, at the jump to supersonic speed, is still uncertain, but it seems probable that the main visible feature of the development will be an increase in sweep back. If the jump is to 800 m.p.h. the wings should still be distinguishable from the body. At 1200 m.p.h. the shape might be so slender that body and wings merge in one surface: the dragonfly we started with would have folded up its wings.

The Ground Organisation.

No survey of high-speed development in air transport would be complete without some consideration of its effect on the ground organisation of the system. Every aeroplane has a minimum speed below which it is unsafe to leave the ground or return to it, and it is this that determines the runway length. There is a natural tendency for this minimum speed to grow with cruising speed. It has reached about 150 m.p.h. with the 600-m.p.h. jets, and needs about 1½ miles of runway. This has two consequences, one related to the disposition of air-ports, the other to the safety of the passenger.

The necessity for large open spaces has led, broadly speaking, to the centralisation of the ground organisation, which works mainly from a small number of large air-ports, each situated many miles from a city centre. This produces the air traveller's well-worn grumble, that he always has to go places before he takes off and after he lands. It means that a fast air-liner running into impossible weather conditions at its terminal has a very limited choice of alternative landing grounds, and must carry a large excess fuel load against the risk of diversion. It also means that air transport's much-vaunted flexibility in speed may recoil intolerably on the traffic controller of a busy terminal if a large increase in cruising speed coincides with an increase in traffic.

The argument as to safety is equally serious. The air traveller who is watching his approach to land in low cloud is right to be rather apprehensive. Landing is much the most difficult job the pilot has to do. Its difficulty in poor daylight conditions or at night increases rapidly with the growth of approach speed because he is left with less time to make the critical final adjustments to his approach to the runway. At 150 m.p.h. he may be reaching the limit of his competence when everything that can be done at present has been done to aid him from the ground. It is arguable that approach speeds should be limited to a maximum substantially less than 150 m.p.h. In this context the supersonic air-liner is bound to come out badly. Whatever its configuration may turn out to be, it must necessarily be an inefficient instrument for comfortable ground performance. Whether it will scrape by the 150-m.p.h. mark is rather doubtful.

These difficulties could be swept away by the development of a device which is now being studied and might—if its cost could be met—revolutionise the ground organisation of air transport. The beginnings of VTOL (vertical take-off and landing) have been seen in press reports of the Flying Bedstead experiments. The aeroplane carries engine thrust which is greater than its weight and acts vertically. It can rise vertically from the ground, hover by sitting on its jets, and accelerate to the speed at which

its wings can support its weight and take over for normal flight; its landing is roughly the same process in reverse. This development would open several possibilities: abolition of the growth of immense masses of concrete; flight between city centres; and ultimately perhaps a radical transformation of the present air-port pattern. But the VTOL aeroplane must carry at least three times as much power as usual, and increase of power means an increase of noisiness. Its increase in weight would be cut down by compensatory savings in several directions. But its economic account seems at present to be rather heavily against an easy passage to acceptance, except in some special applications. All the same, a partial use of its principle may be forced by the hard facts of high-speed design. It may turn out that a satisfactory runway performance of a supersonic aeroplane can be assured only by using some jet lift to augment its wing lift.

The Supersonic Prospect.

To sum up the prospects of the supersonic air-liner, the problem of carrying 100 passengers non-stop across the Atlantic, without an altogether prohibitive cost, in the speed range 800—1,200 m.p.h., with a journey time between 5 and 3½ hours, is technically feasible. Its solution will probably be forced before very long by the particular pressures of expansion now at work within the highly competitive air-transport industry. Potentially a very hot and very noisy vehicle, it can probably be kept cool and quiet enough without resort to new materials and untried engineering methods. It may be difficult to land; it may stretch to their limit the longest of existing runways; and if it is simply added to the current traffic of a terminal air-port it will tax the ingenuity of the traffic controller. Its greatest unknown, and one that can hardly even be guessed at the moment, is how much more its passengers will have to pay for their privileges.

Air versus Surface Travel.

It remains to consider in volume and kind the people that are being and will be attracted to air travel. The basic facts are simple and eloquent enough. About 25% of the U.S. population make one flight per year, and as those who travel by air usually do so frequently, the percentage of individuals is probably much less. This figure is much higher than anywhere else in the world except Australia; in Europe it does not much exceed 2%. These numbers must, of course, be related to their rate of growth. It is true that air traffic the world over has increased some five-fold in the last ten years, but this figure is significant only when linked to the traffic level at the beginning of the period. It is consistent with the much more revealing fact that B.E.A. carries about ¼ million more passengers each year, that is about ½% of the United Kingdom population, though their passengers are drawn from a much wider area. These facts should be set against some rough estimates of the comparative cost of air and surface travel. The British figures are fairly typical. B.E.A.'s air fare hovers round 6*d*. per mile; British Transport's average fare, whether by rail or by road, is rather more than 1½*d*. per mile.

The trend is clear enough. Air transport has made only a very slight impression on the mass of the people even in the areas of highest prosperity, and even if an indefinite extrapolation of its growth curve is permissible it will be a long time before it issues a serious challenge to surface transport. In the main—and after allowing for the introduction of the tourist air ticket—it is a luxury service for top people—the wealthy, the government official, the business executive. For them it has spanned the world; it is they if any who will pay for the supersonic time-saver. In one respect only is air transport showing a popular impact, and that is in a large extension of the holiday radius for the middle-income bracket.

So much for what is and what probably will be. Is there an alternative route for air transport to take: one that would make the major part of a community air-minded? When the railways appeared a century ago they succeeded in a few decades in getting most of the population of Britain on the move. Could air transport repeat that performance on its own speed and distance scale? The signals are heavily against it in regions with highly developed surface systems. In North America the chosen instrument of bulk travel is the motor car and the motor coach; in Europe the railways are losing traffic to the roads. In every region where the standard of living is high enough for the habit of mobility to make a strong growth it is the motor industry in its various forms that is penetrating to the mass of the people. The man with £50 or £100 of income to spend on getting about invests in a cheap car and goes by train or coach when more convenient. The air, he says, is not for him. This is true. But if he lives where roads are few and railways non-existent the air might still be for him if it would work hard to get at him. In fact, it is already at work—in the Australian out-back, in Arctic Canada, and in some other large territories with undeveloped production potential—but in a makeshift fashion, unsupported by big business, using out-of-date equipment, accomplishing heroically much with its means, but far from the beginnings of a well-organised transport system in a virgin field. We may conclude by imagining what the aerobus, the unit of such a system, might look like, on the assumption that to pay its way it would have to carry more passengers than the air-liner of today, whose complement seldom exceeds 100.

The Aerobus.

Consider, then, the air analogue of a five-coach train, with a full load of 300 passengers, travelling at 50 m.p.h. with hourly stops. The aerobus would do the same duty, but at 300 m.p.h.; its stage length would be 300 miles. The shape of this vehicle would probably be an unusual one. The cigar-shaped body has held its place in the aeroplane's anatomy mainly because the human race is nearly 6 ft. tall. As the number of passengers increases the wing necessary to support them grows so large that ultimately the depth of its central part exceeds the passenger's head room. The passenger cabin can then be housed in the wing itself, and the body, which is an inefficient member because it contributes nothing to the lift, can disappear. Our dragonfly, which may fold up its wings to become supersonic, now sheds its body and becomes a swept-back flying wing. The 300 passengers would occupy a triangular room in the centre of the aerobus. It would weigh about the same as a trans-Atlantic jet carrying 100 passengers, with about double the wing area and about 50% more wing span; its landing speed would be much lower.

The aerobus, as its name is meant to suggest, would be ruggedly constructed, with no great aerodynamic refinement, to serve the workaday needs of people who would mostly want to travel a few hundred miles in an hour or two. Its design problems are trivial compared with those of high-speed development. Its first cost would be only a fraction of that of a high-speed vehicle of the same size. Its special features combine to reduce its running costs, which could be further lowered by sacrificing most of the amenities that gild current air travel, since most of its passengers would be on board only an hour or two. Its use is a speculative theme capable of many variations. The changes can be rung on its speed, which might be as low as 200 m.p.h.; its stage length, which might be anything between 100 and 1,000 miles; and its payload, which might fall to 200 passengers. It would operate most efficiently over regions whose centres of population are widely separated, and looking round the undeveloped parts of the world these fall into two broad divisions:—

1. A large territory whose undeveloped resources are being energetically pioneered by a population which is now very sparse and scattered but will, as the development proceeds, expand and concentrate in widely

spaced industrial, mining or farming centres served only by primitive surface transport. Arctic Canada and Siberia are obvious examples of this process.

2. A large country with a dense population, whose way of life has been maintained with the slowest and most primitive of communications, and whose rulers propose to industrialise it in a very large way without the surface transport adequate to the process. Here and now, with a big question mark, stands China; and here too, in the not too distant future, parts of Africa may be included.

In such places and in such circumstances air transport might lead surface transport, instead of following it, and so begin to serve the mass of the people. Whether or not it will do so must be left an open, intriguing question.

EEL MIGRATIONS.

American and European Fresh-water Eels.

All the fresh-water eels of Europe and North Africa belong to one species, *Anguilla anguilla*, and have from 110 to 119 vertebræ in their backbones. The eels of North America differ from ours in having only 103–111 vertebræ and, solely on this distinction, have been recognised as a distinct species, *A. rostrata*. Before the formation of the vertebræ the young larval stages can be distinguished by similar differences in the numbers of muscle-segments or *myomeres* in their bodies.

The Classical Interpretation of the Eel-migration.

The problem of the birthplace of the common European eel was not solved until the early years of this century. Prolonged Danish investigations, led by Johannes Schmidt, produced collections of transparent leaf-like *leptocephalus* larvæ from all over the Mediterranean and North Atlantic. Schmidt then showed that the smallest leptocephali of the European eel come from an area south-east of Bermuda (roughly between lat. 23–29° N., long. 50–65° W.) which must obviously contain the area where the eggs are spawned. From 1922 onwards it was very reasonably assumed that the European silver eels, which leave our rivers on their seaward migration every autumn, must be the parents of the larvæ which originate in the Sargasso Sea and which, as elvers, invade our rivers each spring at the end of a three-year Atlantic crossing. How the adults found their way and survived journeys of from 3,500 to 6,000 miles back to the Sargasso was not known; none had ever been taken in the open ocean, but, since the offspring were found there, it seemed indisputable that the parents must return there somehow.

At the same time Schmidt produced evidence that the American eels must spawn in an area a little south-west of the European, and that their larvæ complete their shorter journey and metamorphose into elvers in only one year.

Tucker's Hypothesis.

In 1959 (*Nature*, **183**, 495, 1405; **184**, 1281), Dr. D. W. Tucker of the British Museum (Natural History) produced a drastically new interpretation of the available evidence. He does not in any way contradict Schmidt's observations, except to suggest that the American eel-larvæ originate south of the European rather than south-west, and that the two supposed breeding-grounds are actually contiguous. On the new hypothesis, however, the European eel-migration is a suicide migration; the silver eels do not return to breed. Both the European-type and American-type larvæ are the offspring of identical American parents, physically modified and distributed according to the water-masses in which they are spawned. Both the American and European eels are thus one species (for which the name *Anguilla anguilla* has priority), and Europe is annually re-colonised by a new invasion of surplus American eel-larvæ in what may be regarded as the oldest form of Marshall Aid!

Two Difficulties of Migration.

Tucker emphasises the difficulties facing the European silver eels on their hypothetical migration: the long distance; the widely-varying current, salinity, and temperature conditions in European waters which would have to be navigated by one single instinctive behaviour-pattern; the advanced and degenerative changes which prevent feeding and endanger the maintenance of the essential difference between the body-fluids and the ocean outside. He contrasts these with the relative immaturity of the migrating American eel and its simpler and much shorter journey.

Two Kinds of Eel from One Kind of Parent?

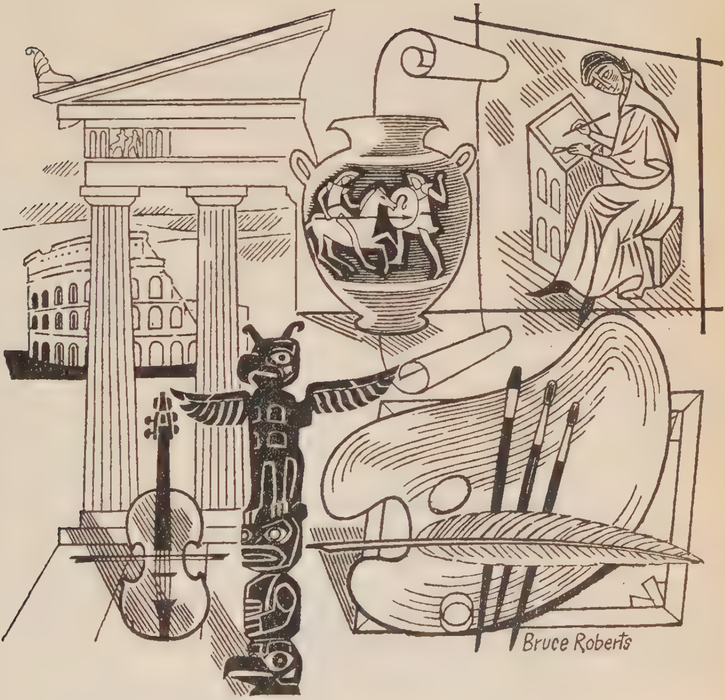
Tucker goes on to show how both American and European-type larvæ may be derived from American parents. Eels spawn at a considerable depth in the sea, over 400 metres down. The eggs and larvæ rise to the surface under their own buoyancy. Now, in the southern part of the Sargasso Sea, there is a steep rise in temperature, from 18° C. at a depth of 300 metres to more than 25° C. at the surface. We know, from experiments on trout and other fishes, that a sudden temperature change at a critical stage in the development of the embryo puts an end to the segmentation of the body. It is very likely that our eel-eggs would react in the same way, so giving rise to larvæ with the low number of myomeres/vertebræ (103–111) characteristic of the parent American eels. In the northern part of the Sargasso, however, the temperature rise from the depths to the surface is very much less; from a similar 18° C. at 300 metres to barely 20° C. at the surface. Eel-eggs rising in this region would not be affected by temperature; the embryos would continue their segmentation unhindered until the hereditary limit had been reached, and so we would have larvæ with the 110–119 myomeres/vertebræ characteristic of the "European" type.

The combined *Anguilla* spawning-area underlies the southern arc of the great clockwise surface-current system formed by the North Equatorial and Antilles Currents and the Gulf Stream, a system which runs deeper as well as faster at its periphery. Our American-type eel-larvæ find themselves travelling on the periphery of this system; they are carried up along the east coast of North America, while, at the same time, high temperatures along their route speed up their development and induce an early metamorphosis so that they are ready to move inshore into fresh water before the end of the first year. Those which drift elsewhere eventually metamorphose and die without making landfall. Our European-type eel-larvæ, travelling much more slowly in much cooler water on the inside of the current-system, drift instead north-east towards Europe; they grow more slowly, though to a greater size, and have their metamorphosis conveniently delayed so that they do not change into elvers until within easy reach of European continental waters.

A Theory to be Proven.

No really damaging criticism of the new hypothesis has so far been published, though it has attracted a great deal of international scientific interest. At the same time it must be emphasised that it is merely a hypothesis, needing further evidence for its eventual proof or disproof, and claiming only parity with Schmidt's interpretation of the evidence presently available. We must wait now for new contributions from laboratories and research ships towards the solution of this newly re-opened problem.

The World of Art



This outline is arranged for the most part on a historical basis. Much has been included about the social scene since the arts of a people must inevitably be related to the surge of life going on around them.

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The World of Art

INTRODUCTION

This section is mainly concerned with the fine arts of literature, music, sculpture, painting, and architecture, and mainly too with their manifestations in the Western world. The approach is historical, because although it may be true that great works of art are timeless and convey something fresh to each generation, it is important to understand what the artist meant to convey to his own generation, and this is impossible without some knowledge of the social background. Little can be said about the life of any individual artist, but if the whole paragraph in which his name appears is read (or better still, the whole sub-section), it is hoped that the general character of his work and the forces influencing it will be made clearer. This section assumes no special knowledge whatever on the part of the reader. It is a background to art as the science section is a background to science, and just as the latter cannot show the reader what a cell nucleus looks like but only tell of its structure, so this section can only tell of works of art. These lie in the world around us, and *knowing* about them is not at all the same thing as *experiencing* them—which, after all is one of the reasons why they were created. But it would be sheer affectation to pretend that experience is always enough in itself to bring about understanding of a work; that we must naturally enjoy the music of Monteverdi when we are used to that of more recent composers; or appreciate a statue by Henry Moore if we have been reared in the classical Greek tradition. One needs to have some idea of the artist's social background and what he is trying to do for the full enjoyment of his work, and that is one of the reasons why facts of the sort presented here are as important for appreciation as for information pure and simple.

What is Art?

The dictionary points out that the word "art" may be used in three different connections: (*a*) of a skill—being able to do something supremely well; (*b*) of a craft—*i.e.*, skilled handiwork ordinarily intended for some practical purpose; (*c*) of the fine arts, with which we are mainly concerned here. The function of the fine arts is primarily aesthetic, and they are deliberately created to this end by the artist; they are something upon which he has worked by taking the materials provided by nature—stone, sounds, wood, pigments—and imposing form and design upon them according to a conception which was originally in his own mind.

Art began in prehistoric times as an activity which was unnecessary, as the first civilised gesture of savage man when he added some useless decoration to his clay pot which in no way improved its true function. Nothing could be done with it except look at it. Music arose from the rhythms of the dance, storytelling from the desire to recount the great events of the past, and the theatre from the religious rituals which re-enacted significant happenings in the lives of the gods man had projected from his own mind upon the blank screen of the universe. Some of the arts have had utilitarian origins, but *as art* their sole function is to give pleasure to the bystander, and when their connections with magic or religion were severed they continued in a life of their own. They represent the overflow of surplus energy, the gratuitous, the unnecessary, the non-utilitarian aspects of life.

Beauty in the sense of perfection of form or perfection in creating the object aimed at is necessary to all art, but beauty in the sense of attractive and pleasurable by direct appeal to the eye or ear is not. Rembrandt, especially in his later years, often chose as his subjects the old, the sad, the sick, or the bewildered, and Bosch depicted "horrid phantoms of hell"; purposeful ugliness or even obscenity in an artist's subject-matter is not inconsistent with aesthetically satisfying work. It would be unnecessary to say this were it not that a general impression arose mainly among the lay public during the Victorian period that art and prettiness were the same, that, in addition, literal truth to nature in its more cheerful aspects was a valid criterion of good art.

It is the function of the fine arts to convey an emotional experience felt by the artist; the experience may be ecstatic or mystical, tender or cruel, lovely or ugly, bitter or sweet, comical or serious, calm or tempestuous, pure or obscene, and the ability of the artist to pass on these emotions is one measure of his competence. Hence the poems of St. John of the Cross, the landscapes of Constable, Goya's *Horrors of War*, the *Mona Lisa* of da Vinci, a shaft of light painted by Rembrandt, Voltaire's *Candide* or Wordsworth's *Prelude*, *Pickwick Papers* or the writings of Pascal, Debussy's *L'Après-midi* or Beethoven's Seventh Symphony, the works of Rabelais and Shakespeare's *As You Like It* are all, in varying degrees, works of art. They are not equally important works of art; for a smile is not as exciting as a belly-laugh, the trials of the Vicar of Wakefield as moving as those of Lear. They are to be judged in terms of what they attempted and succeeded in doing, and whether we feel it was worth doing at all.

Form in Art.

Herbert Read has defined beauty as "a unity or harmony of formal relations among our sense-perceptions." Nothing, that is to say, can be described as a work of art unless it has some shape or form. Even when formlessness or discord enters into its composition, this must be merely an element in a meaningful whole. We must feel that the end of *Hamlet* is an event towards which the whole play has been leading us, and we should feel it was all "wrong" if Hamlet made it up with his uncle, married Ophelia, and lived happily ever after—although this could very well happen in real life. Similarly, the end of a symphony or indeed any piece of music must be the end which, although only dimly perceived—or even not perceived at all—during the performance, is somehow the inevitable result of what went before. In a painting the same unity of formal relations is achieved by the skilful use of rhythm of line, composition (*i.e.*, the way in which the various shapes are arranged), the relations between light and shade, the colours, and the space surrounding the forms. Deliberate intention, the ability to communicate, and form are the indispensable qualities of all art. "Nature has no Outline but Imagination has," said the poet Blake.

Realism.

The idea that all art must be about something concrete and should be judged by the degree to which it approximates to nature is described as realism or naturalism. In this sense, the idea is largely a product of ill-informed Victorian thinking, because no great art of any period has ever been wholly realistic. The classical Greek statues so often held up as models of realism are, of course, extremely idealistic, since they do not in fact correspond to the general appearance of ordinary human beings, and even portraits by great artists are a great deal more than literal transcriptions of the visible appearance of the sitter.

Prior to the invention of the camera the portrait painter had an important social function to perform, since, at a time when few people travelled more than a few miles from their place of birth, it was impossible for subjects to know the face of their rulers or aristocratic suitors to choose their often distant brides-to-be. Velasquez, for example, in 17th-century Spain was commissioned to paint not only one portrait of Philip IV, but an immense number of identical copies, which were

distributed throughout the royal palaces or given as gifts to nobles or other royal families. But these and all other portraits are much more than realistic renderings of what the artist saw before his eyes, and they are only likely to be judged more than competent in so far as they reveal how a sensitive mind *interpreted* what it saw. Otherwise we must adopt the absurd position that the best pictures are coloured photographs.

It was the invention of the daguerreotype, the earliest form of photograph, in 1839 which made it clear that if imitation were to be regarded as the basic function of the artist he had better give up business. For there is nothing he could do in this respect that the camera could not do better. The alternative was to move away from the more literal forms of realism to arrive by way of impressionism at the other end of the scale—abstract or non-representational art. The artist had never been fully committed to the direct representation of nature, but now he could feel even more free to interpret it or communicate his own feelings about it in terms of the medium in which he was working.

That this is by no means a new trend but only one which has returned from the past is well illustrated by the religious paintings of Stanley Spencer (d. 1959) in Britain (G62(1)). These aroused a good deal of antagonism, both by reason of the distortion, sometimes amounting to caricature, and by the presentation of biblical figures in modern dress. Yet this artist's work was purely in the old Gothic tradition, which used distortion to produce an emotional effect; the presentation of biblical figures in what was supposed to be biblical costume is quite a recent innovation. Far from being a modernist, Spencer was a traditionalist. The works of Henry Moore and other modern sculptors are incomprehensible only if we are looking for a detailed copy of form and feature in stone, but when they are seen as a translation of *meaning* from one material to another it becomes possible to judge them on their own merits. There is no reason why art should be "about" anything or why the artist, writer, or composer, should not be free to experiment with patterns, sounds, or words provided only that he is able to communicate to others something of the emotion felt in the process of creation.

Art and the Philosophers.

The branch of philosophy dealing with the nature of art and in particular with the nature of beauty is known as "aesthetics," and not unnaturally its fundamental question is whether beauty is a real quality such as redness or squareness, a quality which is independent of the observer and by which all works of art can be judged, or whether it is merely a matter of taste and essentially personal. If the first theory be correct the person who states that Shakespeare wrote better plays than Noel Coward or that Beethoven was a greater composer than Irving Berlin is stating an objective fact which must be absolutely true at any place or time. If the second theory be correct he is simply expressing an opinion, and his statement really means that he happens to prefer Shakespeare and Beethoven, while others may as legitimately prefer Coward and Berlin.

The objective view is that first expounded by Plato in the *Phaedrus* which regards beauty as one of "the forms" in the ideal world of which our everyday world is merely a shadow and its objects only real insofar as they approximate to the ideal "forms." The belief that beauty is an objective quality and not merely a matter of taste is restated in Clive Bell's theory of "significant form" which appeared in his book *Art* (1914) and which has had an immense influence upon art criticism ever since. Bell begins by pointing out that aesthetic experience begins with the personal awareness of a particular emotion which, no matter how much it differs in quality or intensity, is always of the same type. All genuine works of art possess the ability to stimulate this emotion, otherwise there would be no sense in grouping them together as art; for this is the sole property they have in common. The emotion felt by the artist and transmitted by his work to others may have been initially aroused by a real object, but the object is seen, not as a means to something outside itself, but as an end in itself—as a combination of significant forms. From this point of view there is only one criterion of art—its ability to act as a window to reality, and no matter how the panes change and are clear or dim from one age to another or one place to the next, the view it gives is eternally the same. This is essentially what Spinoza meant when he said that the contemplation of beauty has the power to make the soul lose all sense of time and place, so that in a particular object it sees an infinite meaning, or Schopenhauer when he said that aesthetic interest is detachment, or Wordsworth in his definition of poetry as "emotion recollected in tranquility."

The extreme subjectivist view in aesthetics is expressed in Tolstoy's book *What is Art?*, published in 1897. Here Tolstoy suggests that art is the communication of emotion felt by the artist to others and that when this emotion arises from a fresh and vivid attitude towards the world and is successfully communicated the result is great art. Art which claims to be beautiful but in fact arouses only pleasure is not art at all, yet this has been a characteristic of the so-called art of the bourgeois and ruling classes throughout history. This theory implies: (*a*) that art must be able to communicate the *same* emotion felt by the artist to the greatest possible number of people; (*b*) that it has a moral function; hence, he pointed out, Shakespeare's *King Lear* is a wicked and vicious play; (*c*) that therefore, since Russian peasant songs have communicated emotion to more people than have Shakespeare's plays, they are greater art. Beauty is not something inherent in a poem, a piece of music, or a painting, it is a quality produced in those who experience them, and its presence is to be estimated by counting heads. *See* G59(1).

However, there are many people who would hold this view in a modified form. For example, they may take the view that the value of a work of art cannot be estimated by noting its effect upon *everybody* but only upon those who are specially trained in the appreciation of art. Beauty lies, not in the object itself, but in a relationship between the object and the mind perceiving it. An important exponent of this point of view is Dr. I. A. Richards, whose *Principles of Literary Criticism* and *Foundations of Aesthetics* (in collaboration with C. K. Ogden) have been influential in supporting the theory, based on modern psychology, that what we call beauty is emotional satisfaction; a beautiful object is one that by its contemplation brings about a state of emotional equilibrium in our otherwise conflicting impulses. Ordinarily our environment arouses in us emotional responses, many of which are inharmonious or conflicting and need to be systematised, ideally by an adjustment which "will preserve free play to every impulse with entire avoidance of frustration." "In any equilibrium of this kind," says Dr. Richards, "however momentary, we are experiencing beauty." The fact that for this moment we *are* the whole complex of our integrated impulses accounts, in his view, for the feeling of detachment so characteristic of the aesthetic experience. We see the fruit without experiencing hunger, the nude without desire, the landscape without worrying about the weather or the state of the crops. This view is not necessarily in contradiction with Braque's statement that "art disturbs, science reassures," nor with that of the sculptor Henry Moore to the effect that all great art stimulates feelings of conflict in the observer. Clearly art must not be too perfect or facile to be stimulating; it must first stimulate and even arouse conflicting emotions which demand some participation by the observer before they can be resolved.

Summary.

We know that the judgments of critics and artists are often unreliable, and that tastes change. One can almost hear the sigh of resignation of Frederick when he announced to his court that "old Bach" had come to visit his brilliant son

C. P. E. Bach, yet it is only "old Bach" who matters today. We know that the 18th century found little to please in Shakespeare and the French until fairly recently nothing at all; that the Greek statues which had been admired by the Romans fell into disrepute with the advent of Christianity and virtually remained hidden from sight for a thousand years until the Renaissance, when Michelangelo's teacher Signorelli painted the first convincing nude; that the Renaissance artists loathed Gothic while, Ruskin, Braque, and Picasso express their distaste for the Renaissance. The fact is that art presents us not only with form but with emotions, ideas, and ways of thought, which sometimes become a threat to established ways. The formal and respectable French Salon of 1846 was shocked by Delacroix's vivid colours and Oriental figures as the Renaissance artists who loved the naked human form disliked the emotional distortion of Gothic. They were not wrong—they simply did not share the same world-view, and this is why some knowledge of the social background of the artist is essential. We must know what sort of people the artist lived among in order to understand what he wished to convey.

ART THROUGH THE AGES

PREHISTORIC ART.

The term "prehistoric" refers to that period in human history before any written records were kept. In the absence of such records classification has to be in terms of the human remains and manufactured objects such as tools, weapons, or works of art found by archæologists. Hence we talk of the *paleolithic* or old stone age (which occupied in Western Europe more than 90% of her history) and the *neolithic* or new stone age, which began about 6000 B.C. and gave way in turn to the bronze and iron ages. These dates apply only to Western Europe, the Near East, and surrounding areas; in other parts of the world some peoples are still living in the stone age.

Paleolithic Art.

The earliest works of man were tools and weapons made out of pieces of flint or carved from wood and bone. To begin with these implements were chipped or flaked and it is only as the neolithic period dawns that they were ground and polished. The first important art objects seem to have been created by a hunting and fishing people known as the Aurignacians who, about 25,000 years ago, inhabited southern France, northern Spain, and some parts of Italy. These tribes made necklaces for their women and painted and sculptured both in rock and bone. There are human heads carved in relief on rock surfaces; more commonly, figures in the round, such as the lovely heads of young girls cut out of bone, discovered in France; representations of animals in the form of figurines or ornamenting the handles of tools; and, most typical of all, the statues of pregnant women thought to represent a fertility goddess. Among the best-known of these are the so-called Venuses of Willendorf in Austria, and Menton and Brassempouy in France.

The Aurignacians were cave-dwellers, and when, in 1879, a certain Marquis de Santuola went out for a walk with his little daughter hunting for flints and fossils in the cave of Altamira which is situated in the Cantabrian mountains in the north of Spain he little suspected that he would return with a remarkable new contribution to the knowledge of prehistoric man. His little girl, becoming bored, had wandered off unnoticed by her father until he heard her calling "Toros, toros!" (Bulls, bulls!) She was found standing some distance within the cave and pointing to a part of the roof covered with animal paintings, some life size and all remarkably realistic: they were of bulls, mammoths, bears, stags, and reindeer. The Marquis was interested in antiquities and hastened to tell his colleagues, but he was not believed and was even accused of producing the paintings himself. He has since been vindicated by the discovery of about forty caves similarly decorated in northern Spain and the south of France with two in Italy. One of the most recently discovered is that at Lascaux in the Dordogne found by accident during the second world war.

These cave paintings are great art of a type quite unlike anything produced in Europe before or since. First, they are extraordinarily realistic and reveal a remarkable feeling for movement. As Roger Fry points out, they reveal their subjects in poses which have only recently been demonstrated by the slow-motion camera. Secondly, they depict the subject as a whole without undue emphasis on any one feature; it is almost as if the artist possessed what psychologists call "eidetic imagery," the ability found in young children and some adults to look at an object and then, turning away to a blank sheet or screen, to visualise it so clearly that it appears to be projected on the blank area. The Aurignacian artist seems to have projected his image in this way and, as it were, drawn an outline around it. Thirdly, although each figure is perfect in itself, the drawings collectively show no sign of design or form; they have no pattern, and quite commonly one drawing is superimposed upon another. Possibly the reason for this was that the primary function of the paintings was ritual rather than artistic. The Aurignacian artist's only implement was a piece of pointed stone and his paints yellow, red, and brown earths mixed with animal fat and kept in hollow bones. Black was obtained from charcoal. With these materials he nevertheless created paintings which are among the great works of art of all time.

Neolithic and Bronze Age Art.

Towards the end of the paleolithic age the pattern of life gradually began to change, for the transition from old to new stone age did not come suddenly. Hunting tribes began to settle down, to domesticate animals, to raise crops and build homes. The crafts of spinning and weaving came into existence as people learned to twist the hairs of animals or the fibres of plants into threads strong enough to weave into cloth which took the place of the furs of earlier days. These changes, gradual as they were, became typical of neolithic man and those who followed him. Art towards the end of the old stone age was moving away from the realism of former times; it became more stylised, or, if one may so describe it, idealistic. From about 3000 B.C., hardly any realistic art is found in Europe except among the nomads in the far north and there seems to be a concentration on elaborate patterns built up from circles, spirals, and zig-zag motifs. The fertility goddess is still depicted, but in a symbolic rather than a realistic form; for neolithic man had lost the ability of the Aurignacians to create as in a snapshot the impression given by the object. Since the craft of pottery was discovered in neolithic time, many designs are on pots or other vessels and statues in the round are less common, although figures were still carved in relief.

Some time about 5000 B.C. weapons and tools of copper began to replace those of stone in parts of south-west Asia and north-east Africa and copper was later to be replaced by bronze (an alloy of copper and tin) which is harder than copper alone. But in Europe the people continued to use ground stones; the bronze age did not arrive there until nearly 2000 years later—*i.e.*, about 3000 B.C. It was not until 1500 B.C. that statuettes of bronze were made in Sardinia, although in Egypt and elsewhere artists had been working in bronze ware before 3000 B.C. The Sardinian bronzes are lifelike representations of men and women, the men often dressed in fighting array and armed with shields, swords, or bows.

In neolithic times European man first became interested in building better shelters. These—or at least the more permanent ones which have left

some trace—took four forms: (1) in Mesopotamia bricks of dried mud were used from which quite large constructions were built; (2) in places where stone was available huts were made from unhewn blocks and often took the form of an old-fashioned bee-hive, being roughly domed (one of these still survives in the island of Lewis in the Hebrides); (3) stone was sometimes used to line underground dwellings, as in the remarkable underground village uncovered some years ago by the late Professor Gordon Childe at Skara Brae in the Orkney Islands; (4) lastly, there were the well-known lake-dwellings built on wooden piles by the shores of lakes—the best-known are in Switzerland and at Glastonbury and Meare in England. However, undoubtedly the most striking buildings of neolithic times came towards its close in Europe, during the so-called megalithic (huge stone) period. Great stone monuments, of which Stonehenge and Avebury are perhaps the most familiar, were built in north-west Europe, in north Africa, and round the Black Sea. Some, like the above, were circles of huge stones with transverse crosspieces, the function of which was almost certainly religious. Other relics known as dolmens or trilithons were simply two stones with a crosspiece; these were originally covered by an earth mound, since they are tombs and the function of the stones was to form a chamber to keep the soil from the place where the body lay. Menhirs are single standing-stones, some of them seventy feet high; their function is unknown, although they may have been erected to commemorate a victory or some other important event. Among the most complex formations are the groups of stones arranged in parallel rows as at Carnac in Brittany. Such constructions, although they can hardly be described as architecture, demonstrate the importance attached to religion by early peoples.

In order to maintain a sense of proportion, it is worth noting that, at the time when Stonehenge was built—1860–1560 B.C.—the pyramids of Egypt were old, even the most recent being a thousand years older than Stonehenge; the first code of laws in written form had been promulgated by Hammurabi; Babylon had been sacked by the Hittites; and the *Rig-Veda*, a great work of literature, was being produced in India. Western Europe was beyond the fringe of the then civilised world.

The Early Iron Age.

Since, strictly speaking, we ourselves are still in the iron age, iron in the form of steel being one of our basic materials, we are now dealing only with the early period when the metal was first discovered and its use was spreading slowly throughout the known world. Bronze had always been a costly material because copper and tin, of which it is composed, are comparatively rare metals in Europe and the Middle East, being found only in small and widely-scattered deposits. For this reason, bronze age culture was not greatly in advance of neolithic and the metal was mainly used for making weapons or delicate tools to produce luxury articles for the wealthy. The discovery of iron, possibly before 2700 B.C. in west-Asiatic regions, changed all this; for iron is cheap, plentiful, and, above all, once the art of smelting has been acquired, it can be made hard enough for use in agriculture and building. By 1000 B.C., iron hoes, sickles, knives, and ploughshares were in use in Palestine, and by about 700 B.C. the forests which had once covered the face of Europe were being cut down with iron axes to make way for fields. In this way began one of the great revolutionary periods in human history.

Whilst the early iron age farmers were clearing the forests of central Europe, Saul and David had been dead several centuries, Rome had been built, Chinese culture was flourishing in the valleys of the Yellow River and the Yangtze, the Indus valley civilisation had flourished and disappeared, Egypt and Assyria were masters in the Middle East, Homer had written the *Iliad* and *Odyssey*, and Carthage had been founded. But from northern Europe right across Asia to China the land was inhabited by tribes of wandering hunters and herdsmen; these tribes were loosely described by the Greeks as Scythians: Herodotus tells how they bred horses, drank mare's milk, fought on horseback, and lived in wagons. Later in history some of them settled down to an agricultural life in areas further south and raised great quantities of grain which they sold to Athens and other Greek cities.

Nomadic tribes had existed in northern Europe and Asia for centuries and such art as they possessed was, not unnaturally, based on animal motifs. But about 700 B.C. one of these groups, the Scythians of the Russian steppes, produced something much more sophisticated when they began to decorate their equipment—harnesses, quivers for arrows, and shields—with delightful and highly conventionalised patterns. By this time another tribe known as the Cimmerians had been absorbed by the Scythians proper, as the Scythians were later to be absorbed by the Sarmatians. It was, in fact, the Cimmerians who carried culture from the Tigris–Euphrates region and were presumably the source of the Scythian renaissance; to the Greeks, however, all were "Scythians" and their newly-found arts persisted right into the third century A.D. Here, then, was a group of peoples who had contacts in their journeyings with western Europe, with Asia across the steppes as far as China, and with Greece and Mesopotamia in the south.

THE SPREAD OF CULTURE.

We are apt to think of European, African, Asiatic, and Middle Eastern civilisations as developing separately, and to some extent this is true. A people is "civilised" in the literal sense of the word when it takes to building and dwelling in cities (Latin *civis*, a city), and the earliest civilisations arose in the great river-valleys of the Yellow River, Yangtze, Indus, Tigris–Euphrates, and Nile. For the most part they developed independently of each other, but at a very early stage cultural contacts were established, contacts which are only now being worked out. Many people know of the journeys of Marco Polo in the 13th century when he visited China, of the invasion of the north-west part of India by Alexander the Great, and the later contacts of British and Portuguese with West Africa, but research is revealing much earlier spread of cultural influences.

Here we shall make use of an example in which the Scythians were the active agents although others will be mentioned later. The example is one described by the anthropologist A. L. Kroeber—the spread of what is known as the "flying gallop."

The Flying Gallop.

Throughout history horses have been one of the favourite subjects of the artist, and so long as the horse was represented as standing still no great problem arose. When it was the artist's intention to depict the animal in motion, on the other hand, a problem *did* arise since the artist's eye was not quick enough to observe, to "*freeze*" as it were, one or other of the stages carried through during cantering or galloping. In fact, this was not done until 1879 when the American Muybridge invented the slow-motion camera. Thus up till the end of the 19th century nearly all gallop postures in art are visual lies; although they are made to suggest movement, they do not in reality correspond to any of the stages in the motions of a galloping horse as revealed by the camera. This means that the devices used by the artist are conventions and therefore that they are capable of being traced from one culture to another.

In general, only two ways of depicting movement have been used throughout the centuries: the first was rearing or prancing in which the horse is shown standing on its hind legs with the front legs raised and pawing the air. Horses do, of course, adopt this posture—but not when running. The rearing pose was universally used

by the people of Mesopotamia, Egypt, Greece, Rome, and Byzantium; it continued to be used during the Middle Ages, the Renaissance, and right up to modern times in Europe. Some artists from the Renaissance onwards—for example, Velasquez, Rubens, Leonardo, and Raphael—although continuing to use this posture, tried to make the effect less monotonous by foreshortening, that is, by depicting the animal at an angle to the viewer.

The second method of depicting animals in motion was the flying gallop, and anyone who has seen old racing prints belonging to a period prior to the last quarter of the 19th century will know what is meant. The horse is shown stretched right out with its back and neck almost parallel with the ground which its legs do not touch, the front ones being stretched forward, the hind ones stretched backwards, both nearly horizontal. Obviously, any horse unfortunate enough to get itself into this posture would fall flat on reaching the ground; no such posture exists in reality, but the artist was using it to suggest the speed of flight, as indeed it does much more effectively than the first style. The flying gallop has a fascinating history. It first appears in the art of Crete and the Mycenæan period in Greece (*i.e.*, the period prior to the arrival of those we now know as Greeks, who never made use of it). Next it is discovered amongst the Scythians, who, it will be remembered had contacts with the inhabitants of Mediterranean areas mainly through outposts of traders around the Black Sea. Presumably the Scythians, as a horse-loving people, found the suggestion of rapid movement in the flying gallop more to their taste than the other more static style, and they were in a position to spread the concept widely. They carried it to Hungary, to the Goths, who carried it in turn to the Baltic in the west and the Crimea in the east, and to Siberia, where tribes were making use of it centuries after the Scythians had disappeared. Still later, we find that by the second century A.D. it had spread to the Han dynasty in China which traded with the nomadic tribes of what is now Soviet Uzbekistan to obtain their heavy cavalry horses; by the third century A.D. the flying gallop had spread south to Persia under the Sassanian rulers.

China has maintained this style in her art to the present day, and from China it spread to Japan. But it had further yet to travel, for in 1794 it appears for the first time in England in an engraved print of a race-horse by Stubbs. In France it is seen shortly afterwards in a painting of the Derby by Géricault, but in Germany it does not appear until 1840. Once the style was adopted it crowded out the prancing posture which was retained only in equestrian statues for the purely technical reason that contact with the base of the statue is necessary for support.

How did the "flying gallop" reach western Europe? One can only guess, but it is evident that it was first adopted by people who were interested in fast horses. Racing had long been popular in England and had spread to France towards the end of the 18th century, and a style which suggests speed was likely to appeal in these countries. It is not impossible that the style was invented by Stubbs independently of its long history. But it is much more probable that the influence came through British acquaintance with Chinese ceramics which had been popular for a century and a half before Stubbs both through import into the country and from the experiences of British traders in China. The example of the "flying gallop" shows how cultural contacts were occurring even from very early times throughout most of the world.

PRIMITIVE ART.

The word "primitive" has a number of different meanings. There is the art of the prehistoric communities we have just be discussing, and, on the other hand, the art of modern primitive communities still in existence or at least in existence within historical times. Children's art is often described as primitive, and, finally there is the modern school of primitive painting in which a certain naïvété of presentation is either contrived by a highly sophisticated mind or arises without contriving from a naturally simple one. The works of the French painter Henri Rousseau around the beginning of this century come into the first category; the work of Grandma Moses, who started to paint in her seventies in present-day America, come into the second. Our immediate concern here is with the art of modern primitive communities. The main groups coming into this classification are the negro Africans south of the Sahara, the Bushmen of South Africa, the American Indians, the Eskimos, the Australian aborigines, and the inhabitants of Oceania.

There are some facts we should take into account in relation to these so-called "simple" peoples. First, the only sense in which they are simple is in respect of their material organisation or technology; in other respects they may be extremely complex. For example, the social organisation of the Australian aborigines is so complicated that it is even now imperfectly understood by anthropologists. Secondly, in such societies the division between arts and crafts hardly exists because art is inseparable from life as it is lived—from cooking, storing, and fighting, to placating the gods, influencing the course of events by magic, and adorning the body. Hence the vast majority of works of art amongst primitive peoples are ornaments on objects which have a practical function. Thirdly, it is in general true to say that in primitive societies every man is his own artist: he builds his own house, decorates his own pottery, carves such wooden objects as oars, totem poles, masks for ritual dances, and so on. In most cases the designs within certain limits are firmly fixed by tradition and change very slowly unless the community is brought into contact with people of another culture. No doubt in even quite simple societies there are individuals who are recognised as possessing special abilities as artists and carry out the more complex work, but to the world they remain anonymous. This need not cause surprise, however contrary it may be to our own outlook; for with the exception of Greece and Rome in classical times, nearly all art before the Renaissance was anonymous. This applies not only to prehistoric and primitive art but also to the art of the great river-valley civilisations of China, Egypt, Assyria, Babylon, and the Indus, to Byzantine and Mediæval art; we do not always know, for example, who designed or built the great gothic cathedrals. The reason for this seems to have been that, with the exceptions mentioned above, men throughout history did not ordinarily think of themselves as individuals apart from their society—they simply existed as members of a certain family, group, or race.

African Art.

Africa is frequently thought of as inhabited solely by negroes and white colonists. This view, however, is incorrect; for the native population consists of a number of totally distinct groups. In the north there are the Hamitic-speaking peoples from the valley of the Nile who occupied North Africa at a very early date, pushing the original negro inhabitants towards the Sudan. The Hamites are a mixture of Aryans, Semites, and negroid peoples. In the north-west region between the Sahara and the coast are a predominantly Semitic people descended from the Carthaginians who, under their general Hannibal, at one time almost deprived Rome of her control over the Mediterranean. The rest of Africa, with the exception of some areas in the south, is predominantly Negro. North Africa then is divided almost equally between Semitic-speaking and Hamitic-speaking peoples with brown skins and thin, often hooked noses; nearly all of these are now Moslems and the Moslem religion extends for a considerable distance down the West coast. Abyssinia is a Christian country with a Semitic language, whilst the Copts of Egypt, also Christians, speak a Hamitic tongue. The Copts are allegedly the descendents of the ruling classes of ancient Egypt.

The Bushmen and Hottentots of the south are not true Negroes and were probably driven from

the north many centuries ago. Together with the Pygmies, the Bushmen are today the main non-food-producing groups in Africa. They are huntsmen who live on the animals they kill with stone-tipped arrows and on roots dug up by their women.

Primitive Art in North Africa. We shall not be concerned here with Moslem art which will be dealt with separately, but rather with the remains left by earlier inhabitants—mainly rock carvings and paintings. These are found in two regions: Algeria and the central Sahara. In Algeria many rock engravings have been discovered in the Atlas Mountains. Unlike the art of the Aurignacians of Spain and France, these engravings are in the open and are not painted, but the subjects are similar since they are usually animals. The simplest way of dating these works is by noting the species of animal represented, since the climate and hence the type of animal found in the Sahara has varied considerably in the course of time. For example, representations of the buffalo must be earlier than neolithic times when it had become extinct. Engravings of elephants, ostriches, and rhinoceros must also belong to a fairly early, if somewhat more recent, period, since these, too, no longer lived in the area within historical times. On the other hand, when horses and camels are depicted, we know that the work is not prehistoric; for the camel does not naturally belong to Africa, but was introduced from Asia, perhaps by Alexander the Great about the 4th century B.C.

The carvings fall into three main groups: first, the naturalistic representations of animals now extinct; secondly, the group of rather less naturalistic engravings of a more recent period; and thirdly, the late so-called Libyan–Berber designs which an expert has described as "in part rather crude animal outlines, in part designs that are of a purely geometric and schematic character." Here, again, we see the tendency of art to move away from naturalism.

In the central Sahara, in the Tasili Mountains, rock paintings are found which are naturalistic and animated. Their style is quite different from either the early Atlas carvings or the late Libyan–Berber ones of the same area. They are regarded by many authorities as being most closely related to Bushman art and to the art of ancient Egypt. Whence did the influence come? From Egypt or the wandering Bushmen? Nobody knows.

Bushman Art. The Bushmen of today are small and dwarf-like with yellow skins. They now number only a few thousand men and women living in the least-inviting parts of South Africa whence they were driven by the white men and the Hottentots. Bushman art of today is completely negligible, yet at one time these tribes roamed throughout the whole of the continent and their ancient art is found not only in the South which they now inhabit, but also in the region of Lake Tanganyika and possibly in the examples mentioned above, in the central Sahara. Most authorities believe that their culture originated in the region of the East African Lakes, but some have even suggested, on the basis of similarity of art forms, that the prehistoric artists of south-western Europe were related to the Bushmen.

Bushman art is naturalistic and usually depicts men or animals. In some areas these are painted in several colours, in others in monochrome; yet others are not painted but chipped into the rock. The method employed depended on the natural characteristics of the area. Paintings had to be done on smooth and sheltered rock surfaces. In fact, the only ones which have survived are those where the rock is sheltered by an overhanging face. Chippings were often made on flat rocks, and paintings, depending on local facilities, were coloured with various pigments which have since been analysed: red and brown from hæmatite, an iron ore; white from zinc oxide; yellow from iron ochre; black from soot and charcoal; and blue (which does not occur in European stone age art) from iron silicate. A hollowed-out stone was used with a pestle which ground the materials and mixed them with animal fat. The prepared colours were applied with a thin pliable bone somewhat like a spatula. Bushmen pictures show some attempt at perspective—not discovered elsewhere for many centuries—and the artists could represent the profile and even the front and back views (which the more civilised Egyptians found difficult); the colours shaded gradually one into the other. Roger Fry, the great art critic, compared a Bushman picture of two cranes wading through water with Japanese art which shows how delicate such work could be. Pictures and carvings date from different periods, none of them very recent, and in the later periods, as in those of North Africa, symbolic and geometric designs tend to appear.

Negro Art. The Negroes of Africa can be divided into two main groups in terms of their way of life. There are the agricultural peoples of the west living a settled life in their villages, and the nomadic herdsmen of the east and south. The herdsman, living east of the Great Lakes and in South Africa, limit their artistic efforts almost entirely to the decoration of objects for everyday use, such as clay vessels, spoons, shields, basket-work, and wooden headrests or stools. The designs are ordinarily abstract, painted or carved, or (in the case of wooden objects) sometimes burnt as in poker-work. Much use is made of inlays of beads or wire. Many of these forms are most attractive, but it is typical of the cattle-keeping tribes that the human figure is not represented.

The lands of the western agricultural peoples stretch from the Sudan in the north right down the west coast as far as Angola; also included is the great central region of the Congo. These tribes, in addition to the crafts practised amongst the herdsmen, have produced figure carvings and masks which are highly regarded by critics. They have exerted some influence upon modern Western schools notably in France.

Typically the sculpture is in wood—ordinarily a round block cut from a tree-trunk which forms the basis for the cylindrical shape of the human body. Roger Fry pointed out how the West African sculptor really conceived form in three dimensions and has no difficulty in getting away from the two-dimensional plane. Some of these works represent an ordinary human figure, whilst others are of the more fanciful totem-pole type. Ceremonial masks of wood are also produced with great skill, and another frequently-used medium is ivory which is often exquisitely carved. But African sculpture reached its height at Ife in the Congo region and Benin in southern Nigeria. Some works in ivory from these areas reached Europe as long ago as the 15th century, but the famous Benin bronzes only became widely known following the British conquest in 1897. The bronzes vary from busts of the human head to complete statues of animals or men. There are also scenes in relief of animals, men, or mythological subjects. Decorated ivory goblets, bracelets, and so on, have been found which are in European Renaissance style. These seem to have been made to patterns supplied by Portuguese travellers in the 15th and 16th centuries.

The bronzes were made by a technique said to have been introduced to Benin from Ife about 1280, although this art in Benin did not reach its peak until the 16th century. The technique is known as the *cire-perdue* (lost wax) process. A model is made in clay and coated in wax, the whole being then embedded in a lump of soft clay at both ends of which a thin metal tube is inserted to extend as far down as the wax. The outer coating is allowed to harden and molten bronze is poured into the upper tube replacing the wax which flows out of the other. Finally, the outer covering is broken off and the bronze is complete except for finishing off with a chisel or file. The clay inside, already burnt with the heat, is easily dug out.

The present-day art of the Yorubas of Ife reflects the deterioration of a great tradition; for however pleasing one may find their painted wooden figures and masks, they are infinitely inferior to the old ones in quartz, bronze, or terra-cotta.

These have not been made for many years, and the best probably date as far back as the 12th or 13th centuries. Some of the old masterpieces are retained in the palace of the Oni, and large numbers of beautiful terra-cotta heads were kept until recently in a local shrine. These are, unfortunately, by now all stolen or broken. Other art treasures are a ram's head carved from granite and ceremonial stools of great beauty each cut out of a single piece of quartz, but the terra-cotta and bronze heads show Ife art at its best (a number of examples can be seen in the British Museum).

In general, African representations of the human figure are highly fanciful and are designed according to traditions which vary from one tribal group to another. This, however, does not apply to the terra-cotta and bronze heads of Ife and Benin which are extremely realistic. The features are negroid, but the workmanship resembles that of ancient Greece or Egypt rather than Africa, and Sir Flinders Petrie, the famous Egyptologist, has said that if any of these heads had been found at Memphis they would have been readily accepted as larger examples of the local type. The Yorubas of West Africa indeed believe that they originally came from Upper Egypt. The truth of the matter is that cultural spread is more likely to explain the similarities than the theory of the Yorubas. It is nowadays accepted that Egyptian influence spread much further than used to be supposed; Egyptian caravans penetrated far into the Sudan and their ships sailed to the Land of Punt, which is generally identified with the Somali coast.

Primitive Art in Asia, Australia, and Oceania.

Much less in the way of primitive art has been found in Asia than one might expect. First, because the great Eastern civilisations cannot always be traced back to their early origins; secondly, because the later manifestations of these civilisations have so impressed themselves on other peoples that not much art exists which has not simply been copied from them.

Although, for example, China has been inhabited from the earliest days, there exist no traces of art until neolithic times and the only works of real value derive from even later, during the bronze age in the second millenium B.C. Japan shows no evidence of paleolithic man at all, and here again the only objects of value belong to the bronze age, and there is every reason to suppose that they were copied from Chinese sources.

Siberia and Java, where paleolithic man is known to have existed, possess rather poor examples of rock painting and sculpture, but many of these date from not earlier than A.D. 1000. Although there are similar works in India which may be of greater antiquity, they are frequently obscured by the annoying tendency of later artists to superimpose new works upon the old. There are few genuinely primitive tribes in Asia, and their art, such as it is, has been overwhelmed by that of China and India, both of which will be mentioned elsewhere.

The rock-paintings of the Australian aborigines bear a close resemblance to those of the Bushmen in Africa and the prehistoric Aurignacians. All show the same ability to endow representations of living subjects with a sense of movement. Apart from these, which range in date from prehistoric times almost up to the present, the art of the aborigines generally takes the form of drawings or carvings on bark, ritual objects, or baobab seeds. More recently some aborigines have made use of modern Western techniques and become known in Australia as excellent painters.

The islands of the Pacific are collectively known as Oceania, and culturally subdivided into two groups: the Melanesians of New Guinea and the islands west of Fiji; and the Polynesians, amongst whom are included the Maoris and the inhabitants of the islands east of Fiji. By and large, the former were at a more primitive level, being worshippers of demons, ghosts, and particularly the spirits of ancestors, whereas the more advanced Polynesians were polytheists who worshipped gods representing the powers of nature.

As with other primitive peoples, most Oceanic art took the form of decoration of utilitarian objects: pottery, canoe-prows, paddles, door-lintels, weapons, and so on were covered with designs some of them realistic, others abstract. It is difficult to generalise about these, especially as even in a single area such as New Guinea tribes might differ very considerably in their culture. In the north, for example, realism in representing the appearance of ancestors was usual (even to the extent of using the skull of the dead man as a basis for clay modelling); in the south masks for ceremonial purposes were almost wholly fanciful; in the east neither masks nor statues are found and designs are completely abstract. The Melanesians worked in clay and wood as well as on bark, bamboo, and tortoiseshell, whereas Polynesian art, which reached its highest level amongst the Maoris of New Zealand, produced carvings both in the round and in relief from wood and stone. A remarkable feature of both Melanesian and Polynesian art is the frequently-recurring motif of the "bird-man"—a human face with a long, birdlike beak—which had some religious significance. Ordinarily the Polynesians made use of abstract designs such as spirals interlaced with grotesque figures. Among the most striking, if not the most artistic, pieces of sculpture are the huge stone statues of Easter Island representing human heads and trunks; the figures, many of which are up to 36 feet high, have hollow eye-sockets, thin lips, and square chins. The whole construction is massive, and the works are curiously impressive; however, is spite of previous legends of their antiquity, they are known to be only a few hundred years old.

The arts of Oceania deteriorated rapidly after contact with the European explorers of the 18th century. Although in many cases contact between cultures has proved fertile, this can hardly be said in the case of the Pacific Islanders. It is interesting to note that the songs of the Hawaiians and Maoris which are known to people all over the world are *not* pure folk music and the major part of their inspiration comes from the hymns introduced by European missionaries. In this they resemble the American negro spirituals.

Primitive Art in the New World.

The Indian inhabitants of the Americas, before the arrival of the white man, were of mongoloid stock (*i.e.*, the same stock as the Chinese, Japanese, Eskimo, Lapps, Hungarians, Finns, and Siamese). They came from Asia by way of the Bering Straits about 15 or 20 thousand years ago, and moving south spread throughout the whole continent. It is possible, too, that later invasions came by sea, hopping from one Pacific island to another. The culture of these peoples corresponded to the late paleolithic in Europe and, to begin with, they were hunters and fishers. Later some settled down whereas others remained wanderers. The staple diet of the farmers was maize which they cultivated. The world is indebted to the American Indians for potatoes, sweet potatoes, tapioca, pineapple, peanuts, several types of bean, the cultivated strawberry, pumpkins, tobacco, cocaine, rubber, and quinine (not to mention chocolate, maple syrup, brazil nuts, and sarsaparilla). Throughout history most of the tribes remained primitive, if one can use this word for peoples who, while technologically backward compared with the white invaders, showed in many ways superior ability in the art of living (see *Journey Down a Rainbow*, by J. B. Priestley and Jacquetta Hawkes, for a comparison between the white man's life in Texas and the life of the Pueblo Indians in New Mexico just across the border). On the other hand, in certain regions, American Indian culture flowered into the fantastically complex civilisations of the Incas of Peru and the Aztec and other civilisations of Mexico and Guatemala.

In the far north, from Alaska to Greenland, live the Eskimos who have the distinction of being the first people to discover how to live in an extremely

cold environment, where firewood is non-existent, and thus to occupy a previously uninhabited part of the earth's surface. They live by fishing and hunting and solve their heating problems by making with stone tools lamps of soapstone which burn blubber; pottery is also made for lamps and vessels. In some areas iron is found or imported and made into tools, but for the most part the Eskimos are dependent on flint as a material from which knives, harpoon points, and adzes (a form of axe) are chipped. Skins of animals are made into clothes, tents, and boats. Igloos, the well-known snow-houses, are not the regular dwellings of Eskimos except on the central Canadian coast—elsewhere they are used only in emergency. Although the life of these tribes is as simple as any now in existence, the Eskimos are excellent craftsmen, engraving their pipes, bow-drills, and bag-handles of walrus ivory with realistic hunting-scenes.

North of the Rio Grande, in what was to become the United States, lived more than six hundred tribes of North American Indians whose environment varied from temperate sea-coast to the frozen arctic, from icy tundra to steamy swamps, from great forests to arid desert. Not unnaturally, therefore, their art shows great variations. All the tribes, however, had this in common: they had no written language; no domestic animals for ploughing, milking, producing meat, or carrying loads; and they made no practical use of the wheel, although they used it in children's toys. In the forests of the north-west, the most striking form of art was the totem-pole, often sixty feet high, and carved with grotesque figures of animals and men. These had no religious function, but represented legendary heroes or ancestors of the artist's clan; they endowed the family with prestige. Where wood was plentiful masks for ritual ceremonies, boxes, and other objects were also ornamented with carvings. The art of the hunters of the central plains was more limited and took the form of decorated animal skins made into robes, tents, moccasins, and shields. Sometimes the decorations were semi-realistic, depicting hunters and warriors which bear some slight resemblance to Aurignacian, Bushman, and Australian aborigine paintings without their vividness. Women were only permitted to make geometrical designs.

The two most interesting groups of Indians from the artistic point of view were the Indians of the Mississippi valley and the Pueblo Indians of New Mexico. The former carved squat stone figures in the round with great skill and realism which seem to indicate contact with the more advanced civilisations of Mexico. They also carved such objects as bowls and pipes. The latter are famous for their painted pottery produced by women and decorated with geometrical designs and occasionally with representations of animals and birds. Many Indian groups, both in North and South America, were competent in making baskets and the use of feathers for ornamentation. Typical also of the Pueblos are the patterns made by sprinkling coloured earths in complex designs on a bed of sand; these were used for ritual healing purposes.

The reader should be able to find examples of both prehistoric art and modern primitive art in any good local museum and in London, of course, at the British Museum where there are also two of the Easter Island statues. (For reproductions of Aurignacian paintings see *The Painted Caves*, by Geoffrey Grigson (Phœnix House).)

THE ARTS OF ANCIENT MEXICO AND PERU.

The civilisations of Mexico and Peru are among the most extraordinary in the world; to most of us they call up visions of ruined temples hidden in steamy jungles, human sacrifices, the Incas, and the Aztecs. But this view is an oversimplified one, for the two peoples were very different not only in the type of land they inhabited but also in their way of life and their arts. The Peruvians lived in the high plateaux of the Andes, the Mexicans in the jungles; the Peruvians were a gentle agricultural people, the Mexicans—in particular the Aztecs—were obsessed with a bloodthirsty religion. To the former civics was important, to the latter ritual. The Peruvians from an early date possessed bronze tools, the Mexicans almost up to the time of the Spanish conquest used tools of stone, yet the people with bronze had no written alphabet whilst the people who had only stone could write. Neither of the cultures was particularly ancient since both existed for the most part within the Christian era. Finally, the Incas and Aztecs with whom we are most familiar were the end-products of older and on the whole artistically superior cultures.

Peruvian Art.

The Indian peoples of ancient Peru occupied the territory which includes what is now Peru, Ecuador, Bolivia, and northern Argentina, and Chile. Along the coast there is a belt of flat, dry desert which rises steeply into the Andes where on the shores of Lake Titicaca, thirteen thousand feet up, still stand the huge stone ruins of the ancient city of Tiahuanaco. From archæological evidence it would appear that the Tiahuanacan culture originated in this coastal strip and flourished during the first five centuries of the Christian era. It was there that the arts of modelling and painting pottery reached high perfection. The city of Tiahuanaco was built in the 6th century by the people who lived in the neighbouring highlands who had been inspired by the creative activity of the lowlanders. But their culture was not so deep and had a shorter history. In the 15th century this part of the country was conquered and annexed by the Incas, the climax to 500 years of conquest and empire-building. But within a hundred years they were destroyed, suddenly and violently, by the Spaniards in 1532.

The Incas stand to the Tiahuanacans as the Romans stand to the Greeks. They were good organisers but not remarkable artists. Throughout their history these peoples knew nothing of writing, the wheel, iron, or the horse. But they had domesticated the llama and used its wool along with cotton for weaving their fabrics. With primitive implements they built great roads, stone bridges across canyons, and immense temples in which each stone—some of them eighteen feet long and eight feet square—fits perfectly into its neighbour. They had a wonderful system of soil conservation and their laws were in many respects more humane than those of early 19th-century England.

Unfortunately, the Spanish conquerors' desire to acquire gold was equalled only by their desire to save souls and both attitudes were equally destructive of Central and South American culture. The huge collections of gold and silver vessels and ornaments typical of this area were melted down in order that they might be more easily removed; buildings and sculptures were defaced in an excess of religious zeal; and the Inca records which, in the absence of a written language, took the forms of variously knotted cords known as *quipus* were burned for fear they might contain heretical material. But, if much was destroyed, much survived; for since the Peruvians mummified their dead and buried treasured objects along with the body, thousands of these have been found, mainly in the coastal area. The dry climate has preserved perfectly the fabrics which show a skill in weaving unequalled in history, and the featherwork in which they also excelled is still intact, as, of course, are the metal ornaments and the pottery. Two forms of pottery are worthy of special note, both from sub-cultures contemporary with the Tiahuanacan: that of the Nazca of the south and the Mochica of the north. Nazca pottery is thin, hard, smooth, and painted in many colours; some jugs are formed in the shape of human heads, whilst others are delicately painted with geometrical or naturalistic plant designs. The latter, according to Roger Fry, "show an austere subtlety of taste which can only be paralleled in the greatest works of European and Chinese art."

Typical of Mochica pottery are the small clay figurines, morbid in subject but highly competent in workmanship; they represent the deformed or mutilated, the sick, and drunken or erotic scenes. All pottery in both Central and South America was made without the aid of the potter's wheel which they did not possess.

Cities such as Tiahuanaca were not dwelling-places for citizens. Primarily they were devotional centres given up to the gods; the ordinary people lived in huts, as in Egypt, Mesopotamia, classical Greece, or for that matter, mediaeval Europe. It would probably be true to say of Peruvian architecture of this period that it is more impressive than artistic; but the sculptured reliefs on the stones of Tiahuanaca are interesting in that they set the pattern for designs on fabrics, pottery, and metal-work throughout the Andes and were later copied by the Incas. The main subjects represented are religious: gods with rays emanating from their heads, gods with tears running down their faces, and animals such as snakes, jaguars, and condors (a form of eagle) or various hybrids of these.

Early Mexican Art.

Whereas the Peruvians were essentially peaceful, the Mexicans were obsessed with two subjects: time and blood. The earliest tribes entered Central America from the north at some time about 1000 B.C.; these were the Mayas, whose priest-astronomers had by 600 B.C. introduced a calendar with a year of 365 days, calculated the period of revolution of the planet Venus within an error of 0·08 of a day every 481 years, knew how to predict when solar eclipses would be visible, and performed other feats of scientific achievement which it is not our business to describe here. They erected great buildings which differed from any others in pre-Columbian America in that they made use of the vault, which is, of course, an arched roof or ceiling. Instead of the stress being vertical with one stone laid directly upon the other, the Mayas, using concrete, were able by means of overlapping stones to bring the "legs" of the vault close enough to roof it in with a capstone. This is known as the corbelled or false vault.

Mayan civilisation reached its height about A.D. 200, and then, perhaps because of malaria, the Mayas left their temples to be overgrown by the jungle and moved north into the drier area of Yucatan where they built new cities but were finally overwhelmed by the Toltecs. The Toltecs copied Mayan architecture and built the great city of Teotihuacán which can be seen in the valley of that name to the present day. The ruins are worth a brief description as they illustrate in general the main characteristics of pre-Columbian American architecture: its hugeness, its impressiveness, its remarkable planning, its excellent sculpture, and (as architecture) its comparative failure. Here is an immense area dating from about A.D. 800, about three and a half miles long and two miles wide entirely paved with a plaster floor. At the one end, surrounded by a court-yard, is the Pyramid of the Moon, and from this a great avenue flanked by temples and other religious buildings leads to the Pyramid of the Sun at the other end; these "pyramids," so typical of Central American culture, are also found in the Andes, especially in the parts formerly occupied by the Nazcas and Mochicas. They are not, however, pyramids in the Egyptian sense, since they are not burial places but rather mounds with a flat top for the small temple where religious ceremonies were carried out. Thus in structure and function they more closely resemble the Sumerian ziggurat. The Pyramid of the Sun is almost 700 feet at the base and rises in a series of four terraces to a height of more than 200 feet. A stairway leads up one side from the courtyard below. The pyramids were made of adobe (sun-baked brick) faced with plaster and stone, and in the temples of such structures tens of thousands of victims had their hearts torn out as a sacrifice to the gods, particularly under the Aztecs who, about the time of the Norman Conquest, succeeded the Toltecs and remained in power until under their eighth ruler Montezuma II they were overthrown by the Spaniards.

The Mayas had discovered how to make paper from wood-pulp, and their books took the form of a single sheet several yards long and about eight inches wide; this was folded like a screen, each page being six inches wide. Their writing was, like that of the Egyptians, pictographic, each sign representing an idea rather than a sound as with our own alphabet. Only three such books remain, since the damp climate of Central America was not the best for preserving paper or fabrics. They are kept at Dresden, Paris, and Madrid, but have little interest as literature, since they deal exclusively with astronomy, divination, and ritual. Some Maya poems and stories exist which were copied down at a later date, but they too are more of archæological than artistic importance.

Mayan religious sculpture ordinarily takes the form of reliefs on stelæ or stone columns. In some respects it resembles Indian sculpture. There is the same formal treatment of gods contrasting with a tropical exuberance in the surrounding details. But the Mayas, unlike the Hindus, did not allow the exuberance of the design to interfere with the unity of the work as a whole. The artists knew nothing of perspective, although an impression of depth was sometimes given by combining high and low relief in such a way that the nearer figures stand out beyond the more distant ones. Difference in size of the figures was a sign of rank rather than an attempt at perspective. Religious art, like that of Egypt, ordinarily presented the figures either in profile or full-face, but the secular art—as seen, for example, in the mural paintings—is entirely different. It is realistic and exhibits a vivid fantasy, often dealing with unpleasant subjects: captives kneeling before the victorious chief, dead bodies, warriors holding up decapitated heads, and everywhere blood. Different, too, are the beautiful pottery figurines and small pieces of sculpture apparently without religious significance which create an impression of rest and placidity by their sensitive modelling. In fact, these people living in a stone-age culture have left us, says Roger Fry, more pieces of pure sculpture than the whole of Mesopotamian, or than the majority of modern European, civilisations. In Aztec times, art on the whole declined.

How shall we summarise the art of these extraordinary races? In most history books they do not even appear; they did not culturally influence other parts of the world, yet they built a complex way of life on the simplest foundations. Their architecture is probably more worthy of admiration than appreciation; we know nothing of their music, their literature is insignificant; but their pottery, their fabrics, their sculpture, and some of their mural paintings are great art. The cities—Teotihuacán of the Toltecs, or Tenochtitlán of the Aztecs (on the ruins of which Mexico City now stands)—how dead they are now! Their buildings mean little to us artistically, but the small things remain and a jug made by an unknown potter is worth more than all the monstrous temples of Montezuma or the Incas.

THE ARTS OF CHINA, INDIA, AND JAPAN.

Since these pages are primarily concerned with Western art, we are treating rather cavalierly the great arts of the Orient. We can do no more than sketch the barest outlines and hope that the reader will become interested enough to look elsewhere for more information to enable him to understand the arts of civilisations with different traditions and forms from his own.

Very little is known of the origins of Chinese art, since the history of ancient China is lost in legend. But with the discoveries of archæologists, especially of recent years, knowledge is increasing and the boundary-line between legend and true history is being gradually pushed back.

The earliest known inscriptions and wall decorations belong to the later part of the Shang dynasty

(*c.* 1500–1000 B.C.) but the brush used as an instrument for both writing and painting was not invented until 220 B.C., though it was probably an improvement of the tool then in use. Knowledge of early Chinese painting is for the most part based on later copies and written records. Similarly, although the Indian hymns of the *Rig-Veda* were probably composed about 1000 B.C., they remained unwritten until very much later, and the frescoes of the Ajanta caves—possibly India's richest inheritance—date from only 200 B.C.

The Chinese and Indian civilisations, which arose in the great river-valleys of the Yellow River, the Yangtze, and the Indus, though younger than the civilisations of Egypt and Mesopotamia, are the oldest still-flourishing civilisations in the world, since their arts have had a continuous history of over 3000 years.

The Art of China.

Little has been preserved of the art of the semi-legendary Shang dynasty and the Chou dynasty (*c.* 1000–256 B.C.) except for some exquisite bronze sacrificial vessels decorated with animal motifs which rank among the great art treasures of the world. The Shang people worshipped the spirits of their ancestors and the vessels were used for offerings. They were made by the *cire-perdue* method. (*See* G8 (2).) Mirrors decorated with animal motifs or geometrical designs have also been found, some dating from the 6th century B.C. It is not until the Ch'in dynasty (221–207 B.C.) that we really enter recorded history at all. Ch'in artists produced bronze and jade objects and indulged in somewhat grandiloquent statues and giant bells. The Ch'in was followed by the Han (202 B.C.–A.D. 220), a period of great artistic achievement when Buddhist art took its place alongside the native art and portrait painting began. In the T'ang dynasty (618–906) landscapes first made their appearance, poetry flourished, and sculpture reached its full maturity. Painting was at its finest during the Sung dynasty (960–1279), the greatest period of art in old China, and the beginning of modern times. In 1279 the Sung emperors were overthrown by the Mongols, who thereby made China part of a kingdom extending from the Pacific to the Baltic; this Yüan dynasty was followed by the Ming (1368–1644) and that in turn by the Manchu, which lasted until 1912. These rather boring dynastic names are given here since they so commonly appear in descriptions of works of art, and it is useful to have some knowledge of their dates.

When we are dealing with art traditions very different from the European, it is wise to have a certain humility; we have no right to assume that art is a sort of universal language with the implication that Oriental art can be as readily appreciated as our own. But this is what has all too often happened. Chinese art became a fashion in Europe from about 1669 when Louis XIV of France held a Court Ball dressed in what he believed to be Chinese clothes. The great "Chinoiserie" had begun, and its result was that for many years Europe was interested in Chinese art but selected, and indeed, imitated bad periods and the worst styles. Not unnaturally, Oriental merchants took advantage of this, and produced a great deal of rubbish which it has taken generations of experts to disentangle. Today those relics which our forebears admired are falling out of approval and the real art of the East is coming to be understood.

The Chinese artist does not look at the world from our point of view, and to understand his art we have to develop a new way of looking at things. "The art of China," says Curt Sachs, "has in all its amazing diversity one aim: to press on life and nature the seal of essence, dignity, unearthly aloofness, eternity. In its boldest realism, it is still unreal, fantastic, and dreamy." It does not—except for a few periods—care for the grandiose; hence there has been little imposing statuary or architecture save that of the Buddhist caves of the 6th century. Like those of India, they are enormous and filled with figures carved in niches cut out of the rock. (One might also mention, mainly as a curiosity, the Rococo palaces which, whilst Europe was imitating China, the Emperors K'ang Hsi and Ch'ien Lung built in imitation of Versailles.) The greatness of Chinese art has been in painting, sculpture, pottery, textiles, and literature. Chinese music (G35) is so different from our own that it is difficult to assess. If music is, as Schopenhauer described it, the purest of the arts since it alone has a means of communication not in common use for other purposes, then it is surprising that perhaps of all the arts it is the least communicable when it comes from another culture.

Painting. The art of China, is formal, stylised, serene. "The noble-minded man's music," said Confucius, "is mild and delicate, keeps a uniform mood, enlivens and moves. Such a man does not harbour pain or mourn in his heart; violent and daring moods are foreign to him." This is equally true of the painting in which there is none of the colour, violence, or realism of European art. Although something of this sort was apparent during the early T'ang dynasty, the most typical is the lyrical and gentle art of the Sung. Painting is done with a brush and in water-colours (for the Chinese artist it was unnecessary to worry about complicated problems of mixing colours in oils, different methods of using the brush, or what background medium he was going to use); he painted on silk or paper and ordinarily with one colour. Chinese painting, in which the medium was often Indian ink, is, in a sense, an extension of Chinese handwriting, which is also done with a brush and is regarded as the most important art form. Typical, too, is the interest in nature, which appears at an early date.

In Europe, the first landscapes do not appear until the work of Patinir (1485–1524) mentioned by Albrecht Dürer as "Joachim the good landscape painter," whereas in China they appear in the 3rd century A.D. The European throughout much of his history has thought little of nature and much of people, and even during the Renaissance a landscape was little more than a background to the figures—it was painted from memory and indoors. Indeed, many centuries later Samuel Johnson had nothing better to say of the mountains of the Scottish highlands than that they were "monstrous protuberances."

The Chinese were absorbed in nature, but never interested in the literal depiction of what they saw. Every one of their landscapes has a quality of abstractness; it does not simply show a particular piece of land but rather tries to impart some feeling about the world in general. In these pictures the figures are relatively insignificant and little attention was paid to perspective; one is given the impression of tiny human beings overwhelmed by the immensity of nature. Commonly the paintings took the form of long sheets mounted on silk for hanging on walls as panels or horizontal ones on a cylinder which had to be unrolled piece by piece for the whole to be seen. Tempera and oil-paintings were unknown and the only other form of the artist's work are the frescoes of Buddhist temples, which date from about the 5th century. The great classic periods of Chinese painting were perhaps the T'ang and Sung dynasties, and Arthur Waley has suggested that their interest in nature was due in part to the desire of educated people to escape from the over-centralised bureaucracy under which they lived. The towering cliffs, waterfalls, and mountains show an essentially romantic attitude towards the landscape.

Lacquer, Jade, and Porcelain. There were contacts between China and Europe from a very early date. China has been influenced by Europe through other channels too: indirectly by the Greeks by way of India when Buddhist missionaries brought the form of sculpture resulting from contact between India and Alexander the Great; more directly through relations with Britain and France in the 18th and 19th centuries. China, in turn, has influenced the art of much of Asia and all of Europe. Lacquer is a Chinese invention, although it has never gained much approval in the West. But porcelain, invented in China in

possibly the 5th century A.D. and not known in the West until the 18th century, has been accepted and even dignified with the name of "China." Carvings in jade are also a typically Chinese art, although, of course, practised elsewhere, (*e.g.*, in pre-Columbian America).

Influence of Buddhism. The advent of Buddhism and its growth towards the 5th century A.D. had a profound influence on the art of China. But it was not always a good influence. Religious art, at least in its early phases, tends to be stereotyped and formal, and in the case of China there developed a sculpture presenting only the slightest variations on the subject of the contemplative Buddha, sometimes huge, sometimes small, at all times competent, but mostly dull. Painting, too, was influenced by Buddhism. However, within two or three centuries Buddhist art had lost much of its original severity and during the T'ang dynasty flourished alongside a secular art. The succeeding Sung dynasty was the high point of Chinese art—a sort of Chinese renaissance. The landscapes have been mentioned, but one of the great developments of this period was its pottery, which depends for its effect not so much on decoration but on its form and finish in lovely single-coloured glazes. From this period art on the whole has deteriorated. During the reign of the Ming emperors there were good painters, fine textiles, and excellent porcelain in a new technique of enamel colours imposed over the glazing. But the spirit had gone. The art was often perfect, but it was superficial and affected.

Architecture is not a significant part of the genius of China. For much of her history building was in wood, and few of the buildings existing today are older than the 18th century. Almost none are older than the Ming period.

Literature. Chinese literature begins with the *Shih Ching* or *Book of Songs*—a collection of hymns, poems, and folk-songs composed, it is believed, between the 11th and 6th centuries B.C., but written down many years later. The 6th century was also the age of Confucius and Lao-Tzû, the religious leaders (this was, too, the time when Isaiah was preaching in Babylon, Buddha in India, and Heraclitus in Ephesus). Confucius (551–479 B.C.), lived during a time of civil war, and, disgusted with the state of his country, he set about attempting to teach the rulers wisdom—at the best no easy task. There is no evidence that he himself wrote anything, but, as in the case of Socrates, his disciples copied down his sayings in a book now known as the *Analects*, one of the classics of Chinese literature (obtainable in translation). Basically he was concerned with "gentlemanly" relations between one person and another, was entirely practical, and took only the slightest interest in the supernatural. He represents one pole of the Chinese way of life, as Lao-Tzû represents the other, the mystical, pole. Confucius is the practical, upright, and conservative man of north China, Lao-Tzû the tolerant, passive, and imaginative temperament of the south. The book attributed to Lao-Tzû (born about 604 B.C.) is the *Tao-te-ching* beautifully translated by Arthur Waley, one of our greatest scholars in this field, as *The Way and Its Power*. This book too must have been written down many years after Lao's death. Mencius, another religious teacher, who lived two centuries later, was a follower of Confucius. His writings in *The Book of Mencius* are also considered part of the Chinese literary tradition.

The T'ang dynasty was the great period of Chinese literature. Of the many poets we can only here mention Li Po, by some considered to be China's greatest poet, although the Chinese perhaps prefer Tu Fu. Li Po was the people's poet, Tu Fu the poet of scholars. Their poems and many others may be read in Waley's translations. Chinese poetry is a delight; it is practical at times, mystical at others, describes nature lovingly, and is humorous and sceptical. The attitudes expressed are in fact extraordinarily English. The English reader feels immediately in touch with Chinese writers in a way which he does not with, for instance, Indian. In Indian literature there is little of such humour as this: "Families when a child is born, want it to be intelligent/I, through intelligence, having ruined my whole life, only hope my son will grow up dull and stupid/when he will end a long and successful career by becoming a Cabinet Minister;" or the tragi-comedy of Li Po (was it the poet one wonders?) who "died drunk—he tried to catch the moon in the Yellow River."

Chinese drama until quite recently was sung to music and was more like opera than a play in the European sense. The novel as an art form developed about the same time as in Europe—that is, the 18th century. One of the best-known is *The Dream of the Red Chamber*; but most literature was written in the ancient tongue which was not available to the man in the street. (It is rather as if in Europe we had kept on using Latin for literature and English for everyday speech.) This situation was changed only after Sun Yat-Sen's revolution in 1917, when the colloquial language was increasingly used. The best known writer in this idiom was Lu-Hsun, whose novel *The True History of Ah Q* is still popular. He died in 1936.

The Art of India.

The history of India is the history of a country inhabited originally by dark-skinned Dravidians who were driven towards the south by the light-skinned Indo-Europeans. The art of India resembles that of China in that, although Indian civilisation is ancient, its significant art is not much older than a few centuries B.C. Like China, too, India influenced the art of surrounding countries: Burma, Ceylon, Indo-China, and Tibet. But there the similarity ends. Indian art is essentially religious whereas the Chinese, even in their religion, were essentially sceptical; Chinese art is formal and controlled, Indian art is exuberant, florid, and elaborate in a way which makes it difficult for Europeans to understand; Chinese art takes pleasure in the small things, but the Indian genius lay in the direction of monuments and buildings. The Indians produced nude figures and to the Westerner they seem obsessed with sensuality and passion as the Aztecs were obsessed with war and blood. The Chinese rarely showed nude figures, and, as we have seen, disapproved of violent emotions.

The Indus valley civilisation lasted from about 3000 to 2000 B.C. It was discovered by chance in 1860 by two brothers John and William Brunton who were seeking a source of bricks for the railway they were building from Karachi to Lahore. What they found, in a shapeless heap of rubble, was the ancient city of Harappa. But it was not until the nineteen-twenties that serious investigations began and Harappa's twin city Mohenjo-daro was discovered. However, this civilisation produced little art. Stuart Piggot's book *Prehistoric India* (which is worth consulting if you wish to know more) says that there is a terrible efficiency about the Harappa civilisation which recalls the worst of Rome. Everything appears to have been standardised, from the houses to the streets, which were, as in modern New York, at right-angles to each other; even the pottery was standardised in what Professor Piggot describes as "a variety of depressingly utilitarian forms." At some time about 2000 B.C. the white-skinned Indo-Europeans invaded India from the north-west, occupied most of the area, and set up a caste system to prevent mingling their "pure" blood with that of the dark Dravidians. They were not highly civilised, and their ideals are expressed in their favourite god Indra, who was depicted as strong, pot-bellied, a huge eater and drinker, who fought with bow and arrow from his war chariot.

Literature. From 1500 B.C. date the hymns of the *Rig-Veda* which were transmitted verbally until copied down much later. They are important since they are the Pentateuch of the Hindu religion. In content, as Max Müller says, they vary from the true, genuine, and sublime, to the childish, vulgar, and obscure.

It will be seen, then, that we cannot discuss Indian art without reference to religion. Another classical religious work, the *Upanishads*, appeared about the 6th century B.C.; it was an approach to a form of monotheism; "God," it is written, "is he who, dwelling in the earth, is other than the earth, who inwardly rules the earth." The older gods were not disregarded, but they were represented as the various aspects of the universal Atman or spirit. The *Upanishads* are important because their metaphysics must have influenced the Buddha, Siddharta Gautama (560–480 B.C.). The other great religious leader of this period was Mahavira, the founder of Jainism. Later, in the 13th century, India was to come under the influence of the Moslems, and a new language, Urdu, grew out of the mixture of Persian and Hindi. Secular influences on the art of India came from Mesopotamia (which had contacts with the early Indus valley civilisation), and Alexander the Great, whose invasion brought Greek concepts to Indian sculpture.

Other important literary works are the epics of the *Rамāyana* and the *Mahābhārata*; the religious book perhaps best known in Europe, the *Bhagavad-Gita*; and the works of Kālidāsa the greatest poet writing in Sanskrit, who lived about A.D. 400. Most of these works can be read in translation in the Everyman series; perhaps the two most likely to be enjoyed by the European reader are the *Bhagavad-Gita* and the *Sākūntalā* of Kālidāsa. The epics are to the uninitiated rather boring. From the 19th century onwards Indian literature was influenced by English forms. The most important writer of this century was Rabindranath Tagore, whose poems have appeared in many translations, and there are a number of modern novelists whose work is excellent.

Sculpture and Architecture. Sculpture is the important art of India, and the temples are covered with figures. But, on the whole, little sculpture or architecture belongs to an early date. If we divide Indian art into artificial periods we must begin with late Buddhist times (3rd century B.C. to 3rd century A.D.). Much of what was built during this time was in wood and has perished, but the stupas of Bharut, Amaravati, and Sanchi remain. The stupa was originally a mound built over a tomb, but later it became a large pyramidal mound covered with sculpture erected over a sacred relic. The sculpture is, by European standards, ornate, but reflects at this stage scenes of everyday life in a manner quite different from that of the classic period (4th–8th centuries), which is large, religious, and imposing. The Jains and Buddhists were first in the field of sculpture and architecture. Belonging to the classical period are the rock temples of Ellora (Hindu) and Ajanta (Buddhist) in Hyderabad and the caves of Elephanta (Hindu) which are carved out of the solid rock. There are at Ajanta twenty-nine Buddhist caves begun about 200 B.C., which were intended partly for worship and partly for housing Buddhist monks. Their walls are adorned with sculpture and frescoes which are, perhaps, the greatest in Indian art, depicting scenes in the life of Buddha. Had it not been for the British, they would have been lost for ever; when discovered by soldiers in 1819 they were being used as cattle-sheds.

The vast majority of buildings and sculptures now in existence belong to the period after the 8th century A.D. By this time temples had become elaborate to a degree that seems fantastic by Western standards—they are a maze of towers, courtyards, pillared halls, and statues. In the 17th-century temple of Madura there is a central shrine with an immense pyramidal tower covered with a profusion of sculpture and surrounded by five other towers; these are in the centre of a maze of halls, courts, and gateways. The figures arranged in row after row have a multiplicity of heads and limbs in an extravagant mixture of animal and human.

Whereas the first centre of any complex Indian civilisation was in and around the Indus valley, by Buddhist times the centre was in the Ganges area. (Oddly, Buddhism never became as important in India as it later did in China and other countries.) In the 11th century came the Moslem invasion. Since the Moslems, like the Jews, took very seriously the belief that "graven images" should not be produced, there was no sculpture and the only paintings were miniatures or abstract designs. However, the Moslems built many mosques and everyone has heard of the Taj Mahal at Agra, built in honour of the wife of the Shah Jehan.

Modern Indian art is torn between the style of the Ajanta frescoes of the past and the schools of modern Europe. It is an Indian, Dr. Coomarswamy, who states that "our present poverty in works of art, in competent artists, and effective connoisseurship, is unique in the history of the world" (*The Cultural Heritage of India*).

Japanese Art.

Japanese art in its early stages was largely inspired by that of China, and any important art dates from about the 7th century A.D. when Buddhist missionaries and Chinese and Korean artists were entering the country. It was not until the 10th century, during the decay of the T'ang dynasty in China, that Japanese art began to come into its own and assume an individual character. The Yamato school produced coloured paintings, some of them as illustrations to literary works, of great dramatic quality. Ordinarily the took the forms of rolls (already described und Chinese art) and in Japan known as *Makimono* In the 13th century, Chinese influence comes ba once more and Japanese art reflects the painti and sculpture of the Sung period with its lan scapes in Indian ink and pictures of animals a plants. The greatest master of painting in th manner was Sesshū (1420–1506). Then once mor Japanese art, absorbed with nature, found its own expression in the Tokugawa period (1603 1868). Most Japanese of all was the Kōets school in which the 17th-century artists Kōets and Kōrin were the important figures.

The fine arts in the civilisations of the East were to a large extent aristocratic; both India and China possessed a literature in a language other than that spoken by the people, and obviously the poorer classes could not afford to buy paintings. But in Japan the Ukiyo-e school produced coloured woodcuts which the less well-to-do could afford; these works dealt mainly with scenes from the lives of common folk.

To the Japanese the important arts are painting, pottery (learned from the Koreans during the Japanese invasion in the 16th century, and largely concerned with the important ceremony of tea-drinking), lacquer, and gardening. Metal-work, especially on the hilts and guards of swords, is also characteristic. Architecture and large-scale sculpture is much less important than in Europe or India although there are many beautiful buildings. But what mostly impresses the European about these are their settings.

According to an ancient folk-tale, a rich nobleman built a garden and made an island in the middle of a small lake at some time during the 6th century. This aroused such interest that garden designing has ever since been regarded as a major art form. Japanese gardens are the loveliest on earth, and their changing fashions have reflected the country's historical development. The earliest gardens were full of colour with plum and cherry blossoms and variegated flowers, but, at the end of the 12th century the feudal system began and the warriors accepted as their philosophy the austere Zen Buddhism which had also been imported from China. At this time the trend in gardens was towards subtle green hues—the moss garden, with many types of moss underfoot and trees of many shades of green. The arrangements were symbolic: for example, the garden of the Saihoji Monastery at Kyoto was designed by Muso Kokushi (1275–1351) to symbolise the process of attaining supreme wisdom. In the 16th century the feudal order collapsed, and a period of tranquillity began of which the symbol was the tea-garden with stepping-stones, water-basins,

and quiet patterns of trees and shrubs. There are, too, the sand-garden in Kyoto's Silver Pavilion with an area of silver sand raked into patterns, and the rock-garden of the Ryoanji Temple, in which an area of patterned and well-tended sand has one large rock surrounded by moss jutting out in the centre to symbolise the idea of captive cliffs in water. These gardens still exist today and are carefully preserved. The names of the designers are as well-known as those of painters and writers.

The Japanese resemble the Germans in that they manage to combine a love of nature and beauty with a ferocious militarism. These tendencies are reflected in both literatures. On the one hand there are delicate and rather sentimental lyrics in which the poet grieves to see the cherry-blossoms fall; on the other brutal war-tales and accounts of bloody revenge in family feuds. The typical form in poetry is the short poem of four or five lines such as the following by Minamoto no Shigeyuki dating from about A.D. 1000:

> Winter has at last come
> Unmistakably, even to my cottage
> In the land of Tsu,
> Which lies hidden
> Among the rush-leaves.

The war-tales belong mainly to the feudal period and describe the fights between various clans; they are of little interest, but the brief lyrics are a form used to the present day.

Perhaps the Japanese literary work best known to Europeans is the 10th-century novel *The Tale of Genji*, by Lady Murasaki, a story of court life (translated by Arthur Waley); this was written prior to the feudal period at a time when art was aristocratic and elegant. The novel is well worth reading. From the feudal period date the Nō plays, the classical and highly formal drama of Japan, and during its later part the more popular *kabuki* plays which, having more action, are more widely accepted today. In Japan, as in China, popular literature began to develop in the mid-19th century and from this time, too, Western forms were increasingly accepted.

As Roger Fry says, a sort of sentimental insincerity has been the bane of Japanese art, which perhaps assumed its truest form in the cheap wood-cuts of the 18th and early 19th centuries. These were "vulgar" only in the best sense, and at least two of the artists, Hokusai (1760–1845) and Utamaro (1754–1806), produced genuine works of art. It was largely these woodcuts which introduced the art of Japan to Europe for the first time in the middle of the 19th century, and they had a considerable influence on such artists as Whistler and Manet.

THE GREAT AGES IN EUROPEAN ART.

Thus far we have been discussing cultures which for the most part lie outside our own tradition. From now on we shall be dealing with European civilisation beginning with Egypt and Mesopotamia, which, if not strictly speaking part of Europe, nevertheless fostered a continuous cultural development which reached us by way of Crete, Greece, and Rome. We must also consider Byzantium, which influenced European and especially Russian art; Persia, which influenced Byzantium; and the Arabs who occupied parts of southern Europe for some centuries, influencing thereby Spanish art forms and European learning. These lands had an effect on our culture which India and China did not, or at any rate did not to any extent until many centuries later.

THE ART OF EGYPT.

About 3000 B.C. Egypt came under the rule of a unified monarchy which, in the person of the pharaoh who was both god and king, combined secular and religious powers in a highly conservative and monolithic state. From this time onwards Egyptian civilisation endured with relatively little change for nearly five thousand years, and art changed hardly at all. Such a state tends to produce an art concerned with enhancing its own prestige, as may be seen from the examples of pre-Columbian America, Mesopotamia, and the modern totalitarian countries. Enormous and artistically negligible statues and buildings are erected, the main function of which is to reflect the power of the central authority. That such a situation provides little opportunity for the artist to express himself freely is clear. He has to express himself in stereotypes, and when, as in Egypt, religious conservatism is added to that of the state, he is expected in addition to produce objects of ritual significance which have as little æsthetic purpose as the objects sold in the shops of Lourdes. Hence the pyramids, made to impress rather than to look beautiful, the enduring granite statues, the ten identical figures of himself placed in the tomb of Amenemhet I, and the tomb furniture which at times suggests the mass-production store. This was commercial art based on magical beliefs, and as Roger Fry pointed out, it would have been absurd for the artist to give such objects aesthetic value. A great deal of Egyptian art was shoddy, crude, and standardised; yet genuine works of art—often quite small objects—are found at almost every period.

Architecture.

The Egyptians were the first architects, the first people to erect buildings not only for their practical function but also to look beautiful. The mere presence of ornament does not create beauty nor are the size, cost, or profusion of decoration on a building valid criteria of its excellence. A building, if it is to deserve the name of architecture, must be: (*a*) well-planned and well-built; (*b*) suited to the purpose for which it is erected; (*c*) of its day and age; and (*d*) capable of delighting the eye of the beholder, that is, æsthetically stimulating and satisfying. As Herbert Read says: "In a perfect work of art all the elements are interrelated; they cohere to form a unity which has a value greater than the sum of these elements."

The Pyramids and Temples. Judged by these standards, the pyramids of Egypt or the rock-tombs of a later period are architectural failures. They are too simple in their form, and however pleasing simple shapes may be, we cannot describe cubes, globes, or pyramids as art. Lethaby, in his well-known book on architecture, describes the pyramids as "more like hills of stone than architectural works," and another writer says of the Great Pyramid that it is "a uniform solid triangle of masonry, mechanically accurate and utterly expressionless in its dead monotony." Of course, the pyramids do not now exist in their original form and when first built they were not simply isolated peaks jutting out from the desert. Each was part of a complex of buildings with a valley temple on the bank of the Nile in which the dead king's body was embalmed, with a causeway leading from this to the mortuary temple close to the pyramid, and the pyramid itself. The walls of the temples and causeway were elaborately painted and decorated with reliefs and the whole surface of the pyramid was covered with polished slabs (later removed by the Arabs to build their mosques in Cairo). The first to be erected was the magnificent Step Pyramid at Saqqara, built about 2950 B.C. by the pharaoh Zoser under the guidance of his vizier Imhotep; this has a slightly oblong base, rises in a series of terraces, and is built of quite small blocks. The Great Pyramid of Khufu, however, is constructed of more than two million enormous blocks of limestone each weighing two and a half tons in a structure nearly 500 feet high and 750 feet square at the base. The burial chamber lies at the bottom of a shaft beneath the structure, and as in other pyramids there are additional passages and chambers. Completed about 2885 B.C., this was the largest structure ever erected by man, and even today it is only exceeded in size by the Grand Coulee Dam in the United States. Yet only a century before the Great Pyramid was built no stone buildings existed anywhere in the world; Imhotep was the inventor of the art of building in hewn stone.

Nowhere is the innate conservatism of the Egyptians seen better than in their temples. The important surviving buildings belong to three widely separated periods, and of these only one, the "Granite Temple" near the Sphinx at Giza, was built within the first seventeen dynasties, its probable date being about 2900 B.C. The great age of temple construction was from the 18th to the 20th dynasties (*c.* 1550–1100 B.C.), and to this period belong the buildings at Thebes (Karnak, Luxor, the Ramesseum, Deir-el-Bahari, and Medinet-Habu) and that at Abydos. All the rest—Dendera, Edfu, Esna, and Philæ—were built by the Ptolemies who controlled the country within the empire of Alexander the Great and therefore date from 332 B.C. to the Roman conquest three centuries later. Yet all these buildings, which cover a span of time from about 3000 B.C. right up to the Christian era, differ from each other only in minor details, and, says Martin Briggs, "the temple at Dendera, erected just before the birth of Christ, might have been built thirty centuries earlier."

Of course many other buildings must have existed, but the tourist cannot help contrasting the flat Delta area with its almost complete absence of large historic monuments, other than the pyramids, with the rich crop to be seen in the region of Luxor, and even these are mostly temples and tombs. There were two main reasons for this: first, the Delta where Egyptian civilisation began was also the region where annual floods slowly but inexorably buried ancient cities and buildings beyond recovery; secondly, temples and tombs were strongly built because so much importance was attached to the life after death. In contrast, houses, villas, towns, and even palaces were relatively flimsy in construction since they were merely temporal structures. Pre-dynastic and early dynastic temples were built of wood, so none of these have survived.

The Temple of Karnak.

As an example of Egyptian temple architecture we may take the great temple of Karnak. This was approached from the town by a sphinx-lined avenue over a mile long leading to the gateway with its two huge towers grooved for tall masts carrying coloured banners. Within the gateway lies the open courtyard flanked by great columns, wide in the middle and narrower at the top and bottom, with rows of statues of the animal-headed gods Thoth, Anubis, and Horus. The courtyard opens into the Hypostyle Hall roofed over with enormous flat slabs of stone supported by further columns and lighted by means of windows situated just under the roof. The walls and columns are decorated with paintings, carved inscriptions, and bas-reliefs. At the far end of the hall lies the small dark sanctuary, the dwelling-place of the god on earth, and rooms for use by the serving priests. The sanctuary, as in other temples of the ancient world, was never entered by the laity.

Although this building can hardly be described as beautiful in the classical sense, its total effect is so stupendous in its massive strength as to dim the critical faculties. The Hypostyle Hall is the largest roofed-in space of any temple in the world, covering an area almost equal to the whole of Canterbury Cathedral; yet it is only the main hall of a building which, if set down in London, would stretch from Piccadilly Circus to Hyde Park Corner. Each of its twelve central columns is 69 feet high and 12 feet in diameter, and each is surmounted by a capital on which a hundred men could stand. Altogether, there were 134 columns in six rows with sculptured capitals at the top. This type of decoration, which took the form of palm-leaves, papyrus flowers, or the lotus, clearly stems from early days when wooden temples had columns of tree-trunks or bundles of papyrus reeds.

Another familiar feature of Egyptian architecture was the obelisk or commemorative pillar, a type of structure first erected during the 11th dynasty. The two "Cleopatra's Needles" in London and Paris date from the reign of Queen Hatshepsut, who lived some 1500 years before Cleopatra was born.

Sculpture.

Early figurines and amulets modelled in clay or wood are found in pre-dynastic times, but later ivory and stone were increasingly used. Animal forms were common, and a baboon in alabaster and a lion in granite survive from the 1st dynasty. The first datable object is the well-known palette of Narmer in the Cairo Museum which is carved with reliefs depicting the pharaoh's victories. It belongs to the 1st dynasty, perhaps about 3200 B.C. But the main Egyptian achievement in sculpture is the portrait statue, arising out of the belief that the soul of the dead required an accurate representation of the body in order to attain immortality. This need for a naturalistic treatment conflicted to some extent with the prestige motive already described, and throughout Egyptian history periods of comparative realism alternated with periods of formalism. The large royal statues are shown in one of two postures: standing, with the eyes gazing steadfastly into space, arms by the sides with clenched fists, and the left leg advanced, or sitting bolt upright with legs and feet close together and the hands laid palm downwards on the thighs. During the 4th dynasty when a demand had arisen for representations of the dead amongst the nobles many excellent naturalistic statues and heads in wood, copper, and hard or soft stone were produced. Some statues were of painted limestone; for the Egyptians, like the Greeks, had the custom of painting their sculpture. Unlike the Greeks, however, they never showed the slightest interest in the naked body; the muscles are mere contours beneath a polished surface and display no interest in the underlying anatomy. Yet their characterisation was often remarkable, as, for example, in the 5th dynasty portrait of a scribe which portrays perfectly the intellectual with a keen and alert mind. Middle Kingdom sculpture gave up the use of painted limestone for more monumental likenesses in dark hardstone. The pharaoh was represented in a more human and less divine form, and to some extent royal statues were replaced by those of the heavenly king Osiris. This was a period during which some measure of power was passing from the hands of the king to the lower orders—a fact attested by the immense number of crude and cheap objects it produced. The ordinary man wanted something better than he had been used to in the past, but had not yet acquired the taste to distinguish good art from bad.

The only person ever to crack the crust of Egyptian conservatism was Amenohais IV, or Akhnaton as he later called himself. This heretic pharaoh of the 18th dynasty attempted to replace the polytheistic beliefs of his people with a religion based on the one supreme sun-god named Aton (hence Akhnaton's name). Sculptors and painters were encouraged to depict what they saw regardless of whether or not their realism might shock those used to the dignity and solemnity of official art and the results may be seen in some of the treasures which have come down to us. Amongst these are the torso of a little girl, believed to be Akhnaton's daughter, now in University College, London, and the portrait heads in Berlin which include the well-known head of his queen Nefrotete. Fry considered the torso to surpass in sensitivity of modelling anything produced by the Greeks, and the portrait heads to anticipate the best work of the Italian Renaissance. Akhnaton's artists depicted him as he was, lifting his daughter on to his knees, leaning on his stick, or walking with his wife in the garden. But these developments came to an end with Akhnaton's reign, and his weak son-in-law Tutankhamen gave in to the conservative forces of the priesthood. The artist returned to copying the past, although some realistic portrait sculpture dates from shortly after this time. Still later, sculpture came to be strongly influenced by Greek Hellenism, and the older Egyptian busts may have influenced the Romans.

Wall Decorations and Paintings.

From the time of Zoser (2950 B.C.) almost every part of a building, inside and out, was painted or

carved in relief. Much the most common decoration was the hieroglyphic inscription, for, like the Chinese, the Egyptians took pride in ornamental writing. During the 4th and 5th dynasties, low reliefs depicted scenes from country life, warfare, the hunting-field, or river-fishing, and in these oxen, hippotami, gazelles, donkeys, birds, fish, and men are portrayed with a keen sense of design and some attempt at naturalism. The painting was in tempera (*i.e.*, on dry plaster) and in early times only black and red were used mixed with a binding substance soluble in water—frequently egg. Later, yellow, green, blue, and ochre were employed. Painting reached its highest level between the 12th and 19th dynasties, and the relative freedom of the great 18th dynasty is nowhere seen to greater effect than in the paintings of the daughters of Akhnaton now in the Ashmolean Museum at Oxford.

The basic limitations of Egyptian painting lay in the artist's conventional use of colour and his ignorance of perspective. There were no shadows, nor did one colour merge into another. By convention hair was black, garments white, vegetation green and water blue; by convention important people were taller than the less important, men than women. Everything was painted as seen from the most conventional angle: the head in profile, the eye as seen from the front, fish from the side, but the pool in which they swam from the surface. This, of course, is quite logical; for a child asked to draw a penny will draw a circle rather than a straight line, although the latter is equally valid depending on the viewpoint of the observer. But it does not give the impression of solidity or depth, and although the Egyptians and the Cretans were the greatest painters of their time, and in fact influenced each other during the period of the Empire, they produced no masterpieces by world standards.

Literature.

Egypt produced the first literature known to history, by far the greater part of it religious. However, there were also texts dealing with medicine, mathematics, astronomy, and geography, and books, or rather papyrus rolls, on correct conduct, social criticism, and historical events. Poetry and the short story were common forms. Of religious works, a Memphite drama dating from the founding of the 1st dynasty mirrors, according to Breasted, "the oldest thoughts of man which have anywhere come down to us in written form," but best known are the *Coffin Texts* of the 12th dynasty and the *Book of the Dead* of the 18th dynasty. These are collections of texts, the former written on the inside of the wooden coffins of noblemen between 2300 and 1800 B.C., the latter papyrus rolls containing incantations and spells buried in the humbler graves from about the 16th century B.C. Both were derived from the *Pyramid Texts* of the 6th dynasty on the walls of the royal tombs. Egyptian influence occurs in the Bible in the *Psalms* and the *Book of Proverbs*. The 5th dynasty "Instructions of Ptah-hotep" is the first manual of good behaviour; social criticism is found during the feudal period notably in *The Eloquent Peasant*, which reproaches the official classes for their exploitation of the poor. Egyptian poetry, found in some anthologies, has a lyrical quality which remains unsurpassed until the times of the Hebrews and Greeks; the poem *The Dialogue of a Man Weary of Life and His Soul* is surely one of the great poems of the world. The short story, often in a form reminiscent of the tales of the *Arabian Nights*, frequently dealt with the adventures of its hero during wanderings in distant lands. *The Shipwrecked Sailor* and *The Tale of Sinuhe* come into this category.

THE ART OF MESOPOTAMIA.

Mesopotamia, the land of the Tigris–Euphrates valley, is an open plain exposed to invasion on all sides; although fertile, it has little wood or stone. In ancient times its rulers were warlike autocrats and a powerful priesthood. The non-semitic Sumerians ruled from about 5000 B.C. to c. 1850 B.C. when they were displaced by the semitic Babylonians, who in their turn were conquered by the Assyrians a thousand years later. The Babylonians returned in 612 B.C. for a mere century before they were finally defeated by the Medes and Persians. Mesopotamian art reflects these facts. As well-executed as Egyptian art, it is crude and brutal rather than sensuous and elegant; it rarely depicts women; it uses mud-brick in place of stone, which, like wood, is used only for luxury articles; but like much Egyptian art it is concerned with power, prestige, and religion.

The beaten mud or sun-dried brick used in place of stone made it inevitable that the great palaces and temples would soon crumble to dust. Ur, Babylon, and Nineveh were forgotten mounds of rubble until they were excavated by archaeologists from about the middle of the 19th century. In contrast with Egypt, the traveller in Mesopotamia will *see* little to convey anything of the realities of these bygone civilisations, which, with relatively few exceptions, have had little influence on the main stream of art.

The Sumerians: City-states.

The Sumerians were not only the first, but the most fundamental influence in Mesopotamia. They were first in time; they set the patterns of the future; and they were the most creative. They invented the art of writing (cuneiform—the earliest form of the script was found at Erech of the Bible in 1928–31). Their conglomeration of city-states produced accomplished potters, sculptors, and metal-workers even before 3000 B.C., but the first great period of art begins with the ascendancy of the city-state of Ur under its ruler Sargon about 2800 B.C., about the time of the building of the Great Pyramid. After coming under the subjection of other city-states for a time, Ur rose again under its king Ur-nammu about 2210 B.C.

Neither Ur nor any of the other cities exist today, but their general plan is known from excavations. Each was surrounded by a high wall with great gateways within which lay the dwelling-houses with their flat roofs. At a higher level an oval wall enclosed the temple precincts, and a third wall the main courtyard of the temple with the rectangular sanctuary of the god on a raised platform at one end. The larger cities were dominated by a tower or ziggurat, pyramidal in shape and rising in three to seven stages with terraces in between to a small shrine at the top reached by flights of steps or ramps. The terraces were often planted with trees or gardens, and this may have given rise to legends of the Tower of Babel or the Hanging Gardens. Probably each level was decorated with brightly coloured glazed bricks to relieve the monotony of the underlying baked clay bricks cemented together with bitumen. For the same reason private and public buildings were decorated with patterns of shells, lapis lazuli, or mosaics.

First Use of Arch Construction.

At all times architects have been faced with the problem of roofing-in their buildings, and in the course of time two main methods evolved: the flat roof laid on beams supported by walls or columns, and the arch or vault. The former method was used by the Egyptians and Greeks, who never got beyond the column and lintel architecture based on the tree-trunks and beams of an earlier stage. This fairly obvious technique was independently discovered in many widely separated parts of the world and can lay no claim to being unique in any one area. The true arch, however, has a very different and almost fantastic history, for it originated in the single area of Mesopotamia and thence spread to the Etruscans, the Romans, and, by way of Romanesque architecture, to the rest of southern Europe. In northern Europe the rounded arch became the pointed one of 12th-century Gothic which, finally

reaching Italy, confronted its romanesque predecessors with the great cathedral of Milan. From Rome the arch spread east to the Byzantine empire, where it was copied by the Arabs, who carried it to Spain in the form known as Moorish, and, together with their religion, brought it to India, where it is seen in the Taj Mahal. Spaniards brought the arch to Mexico, where it was later used by converted Indians in building their mission churches as far north as California. Yet the whole of this development began in a small part of northern Mesopotamia nearly six thousand years ago.

The true arch is built of wedge-shaped blocks and these are so fitted together that each plays its part in supporting the whole although no single block is self-supporting. The last block or keystone locks the structure together. In this respect it is totally different from the false or corbelled arch in which layers of flat stones laid horizontally overlap each other successively until they approach the centre when the remaining space is roofed over by a large flat stone and the sides are buttressed with masses of heavy masonry to prevent collapse. The corbelled arch, vault, and dome were independently discovered in many areas from the Mycenaean tombs of Greece to Ireland and Mexico. Although originating in Mesopotamia, the true arch was never used in large-scale architecture. Rather it was employed in tombs (as in the royal tombs at Ur), or for drains and gateways, and it was left to the Romans to make it a major feature of their architecture.

Sumerian Sculpture.

Since wood and stone were difficult to obtain, their use was reserved by the Sumerians for luxury or essential articles—stone for sculpture and wood for toilet implements, sledges and the wheeled carts they were the first to use. There exists some excellent sculpture which is perhaps freer and more vital than most Egyptian work, but the Sumerians, and those who followed them, shared with the Egyptians an indifference to the beauty of the nude figure. That this was not due to lack of skill is evident from the exquisite manner in which head, hands, and feet were modelled. Two magnificent heads dating from the 3rd dynasty of Ur, which can be seen in the Louvre, are masterpieces of the sculptor's art, as is the famous head of Gudea, Governor of Lagash. Naturalism appears in the treatment of animal figures in reliefs, but the general trend was towards stylised designs. Stone was also used in the making of cylindrical seals engraved with writing for impressing on soft clay. These were often highly decorative and carved with designs based on religious subjects. Unlike the Egyptians, who wrote in ink on paper made from papyrus reeds, the Sumerians cut their wedge-shaped cuneiform letters into clay tablets.

Decorative Art.

The Sumerians were expert workers in gold, silver, and semi-precious stones for ornamental purposes; copper and bronze for weapons; and in the inlay patterns found on wooden boxes, lyres and harps. They made use of the potter's wheel to fashion vessels of clay or made bowls by hollowing-out stone with their drills. Many such objects were found in the royal tombs excavated by Sir Leonard Woolley in 1927. Here the royal bodies lay buried in stone chambers at the foot of deep pits, and in the surrounding area lay the sacrificed bodies of men and women of the court, soldiers, musicians, and even oxen with their carts, grooms, and riders. All were accompanied by the objects they had known in life: gold crowns and helmets, golden drinking-cups, gold daggers, musical instruments inlaid in gold and mosaic, silver head-bands, bronze weapons, jewellery, and gorgeous robes. These, like the Egyptian finds, have been criticised as showing more concern with luxury than good taste, but at any rate they demonstrate the skill of the Sumerian craftsmen of 2700 B.C.

The Babylonians: Temples and Palaces.

The two great periods of Babylonian rule were separated by a thousand years of Assyrian dominance; the first was the period of Hammurabi (*c.* 2100 B.C.) and his successors, the second the brief glory of Nebuchadnezzar II (*c.* 605 B.C.) which lasted only seventy years. In its architecture the Babylonia of Hammurabi's time did not differ greatly from that of Ur during its golden age except in its increasing tendency towards the massive and ornate. One of the largest temple ziggurats was built at Birs-Nimroud with a tower 272 feet square at the base and 160 feet high; originally it had seven tiers each dedicated to one of the seven planets and was decorated with coloured glazed tiles. On the whole, tombs and temples were of lesser significance in Mesopotamia than in Egypt and palaces played a correspondingly greater part, since the cult of the dead was never developed to any extent and secular power was. As mere structures the palaces must have been poor things, squat and angular like children's block buildings, and only their elaborate ornamentation gave them any aesthetic interest. In plan they differed from the houses of the well-to-do mainly in their size, their great surrounding walls, and their many inner courtyards in a maze of chambers and passages. These chambers were lined with decorated glazed tiles and paintings in which animal and repetitive floral designs are common. At Mari, in northern Babylonia, some remarkable wall paintings depicting a royal investiture have been found. Coloured in dark red, blue, and black, they are vivid and lifelike, recalling similar work in Egypt and Crete rather than Mesopotamia.

Assyrian Art.

A typical form in large-scale Assyrian architecture was the great gateway flanked by huge winged bulls or lions with human heads. These were first unearthed by the Frenchman Paul Botta at Khorsobad in 1843. Botta also discovered the palace chambers with walls carved in low relief on alabaster slabs depicting the brutalities so general in Assyrian art: besieged towns, burning buildings, prisoners being flayed and crucified, and everywhere squat, broad-shouldered, and bearded warriors in their chariots. Many of these reliefs were shipped to Paris, where they are still to be seen in the Louvre. A few years later, the English Layard discovered and excavated the site of Nineveh, where he too found reliefs and winged monsters, some more than 15 feet high. These, too, were removed and now clutter up the galleries of the British Museum, where they were a great attraction in Victorian times. The reliefs on the lower part of the walls were originally painted whilst the upper part was decorated with glazed tiles depicting similar scenes. Roofs were ornamented with painted geometrical designs. Grandiose as these works are, it is doubtful whether later Mesopotamian art ever equalled that of the Sumerians, although an exception may be made of the reliefs depicting a lion-hunt found in the palace of Ashur-bani-pal (668–626 B.C.), the last great Assyrian king. This is perhaps one of the finest series of sculptures prior to the Greeks.

The minor arts of Babylonia and Assyria follow in general Sumerian prototypes, but the cylinder-seals in reddish-black iron ore of the 1st Babylonian dynasty and the seals of precious stone made by the Assyrians are unique, as is some of the Assyrian pottery. Possibly the greatest achievement of the Assyrians, however, was their preservation in the royal libraries of the literature of earlier periods. Most of this originated with the Sumerians, was absorbed or imitated by the Babylonians, and copied down from Babylonian texts by the Assyrians.

Literature.

The most typical literary form was the epic poem, of which the two best-known examples are the Epic of Creation and the Epic of Gilgamesh. The latter includes an account of the Deluge which was later borrowed by the Hebrews and

finds a place in Genesis. It may be said to have set the pattern for all future epic poems—that is to say, it recounts the wanderings and adventures of the hero and his eventual success. Epics are as unknown in Egyptian literature as the love-poems popular in Egypt were unknown in Mesopotamia. Penitential hymns probably date from the period of the Semitic invasions, and to the same time belongs the "wisdom literature" which, as in Egypt, gives somewhat platitudinous instructions regarding right conduct. Immense numbers of letters dealing with administrative and business matters and inscribed on clay tablets have been unearthed, but most Mesopotamian literature is religious and primarily of historical interest.

AEGEAN ART.

Minoan Civilisation.

The Minoans of Crete came to the island about three or four thousand years B.C., possibly from Asia Minor. They were a stone age people living in caves and huts. During the Early Minoan Period (*c.* 3000–2000 B.C.), bronze came into use and towns were built but the arts remained at a primitive level and palaces did not yet exist. The Middle Minoan Period saw the unification of the island under a line of kings ruling from their capital at Knossos and the rise of a great civilisation which came to an abrupt end with the destruction of Knossos in 1400 B.C.

The culture of Crete was, by any standards, remarkable. Here was a people who were the first Europeans to be able to write, yet produced no literature but tradesmen's inventories; a people who built great palaces of stone such as those of Knossos and Phaestos with their many storeys, their drainage-systems, and even flushing water-closets; who laid fine roads and erected attractive houses, yet were almost forgotten to history except in Greek legend until their civilisation, the first to be based on naval power, was unearthed by Sir Arthur Evans from 1899 onwards.

The Minoans, in spite of their apparently theocratic form of government, were the first civilised people in history who were not overwhelmed by the power of a monolithic state. Their frescoes on walls, their painted pottery, and their metal-work were ornamented with subjects far removed from the prestige motifs of Egypt and Mesopotamia, or the Egyptian obsession with death. Pottery was often decorated with such sea-symbols as the dolphin, sea-urchin, or octopus, and in the beautiful egg-shell thin Kamares ware there is a delicacy previously unknown. The great frescoes in the columned halls and passages of the palace of Knossos depicted no scenes of conquest, of gods, or an after-life, but in colours of light red, crimson, bright yellow, and turquoise blue, green, and terracotta showed blue skies, birds in flight, butterflies, apes picking flowers, and processions of young men in gay kilts wearing floral crowns. The women wore crinoline-type skirts, puffed sleeves, and left their breasts exposed. A motif which frequently appears is the bull, for this was the island of king Minos and the minotaur, princess Ariadne and her lover Theseus; whatever truth may lie behind the myth there can be no doubt that ritual bull-fighting pictured in the frescoes played a large part in Minoan culture. In the last two centuries of Minoan rule the frescoes and art in general became more grandiose; the pottery lost its bright colours and delicacy, which were replaced by sombre reds and browns on larger and clumsier vessels, and the wall-paintings depicted processions of people bringing offerings to the king. The Cretans also produced exquisite miniature sculpture, and their craftsmen were skilled in engraving precious stones and making jewellery.

The arts in Crete were undoubtedly influenced by those of Egypt, but it seems likely that this influence was greater in pre-dynastic times than it was later. The Cretans' skill in bronze-working and the making of faience ware may have come from the Delta area about the time of Menes. In its turn the Minoan culture was to influence Greece, where the peoples of Mycenean times made use of the Minoan script to write their own language. However it is generally agreed that Crete produced no masterpiece of art, and if one asks why, the answer must be that its way of life was too easy and conflict-free and that consequently its art suffers from a rather facile prettiness unmotivated by the powerful emotions which—whether we admire them or not—motivated the Egyptian or Mesopotamian artist. Nearly all great art has been produced by men with a burning belief in *something*, and this sort of fire the Minoans seem to have lacked. What they produced was elegant and pleasing decoration, and, it would appear, a people leading a free and satisfying life.

GREEK ART.

Contrary to earlier theories the Greeks have been the inhabitants of Greece since about 1900 B.C., so we can no longer apply the word "Greek" to the classical period (*c.* 600–300 B.C.) alone. The Mycenaeans coming from the north were the earliest Greek-speaking people; they learned to some extent the crafts of the Cretans, whom they later displaced from their control over the Aegean, and were themselves conquered by a further influx of Greek-speaking invaders about 1100 B.C. The latter were the forebears of the classical Greeks, who, after a "Dark Age" following the collapse of Mycenaean power, created one of the greatest civilisations the world has known. Yet this occurred at a time when the great nations of the ancient world were dying and the threat of the surrounding barbarian hordes was steadily increasing.

What distinguished the Greeks from Other Nations?

Like most peoples, the Greeks had gods, but they did not take them too seriously, for they were essentially sceptical in their outlook. Like the Egyptians and the peoples of Mesopotamia they were interested in astronomy, anatomy, mathematics, and geography, but their interest arose from the desire to know rather than from priestly or mercantile considerations. Explanation was sought in the natural order rather than the supernatural, and they were therefore the first scientists. Modern cosmology, modern atomic theory, and the theory of biological evolution, all stem from Greece. European philosophy begins with Plato and Aristotle and from the 16th century onwards Greek drama, poetry, and sculpture have been the main foundation of these arts in western Europe. Although little remains to us of the total heritage of Greek art, we know from what does remain that the Greeks produced some of the greatest architecture and sculpture the world has known and that their literature is beyond doubt one of the finest. Thucydides is still esteemed as an historian, and no prose other than the Bible can equal that of Plato; Homer wrote the two greatest epic poems, and Pindar some of the greatest odes. Of the four greatest writers of tragedies who ever lived, three—Aeschylus, Sophocles, and Euripides—were Greek. This achievement was the work of a land which never became unified, a land of small city-states, but primarily it was the work of one of these: the Athens of Pericles. Of course this great outburst of the human spirit did not arise without cause, for as the Greeks themselves were accustomed to say: "nothing arises out of nothing". They took the skills and knowledge of the older empires and, ridding them of their supernatural accretions, made them into something new and wholly human. Even their gods had human frailties.

Mycenaean Civilisation.

The Mycenaeans were a bronze age people who had acquired the skills of working in bronze along with the use of the potter's wheel from the Minoans, who had also taught them the art of writing in linear script. Their crafts and arts

were highly developed. From about 1400 to 1100, when it was sacked and burnt Mycenae on the mainland was the centre of civilisation of the Aegean world. It is this civilisation that Homer describes in the two great epic poems, the *Iliad* and the *Odyssey*, created by him in the 8th century B.C. at the end of the "Dark Age" which followed the collapse of Mycenaean power.

The Early Period: Homer and Hesiod.

The *Iliad* and the *Odyssey*, the former dealing with the siege of Troy, the latter with the adventures which befell the hero Odysseus during his return home, have been translated many times, but the translations in English from Chapman in Elizabethan times to Pope in the 18th century, and Butcher and Lang in the early 20th are apt to be "dated." For this reason the modern reader is safer with a translation such as that of Dr. E. V. Rieu which, if its literal rendering misses some of the poetry, at least leaves us in no doubt as to what Homer really said. Hesiod (750–700 B.C.), also lived during the "Dark Age," but unlike Homer his existence as a real individual has never been called in doubt. His poem *Work and Days* tells of the farmer's hardships, preaches the gospel of hard work, and rails against landlords and princes. Hesiod lived in Boetia, one of the poorest parts of Greece: "a sorry place near Helicon, bad in winter, hard in summer, never good."

Sappho, Anacreon, and Pindar.

The period between 600 and 500 B.C. was a time of development in Greek art when buildings of mud-brick and wood were being replaced by limestone and marble, and music, literature, and sculpture were cultivated. It was not yet the great age of art, but it was the beginning. Much of the art of this period came, not from the mainland, but from the Ionian Greeks of Asia Minor or the islands of the Aegean. The short lyric poem was replacing the epic and is typified by the works of the poetess Sappho of Lesbos (611–592 B.C.), of whose love-poems only a few fragments remain, Anacreon of Theos (560–475 B.C.), whose odes often take the form of drinking-songs, and later Pindar (522–443 B.C.), one of the greatest—and least-known—poets who ever lived. Pindar lived at a time when the aristocratic way of life to which he had been born was coming to an end and the first democracy in the world was coming to birth in Athens. Most of his odes celebrate a noble victor in the great athletic contests, although he is more concerned with the achievement as a spiritual than a physical feat.

When, during the early part of this period stone begins to replace wood in architecture and sculpture, the stone is treated in a manner similar to that used in working the original material. As in Egypt, the stone columns of temples are topped with sculptured foliage indicating their historical development from trees, and stone statues show a stiffness of treatment from which we may presume a similar origin. The influence of Egypt is seen in the statues of youths known as Kouroi or Apollos which date from about 550 B.C. and show the erect figure with arms by the sides and left leg advanced typical of formal Egyptian sculpture. The first large statues in marble were the Hera of Samos and another on the island of Delos; both of these possessed primitive characteristics even to their draperies which were arranged in perpendicular folds.

The Age of Pericles.

The public career of Pericles lasted from 463 to 431 B.C., and encompassed the greatest period of Greek culture. The 5th century began with the battles of Marathon and Salamis in which the Persians were defeated by a combination of Athenians and Spartans. It ended with the futile Peloponnesian wars between Athens and Sparta which ultimately brought about the end of a great civilisation. Much of the history of this time is known through the works of the historians Thucydides (460–399 B.C.) and Xenophon (444–359 B.C.). Thucydides wrote an account of the Peloponnesian war containing the famous funeral oration of Pericles which summarises Athenian ideals as Lincoln's Gettysburg address summarised American. Whether Pericles actually used the words attributed to him or not, it remains one of the greatest speeches of history. Thucydides was the first scientific historian in that he sought to discover the processes going on behind events; in this respect he differs from Herodotus (484–424 B.C.), the "father of history," whose fascinating anecdotes of his travels amongst the Egyptians, the Persians, and other peoples, even if on the whole truthful, remain essentially travellers' tales. Xenophon, a pupil of Socrates and the general in charge of what proved to be a retreat (when he came to the aid of Cyrus the Younger who wished to drive his half-brother from the throne of Persia) wrote an account of the action in his *Anabasis*, another well-known historical work.

Literature and Philosophy: Plato and Aristotle.

Writing was first used to any extent in the political and commercial circles of the 7th century B.C., but oral transmission of learning was still the rule. Those who put their learning into literate form used poetry as their vehicle even when writing on philosophy as did the 6th- and early 5th-century philosophers Anaximander and Empedocles, both of whom wrote in verse. Cadmus of Miletus (c. 547 B.C.) was the author of the first Greek work in prose, but from the time of Hecataeus (500–476 B.C.) onwards writing in prose became fully established, although the oral tradition was still strong, as one may see in the importance attached by the Greeks to the art of rhetoric in the oratory of Demosthenes (385–322 B.C.) and the dialectic method of teaching used by Socrates (469–399 B.C.). Plato (427–347 B.C.), a pupil of Socrates and perhaps the finest writer of Greek prose, came of an aristocratic Athenian family. After the death of Socrates he travelled for some years in Italy and Egypt, but later returned to Athens where he founded the Academy which was in effect the first European university. He expounded his philosophy in the Socratic Dialogues which purport to record conversations between Socrates (who himself wrote nothing) and a number of young Athenian aristocrats. This is one of the great books of world literature; the dialogue known as the *Phaedo* gives an account of the execution by poison of Socrates, and *The Symposium*, which is a discussion on the nature of Love, brings the reader so close to the scene that he can almost hear the conversation of the guests attending the feast. The *Republic*, in which Plato deals with the structure of the ideal state, has led in modern times to his being stigmatised as a totalitarian, a Communist, or a Fascist—an absurd attempt to transport contemporary political concepts into the past. Plato's pupil Aristotle (384–322 B.C.) was the greatest of Greek philosophers and his philosophy, modified by St. Thomas Aquinas and known as Thomism, is the official doctrine of the Roman Catholic Church today. Aristotle wrote on many subjects: biology, ethics, logic, politics, and rhetoric, but possibly his best-known works are the *Ethics*, the *Politics*, and the *Poetics*. He was tutor to Alexander the Great and founded the Lyceum at Athens.

The Drama.

Towards the end of the 6th century with the rise of Athens to intellectual supremacy the theatre developed into one of the greatest of the arts. The word "drama" is derived from a Greek word meaning to do or to act and drama was subdivided into tragedy and comedy, the former signifying a "goat-song," the latter a village revel. The origins of the theatre are lost in the past, but it seems clear that it arose from primitive rites connected with fertility and harvest-time; "goat-song" probably refers to songs sung in honour of Dionysus, the god of wine, by men clad in goatskins, and the revels from which comedy arose were simply those somewhat in-

decorous festivities attending a harvesting. Dionysus or Bacchus was originally a minor god, but at a later stage he became the tragic figure who dies and comes to life again, celebrated with wine which symbolically represents his blood shed that the earth might be fruitful. In the earliest plays a single actor exchanged dialogue with the chorus and the performance probably took place in a natural amphitheatre so that the audience would have a clear view. Subsequently the space around the altar of the god where the chorus sang and danced developed into the "orchestra," the forerunner of the stage. An erection behind the altar, the "skene," was at first a dressing-room for the actor but, as the drama became more elaborate, it became a solid structure with a façade of columns and three doorways. According to Aristotle the first painted scenery was introduced by Sophocles. The chorus of twelve or fourteen performers, all male (as were the two to three actors) was a relic of the early religious rites; it had the function of providing a poetic commentary on the action and characters of the play becoming progressively less important from the time of Euripides, who wished to focus attention on the actors as motivated by human passions rather than by the supernatural. The actors themselves used tragic or comic masks and increased their height by the use of the "colthurnus," a thick-soled sandal.

Prizes were offered each year for the best plays and early in the 5th century stringent rules were laid down for the competitors. Each had to submit a series of four plays: three tragedies dealing with the same or different subjects and a play treating in a satirical way some incident in the tragedies. The permitted numbers of actors and members of the chorus were determined, as was the length of the play, and violent action on the stage was not allowed. The ritualistic approach and regulations led to a stylised and static performance which more closely resembled a performance of the *Messiah* than a play in the modern sense.

Tragedy: Aeschylus, Sophocles, and Euripides. During this century three men wrote tragedies which raised the Greek drama to its highest level: these were Aeschylus (525–456 B.C.) the father of tragic drama, Sophocles (495–406 B.C.), and Euripides (480–406 B.C.). There were, of course, many other writers of tragedy, since competitions went on for some centuries, but of all these nothing remains save one by an unknown author. Although Aeschylus is reputed to have written seventy plays, Sophocles more than a hundred, and Euripides seventy-five, all we have left are seven by each of the first two writers and seventeen by the third.

The plays took for their subject the events and characters of ancient myths which were regarded, as were the works of Homer, as semi-sacred. But the Greek dramatists differed from others not only in their choice of subject-matter and their staging of a play but also, as Professor Kitto has shown, in their conception of what a play is *about*. To the Greeks a play was not, as it was with Shakespeare and most other dramatists, a slice of life with a main plot and other subsidiary ones which really have little to do with the story; it was an attempt to express a single thesis with clarity, force, and a concentrated attention that had no time for side-issues. The framework of the play is not a story but a conception, and so the *Agamemnon* of Aeschylus, for all the complexity of its plot, deals with one matter only: the thesis that retributive justice inflicted in revenge leads to chaos. Aeschylus' plays include *Agamemnon*, *Eumenides*, *Orestia* (a trilogy), and *The Persians*; Sophocles wrote *Ajax*, *Oedipus Rex*, and *Antigone*; Euripides, *Orestes*, *Medea*, *Hippolytus* and *Electra*.

Comedy: Aristophanes. Comedy, at any rate in its more sophisticated forms, developed later than tragedy. Originating possibly in Sicily with Epicharmus of Syracuse, it subsequently became essentially an Athenian art. Historically, comedy has three phases: the "Old Comedy" represented by nine of the eleven surviving plays of Aristophanes, (*c*. 444–385 B.C.) "Middle Comedy" represented by the other two and belonging to the first two-thirds of the 4th century, and "New Comedy," which survived into the 3rd century in the works of Menander, (342–*c*. 291 B.C.). The development moves from old forms with coarse humour and a satirical treatment of topical issues, through the middle more sophisticated stage reminiscent of Gilbert and Sullivan's comic operas, to Menander's essentially romantic comedies with the type of plot associated with such plays as Shakespeare's *Comedy of Errors*. Shakespeare borrowed this plot from Plautus who, with another Roman dramatist Terence, had adapted many of Menander's plays now known only from fragments. (The papyrus of a complete play of this writer was discovered in 1957.) Aristophanes main works are the *Clouds*, satirising Socrates; the *Frogs*, tragic poets; *Lysistrata*, feminism; the *Birds*, city life; and the *Wasps*, the Athenians' love of law-suits.

Painting and Vase Painting.

Hardly any Greek painting up to the time of Alexander the Great is known to us except the decorations on vases. The painters of the age of Pericles and after, although in their time often more highly praised than the sculptors, now exist only in their names: Polygnotus, Philoxenus, Zeuxis, and Appeles. But some idea of the character of Greek wall-paintings can be obtained from Roman copies in mosaic and fresco, notably at Naples and Pompeii. Painting in Greece reached its zenith during the 4th and 3rd centuries B.C. The mosaic *Battle of Issus* in the Naples Museum, after a picture by Philoxenus, representing the great battle between Alexander and Darius, is a copy of a 4th-century fresco from Pompeii. *The Adobrandini Wedding* of a much later date at the beginning of the Christian era influenced such diverse artists as the 17th-century Frenchman Poussin and the present-day Picasso, both of whom were impressed by its statuesque figures and geometrical style. A painting (believed to be a copy) of a woman playing a lyre found in a villa near Pompeii shows an awareness of perspective not found in Italian painting until the 12th century.

The Greeks were amongst the great potters of the world, and the word "ceramics" is derived from the area near Athens where potter's clay was obtained. The origins of the craft, as the Greeks learned it, date back to Crete and the Mycenaeans, where excellent work was produced, at first with geometrical designs and later with the sea-symbols mentioned already. The Greeks of the 9th and 8th centuries B.C. returned once more to rather monotonous geometric designs of single or concentric circles with interlacing lines arranged in bands. In some cases "match-stick" figures (which later tended to fill out) were depicted in funeral processions or naval battles arranged between the bands. The seventh century saw the introduction of motifs from the East: lions, bulls, and winged monsters, sometimes with human figures, painted in brown with touches of red, white, and yellow. At this time Corinth produced the best pottery, but in the following centuries Athens was supreme. From 600 to 500 B.C. the Black-figure style was popular with black and mostly human figures on the natural earthen-red ground; these were archaic in tradition but, especially in the work of the painter Exekias, show a wonderful sense of pattern. From 500 B.C. or thereabouts the technique was reversed and an immense number of vases were produced with red figures on a black background. Whereas in the older style, markings on the figures had been made by scraping the paint to reveal the red pottery beneath, these were now done in black paint on the red figure. Many of the potters signed their works and some added inscriptions in praise of a good-looking boy apprentice. "Young Skouras is a handsome lad" or "That boy Aristophanes is the playmate of Zeus" (since, of course, they did not share present-day views on homosexuality). Throughout all these developments one can see how the Greeks, although they retained the Egyptian genius for design and clarity, progressively turned away from tradition and

began to look at the world for themselves without relying on any formula. Figures become more human and rigid postures disappear. But one of the greatest moments in the history of art was when, sometime before 500 B.C., a Greek artist discovered foreshortening—he could depict the foot, for example, from the front, or an arm pointed directly at the viewer. The old art of profile or full-face was dead and the era of modern art had begun with all its limitless possibilities of depicting the human figure. However, Greek vase painting was on the decline from the beginning of the 4th century and by its end was dead.

Architecture.

Almost the whole of the Greek genius in architecture was expended on temples which are all basically similar in design. If the Greeks knew of the arch, vault, and dome—as they almost certainly did—they ignored them in favour of the ancient column and lintel not because they were afraid to experiment but because they had found something which in its very simplicity is flawless and perfect. Possibly this is why the Greek temple is the one universal style in the history of architecture, from the time of the Romans, who spoiled its effect with inappropriate domes and ornate columns, to Louis IV, who erected pseudo-classic buildings all over Paris. An immense number of imitations are found both in Europe and the United States (the latter much influenced by Thomas Jefferson who besides being President was also an architect with classical leanings). That the classical style is ideal rather than individual and personal, intellectual rather than emotional may in part account for its subsequent appeal to the peoples of so many and varied nations and times.

Temple Design. Fundamentally, the temple is a rectangle with a low-pitched gabled roof resting on the side walls. The roofs of Egyptian and Mesopotamian buildings, as we have seen, were flat, and it seems likely that the slightly sloping roof was an innovation brought by the Greeks from the north. The skeleton of the temple then was a "typical" house such as a child might draw or build with blocks. In its earliest stage the only material used was wood, but later the walls were built of limestone and wooden columns in front helped to support the roof of a porch. Finally, the whole structure was of marble with front and back porticos and a colonnade on either side. Within was a front chamber or cella with a statue of the god or goddess to whom the temple was dedicated and a back room holding the treasures sacred to the god. All ceremonials were carried on outside the building. In the course of its development temple architecture branched into three styles, the well-known orders, which, although nominally concerned only with the height and proportions of the columns and the ornamentations of their capitals, in fact influenced the details of every part of the whole structure. The Doric column, as seen in the Parthenon, is heavy and solid with a simple cushion-like capital, but in later buildings on the Acropolis, notably the Erechtheum, the Ionic style was used. In this style the columns are slender with a double scroll or volutes at the top; the total impression is one of grace and ease in contrast with the strong, reliable-looking Doric column. The Ionic style belongs to the generation after Phidias who directed the building of the Parthenon. Still later, the Corinthian order, invented in the early 4th century B.C. and named after the city of Corinth, was popular in the wealthy cities of Egypt and Asia Minor under the rule of Alexander the Great. This order is similar to the Ionic, but the capitals of the columns are much more ornate and decorated with carved acanthus leaves. The rich ornamentation extends throughout the whole building, as, for example, in the temple of Zeus in Athens, one of the best in this style.

The Acropolis at Athens: the Parthenon.

The Acropolis, a hill *c.* 250 feet high with a flat oval top 500 feet wide and 1,150 feet long, was the ancient Athenian citadel, adorned with a number of buildings: the Parthenon, which is the largest; the Propylaea, a gateway with a broad flight of marble steps; the Erechtheum, with one part dedicated to Athena in Ionic style and another part sacred to the legendary king Erechtheus and famous for its Porch of the Maidens. Beside the Propylaea was a colossal statue of Athena standing in the open and visible from far and wide; beside the Parthenon stood the Odeum, a place for musical festivals. On the south slope of the hill lay the great theatre of Dionysus, and the Theseum, a Doric temple. Built between 447 and 432 B.C., the Parthenon itself was 229 feet long, 102 feet wide, and 65 feet high. It was made wholly of marble without mortar (even the roof was of hand-carved marble tiles), and the columns were composed of separate drums precisely fitting one on top of the other.

The perfection of the whole is almost incredible: for not only did all the parts join in the whole with mathematical accuracy, but allowance was made for optical illusions. Thus the floor or stylobate was slightly rounded towards the centre to give the impression of a level surface when seen from a short distance, the columns bulged slightly in the middle and leaned slightly towards the building to give an impression of strength, and the metopes (see later) were actually oblongs so that they might appear as squares when viewed from the ground. Resting on the columns is the entablature which supports the roof and includes a lower undecorated part, the architrave, above which lies the frieze in which sculptured panels or metopes alternate with three-grooved triglyphs which represent what was once the ends of the rafters in the wooden temple. The main frieze running round the upper part of the walls represented the annual procession with warriors on horseback or in chariots, peasants, young girls carrying olive boughs, and old men carrying jars, all moving to the shrine to do reverence to Athena. It was 524 feet long and just over 3 feet high. The pediments or triangular areas at the gable ends of the temple were decorated with a remarkable series of statues in full relief—that is, completely separated from the background. The shape of the pediment necessitated that the central standing figures should be twice as large as life, while those towards the angles at the base had to be arranged in kneeling or bending postures. All this was done with consummate skill.

Today, however, all that remains in position are a few heads on the pediments and parts of the frieze; the rest of the frieze is divided between the museum at Athens and the British Museum and the remaining pediment statues are in the British Museum whence they were taken by Lord Elgin at the beginning of the 19th century. Although the great statue (now long since disappeared) of Athena which occupied the cella was certainly by the great sculptor Phidias (who also directed the construction of the Parthenon), it is unlikely that he himself created the Elgin Marbles. Statues and buildings were painted, the buildings often in strongly contrasting colours such as red and blue in the case of the metopes and triglyphs of the Parthenon. The building, erected only a few years after the destruction of its predecessor by the Persians in 480 B.C., was reduced to its present condition when, whilst being used as a powder-magazine by the Turks, it was blown up by a Venetian shell in 1687.

Sculpture: Classical Period.

Most people brought up in the Western Hemisphere are so familiar with the general appearance of Greek statuary that, whatever other doubts they may have, they will almost certainly be prepared to assert (*a*) that Greek sculpture attained a standard of perfection by which all later works must inevitably be judged, and (*b*) that, from what one sees in even quite small provincial museums or galleries, it is obvious that a large number of Greek sculptures have come down to us. Neither of these statements is true. The Greek standard of beauty is one, but by no means the only, standard by which a work of art may be judged, and many critics have felt that it has sometimes proved more of a hindrance than a help in assessing

the works of other cultures. The second assumption—that much remains of the Greek heritage—is also incorrect; for, in point of fact, hardly anything remains of original 5th-century sculpture. What we see in the vast majority of cases is a plaster cast, often an inferior one, made from a late Alexandrian or Roman copy of an original, and even this is more likely to represent a work of the 3rd or 4th century B.C. than the 5th. The famous *Venus de Milo*, for example, now at the Louvre in Paris, is 3rd or 2nd century, and the *Hermes* of Praxiteles (born *c.* 385 B.C.) is possibly the only existing statue which can be assigned with any degree of certainty to an individual artist.

We have seen that, from the end of the 7th century B.C., the Greeks who had hitherto worked in wood and bronze turned to marble, but it was two centuries before they were able to cast aside the limitations imposed by the past. To the first part of the 5th century belong such works as the Apollo and Zeus on the Temple of Zeus at Olympia (*c.* 460 B.C.), and the bronze charioteer of Delphi (*c.* 470 B.C.); these are now highly thought of although severe and lacking in detail compared with later works. But the most famed three sculptors of the 5th century were Polyclitus, Phidias, and Myron, none of whose works in the original remains. Polyclitus, famous for his bronze statues of athletes and his concern with mathematical proportions, is best known for his *Doryphorus* (man with spear), a Roman copy of which (in marble) is in Naples: Myron, the sculptor of the *Discobolus* (discus-thrower) and the *Athena and Marsyas*, worked exclusively in bronze; and Phidias, although responsible for overseeing the work on the Parthenon, is not now believed to have executed any statues now extant. The forty-foot high gold and ivory statue in the Sanctuary of the Parthenon representing Athena in a seated posture is known only from crude representations on coins. In the 4th century the three great sculptors were Scopas, none of whose work remains; Lysippus, sculptor to Alexander the Great; and Praxiteles, the greatest of all, whose original *Hermes* at Olympia is mentioned above. Copies of his other works survive, notably the *Aphrodite* (or Venus) made by the Romans. Finally, there are two original masterpieces by unknown artists—the *Winged Victory of Samothrace* (*c.* 300 B.C.), and the *Venus de Milo*, both in the Louvre. During this time the sculptor's ideals were beginning to change, and the reverently-treated and noble figures of Zeus, Apollo, and Athena were gradually replaced by the more earthly figures amongst the gods, Hermes, Aphrodite, and Dionysus. The treatment of the subject was more sensuous, the figures increasingly effeminate, and the draperies of the female figures moved ever further down until they no longer existed. Although this art has been compared unfavourably with that of the 5th century, the deterioration, if any, must have been slight.

As mentioned above, the Greeks may unwittingly have done us a disservice when later generations came to accept their approach not just as one out of many but as the sole criterion of excellence. For the Greek tendency was to equate two entirely distinct concepts of the meaning of beauty: the natural beauty of the object confronting the artist and the aesthetic quality of his work. In effect, this implies that a beautiful work of art must have as its subject things which are themselves beautiful—a dangerous fallacy if universally applied. Rembrandt showed once and for all that fat and ugly old ladies can be just as " beautiful " to the artist as slender and lovely young ones, and if a knowledge of classical Greek sculpture is an essential foundation to anyone who wishes to understand art, it cannot be used as an absolute measuring-rod to apply to an artist who has found his inspiration elsewhere.

HELLENISTIC ART.

The Hellenistic period of Greek civilisation began with Alexander the Great (356–323 B.C.) and lasted until his empire passed into the hands of the Romans in 146 B.C. It was a most important time in the history of art, bringing about, as it did, the spread of Greek culture far beyond its original frontiers. Egypt, Asia Minor, Mesopotamia, and Rome absorbed and developed Greek concepts, and through them India and above all Western Europe were influenced. Athens was no longer the cultural centre of the Mediterranean world and was replaced in her supremacy by the great cities of Alexandria in Egypt, Antioch in Syria, and Pergamum in Asia Minor. But if Alexander's empire absorbed Greek concepts it is no less true to say that the West was influenced by the East—by Eastern ideas of government, Eastern religion and philosophy, and Eastern art. There were absolute monarchies in place of city-states, cosmopolitanism in place of the Greek tendency to suppose that all who were not Greeks were barbarians, and a rather despairing attitude in philosophy exemplified by the Stoics, who in effect said " we must grin and bear it " and the Epicureans, who said " get pleasure while you can." This was a secular, pleasure-loving, sensuous, rootless, society without convictions—or with so many contradictory convictions being preached at every street-corner that they really amounted to none—and Hellenistic art was a reflection of its society.

Literature.

In literature, the popular forms were comedy in the style of Menander and pastoral poetry as in the works of Theocritus of Syracuse. Menander wrote for those who enjoyed city life, Theocritus for those who were bored with it, and his highly idealised milkmaids and goatherds could only have been appreciated by those who knew nothing of country life. The epic poem was long dead, except in the works of Alexandrian scholars whose efforts were as technically perfect as they were meaningless to an age devoid of heroic figures. Lyric poetry no longer flourished and tragedy had come to an end, perhaps because tragedy is based on a belief that life, no matter how dreadful it may be, has a meaning. The tragic play is not necessarily based on a religious view of life, but it must be based on *some* view such that the individual characters in the play exemplify a deeper version of the human situation than their own particular manifestation of it. Many great playwrights were, or may have been, sceptics, but even so their plays were based on a framework of belief whether or not they themselves accepted its theological justifications. Euripides' framework was Greek mythology; Shakespeare's, Catholic Europe; Ibsen's, Lutheran Protestantism, although all these men were sceptics writing at a time when the tradition, so far as their own culture was concerned, was dying out. The Hellenistic world had no traditions and amid the vast political and social changes nothing and nobody could be believed; life was luxurious but pointless to the wealthier classes. Menander's comedies and Theocritus' poems were the equivalents of modern musical comedies and thrillers.

Sculpture.

Hellenistic sculpture continued the trends which made their appearance in 4th-century Greece. It was sensual, effeminate, and violently emotional. In place of the idealised forms of classical Greek statues which represented an idea rather than a person or even a god, Hellenistic sculpture depicted individuals, and not always noble or beautiful ones. The best examples of Hellenistic sculpture come from the Pergamene school which was later followed by the school of Rhodes: among the more familiar are the *Dying Gaul*, and *Gaul Slaying his Wife and Himself*, (*c.* 241 B.C.), the *Old Market Woman* (2nd century B.C.), the *Apollo Belvedere* (2nd century B.C.), the *Prize Fighter* (*c.* 50 B.C.), and the *Laocoön*. Most remarkable of all is the enormous frieze on the altar of a temple at Pergamum depicting a battle between gods and giants. The frieze is 400 feet long by 7 feet high, dates from about 160 B.C., and tells its story with tremendous realism. Its brutal violence is far removed from the controlled and serene art of classical Greece, but foreshadows the exuberance and restless excitement of 17th-century baroque art.

Portrait sculpture was another typically Hellenistic form of art and one which, in spite of earlier ventures elsewhere, might almost be said to have been invented in this period. The classical Greeks thought little of portraits, and when they did produce them did so in an idealised style. Just as the statue of an Egyptian pharaoh was primarily a portrait of a pharaoh rather than a particular man, so a bust of Pericles represented a noble man and a bust of Alexander a successful general and ruler. The Hellenistic Greeks produced portraits which recognisably represent this man and no other, not an idea but a personality. Their art was seized upon by the Romans who, as the world knows all too well, worked the portrait statue to death.

Alexandria the Intellectual Centre.

The great Hellenistic cities were geometrically planned and their wealth made possible the building of fine temples, baths, theatres, libraries, and market-places. The Doric style disappeared to be replaced by increasingly graceful and slender Ionic columns or ornate Corinthian ones. The true arch was sometimes used although not fully applied. The common language was a Greek dialect, the *Koinē*, which was used by the Jews for the version of the Old Testament known as the Septuagint, in the writing of the New Testament, and by St. Paul during his missions. Alexandria, the intellectual centre, was famed for its Museum with its library of 700,000 books. Here worked and lived the physicians Erasistratus and Herophilus, the mathematician Euclid, Archimedes, the geographer Pytheas, and many other great men.

Hellenistic society did two main things. It spread Greek culture far and wide, and it extended the boundaries of art beyond the rather limited concepts of classical Greece. From this time onwards the whole of experience was grist to the artist's mill.

ROMAN ART.

From about 1000 B.C. Italy was occupied by bronze age peoples from the north, and a century later by an iron age culture also from beyond the Alps. By 800 B.C. the area west of the Apennines and north of Rome was occupied by the Etruscans, large coastal areas in the south by the Greeks and Rome itself was a mere handful of settlements on the left bank of the Tiber at a ford connecting Latium with Etruria. The early history of Roman power is the history of her conquest of the Etruscans, Gauls, and other peoples in north and central Italy by 295 B.C., and the final expulsion of the Greeks in the south by 270 B.C.

The Etruscans.

The Etruscans appear to have come by sea from Asia Minor and penetrated into Italy by way of the Tiber into the area now known as Tuscany. This happened about 800 B.C. or earlier and by the 6th century B.C. they were at the height of their power, holding most of northern Italy and the west coast as far south as Naples. Rome was ruled by Etruscan princes, the Tarquins, until their expulsion in 509 B.C. Etruria was a land of independent fortress towns joined together in a loose confederacy, and her people were skilled in agriculture, metal-working, and ship-building. This work was carried out by the native peasantry under their Etruscan overlords. Religion, art, and learning were borrowed from Eastern sources, and their religion seems to have been a gloomy affair with worship of the destructive forces of nature, spells, charms, and curses, human sacrifices, and a vivid conception of the after-life which had a hell populated with demons. The popularity of the skeleton as a motif in art reveals their obsession with death, as also do the communal burial chambers under large mounds (accorded to important families). These were decorated with paintings and the bodies lay in clay sarcophagi with realistic likenesses of husband and wife lying together as on a couch upon the lid.

Prior to 600 B.C. Etruscan art was influenced by Asiatic and Egyptian art; there are the bronze vessels, gold-work with its remarkable granular decoration, jewellery of high technical skill, and the characteristic grey-black pottery known as *bucchero*. Then, between 600 and 450 B.C., Greek inspiration was apparent with statues and statuettes of bronze and clay. The clay statue was first moulded and then baked but not glazed; terra-cotta, as it is called, was ordinarily reddish in colour. From the end of this period Etruscan art declined until it merged with Roman art. Though the Etruscans excelled as skilled technicians their art is not highly esteemed. This is true also of their architecture.

An Etruscan temple is a modification of the classical Greek temple. Set always upon a hilltop, standing on a high *podium* or platform, approached from the front by a flight of steps, it had a deep front porch, the roof of which was carried by a double row of widely spaced columns; there was no surrounding colonnade, and the roof projected beyond the line of the side walls, giving it a somewhat top-heavy appearance. The Etruscan knowledge of the arch was passed on to the Romans. Latin culture, the culture of Latia, the district surrounding Rome, owed much to the Etruscans. Roman religion and ceremonials, the earliest temples, the religious calendar, the alphabet, the division of the people into patricians and plebs, (nobles and commoners) all stemmed from Etruria. But after the expulsion of the Tarquins Greek influence was predominant. Some of the Greek gods were introduced, and Greek became the language of the educated classes whilst Latin was for traders and common people.

The Early Romans.

The early history of Rome is legendary and need not be taken too seriously, but from the beginning her culture was derivative, the main sources being Greece and Etruria. The Romans were conservative, methodical, unimaginative, and, as some might say, dull; the foundation of their life was the family, and the obvious aim of their education was to perpetuate unchanged the traditional modes of life. It was a long time before they showed any intellectual or artistic leanings, since they were too preoccupied with conquest to give much time to anything else.

The Latin language may have been used in the early ballads and epics recited at the banquet table, in political oratory, and in the codification of the law, but there was no Latin literature until about the 3rd century B.C., and even then what was produced was mostly translated from the Greek. The early Romans had been tillers of the soil and were suspicious of "culture." In respect of architecture they were no less tardy, since if we take the foundation of Rome as 753 B.C. and pass from this event to the death of Augustus in A.D. 14 (the total period covered by many history books), important architecture only begins to make its appearance about the latter date. Prior to the expulsion of the kings in 509 B.C., Rome was a cluster of primitive huts with a few Etruscan-style temples, and if some more ambitious structures were erected under the Republic, nearly all of these have disappeared. "For all practical purposes," says Martin Briggs, "Roman architecture is confined to the buildings of Imperial Rome, and the first 700 years after the city's traditional foundation seem unimportant." Roman sculpture and painting came from Greek and primarily Hellenistic sources following the sack of Corinth in 146 B.C., although Etruscan influences must have played an earlier part.

Roman Architecture.

Before discussing specifically Roman types of building it is necessary to say something about Roman methods in architecture. The traditional view has been that, having developed the arch borrowed from the Etruscans into a structure which could play a really effective part in building, the Romans perversely proceeded to add to it for

purely decorative purposes the column and lintel forms which they had borrowed from the Greeks. But this, says Lethaby, is precisely the opposite of the truth; for in fact classical Greek styles had long been in use when the arch, vault, and dome were imported under Hellenistic influence. Roman architecture does not represent a native system of arched construction smothered over by a borrowed foreign style, but a development of Hellenistic art away from a more primitive form. When new structures of a type not previously in use were needed the arch was used; but generally speaking the classical style was retained in such buildings as temples and theatres for which it had become traditional. Thus the enormous Pont du Gard at Nîmes in Provence which carries an aqueduct across a valley is an example of the use of the arch on a colossal scale. It was erected in 19 B.C., but the temple known as the Maison Carré also at Nîmes and built in A.D. 14 is in classical style and differs from Greek models only in detail. The former was a new utilitarian structure, the latter a traditional one.

Whilst the Greek ideal had been the harmoniously proportioned building based on the restrained use of energy, the Romans were impressed by the gigantic and wasteful. The 2,500 separate figures on the column of Trajan illustrating his campaign in Dacia, the Colosseum with its 45,000 seats, and the great dome of the Pantheon tell their own story. But the building of huge unwieldy edifices and the roofing-in of large spaces without intermediate supports required a special technique, and this was provided for by the discovery of the use of concrete. Concrete is a combination of sand, gravel, and water mixed with a cementing material, and the Romans used *pozzolana* (volcanic ash) and volcanic stone with lime as the cement. By this means it became possible not only to make immense vaults and domes but also, by using concrete in the construction of walls, to erect a building which was all of one piece and gained in strength from having no weak joints. The heavy roof poses a serious problem for the architect in that its downward and outward thrust has to be taken into consideration if the whole structure is not to collapse. The Byzantine dome stood on four strong piers, the Roman on heavy circular walls, but the Gothic architects developed the flying buttress standing apart from the building itself and pressing inwards and upwards. In contrast to the Greek architects who, relatively speaking, neglected the interior of their buildings, the Roman architect tended towards impressive interiors whilst neglecting the outside. The Roman dome, as in the Pantheon, had no significance externally and its impressiveness is only apparent from the inside. Prior to the time of Augustus the main building materials were sun-dried brick or stone covered inside and out with stucco; afterwards marble was used for important buildings, kiln-dried brick for the humbler or more utilitarian ones.

The almost complete lack of buildings erected prior to the period of Augustus, although due in part to the ravages of time, is for the most part the result of demolitions carried out by a long line of Emperors who wished to replace them by more ambitious structures. The gigantic and costly edifices which took their place were made possible by the spending of the booty from many campaigns; they still make Rome one of the most impressive cities in the world.

Civic Buildings. The passion of the Roman architect for symmetry is nowhere seen more clearly than in the designing of a forum—the enclosed space in the centre of a town which combined the functions of market-place, meeting-place, ceremonial ground, and sports arena. This had as its focal point a temple which often had its back wall in direct contact with one wall of the enclosure, whilst in the centre of the square were colonnades, and round the other sides the *basilica* or public hall, and other public buildings. But the forum was only the central area of an ordered piece of town-planning where two wide streets met at right-angles with other streets of specified width crossing them at regular intervals. Public baths, theatres, and amphitheatres were found even in small towns and water supplies were lavishly arranged—Rome itself was supplied by no less than fourteen aqueducts with a total length of 265 miles, and many provincial towns were better supplied with water in Roman times than they are today. In fact, many Roman aqueducts are still in use as are the Roman roads which, crossing hills and valleys in a straight line, reveal the determination and engineering ability if not always the intelligence of those who built them. Equally elaborate and permanent were the drainage systems and sewers, notably the Cloaca Maxima, the main sewer of Rome. Yet for all this mechanical perfection and efficiency something is lacking in Roman architecture; it is, says Lethaby, the great Philistine style. Roman culture was often but a thin veneer that hardly concealed the natural coarseness and brutality of Roman manners, and as conquest succeeded conquest a great civilisation was gradually choked by its material advantages.

Temples. The Roman temple tended to retain more or less the same form right up to the times of the later Caesars—that is to say, it followed the Etruscan modification of the Greek temple as seen in the Maison Carée at Nîmes. This is on a raised platform or *podium* with a flight of steps at the front as the only means of access (Greek temples were accessible from all sides) and the side columns are half built into the walls. But other forms were in use, and some of the larger temples (*e.g.*, at Baalbek and Palmyra in Syria) have a peristyle of free-standing columns or even, as in the case of the Great Temple of Baalbek, a double peristyle.

The Pantheon.

The supreme achievement of the Romans in the constructional sphere was the Pantheon in Rome, a circular temple, and the only building extant in that city which preserves its original condition. It was erected by the Emperor Hadrian between the years A.D. 120 and 124 in honour of all the gods and is one of the architectural masterpieces of the world. The Pantheon is a rotunda or drum-shaped building 142 feet in diameter with no external decoration but a Greek-style entrance porch. The dome, 141 feet high, is built of bricks laid in horizontal corbelled courses for two-thirds of its height, the remaining third being in *voussoir* or arch fashion and the crown has a round opening for light 27 feet in diameter. The immense weight of this structure necessitated supporting walls 20 feet thick, a system of horizontal and vertical brick arches around the dome to counteract its outward thrust, and rows of deeply recessed panels inside to reduce its weight. Even this was not enough, and the external walls were continued upwards for a considerable height above the base of the dome. This gives the dome, impressive from within, a flat and saucer-like appearance from outside—a lesson which was not lost on Wren when many centuries later he solved the same problem in the case of St. Paul's by building two domes, the inner for its effect from within, the outer solely for its external appearance. Other, but smaller, circular temples are the Temple of Vesta at Rome, another of the same name at nearby Tivoli, and one at Baalbek. There is an octagonal temple at Spalato in Dalmatia.

Buildings for Recreation. The ability to roof in enormous spaces was of prime importance in the building of the great *thermae* or bathing establishments with their vast halls surrounded by smaller rooms for changing, games, and baths of all kinds. One of the largest, that of Diocletian (A.D. 302), has a central hall 200 feet long and 80 feet wide; it was converted into a church by Michelangelo in 1563. The Romans solved this problem by the invention of the groined vault formed by the intersection of two barrel vaults (the ordinary semicircular type) running at right-angles to each other. The groined vault was the predecessor of the later articulated Gothic one.

Other buildings designed primarily for entertainment were the theatres and amphitheatres—

the latter a peculiarly Roman structure used for the gladiatorial combats and wild beast fights which they had inherited from the Etruscans.

The Colosseum.

The largest of these was the Colosseum (A.D. 72–80). This enormous building is oval in plan with concentric rings of seats rising upwards; it contained seating space for 45,000 spectators and above the highest row was a colonnaded portico to provide standing-room for several thousands more. It is 206 yards long, 170 yards wide, and the external wall, 162 feet high, is built in four storeys, the first three consisting of round arches with columns in between, each of a different order of architecture. The first level is Tuscan (a modified and simplified Doric), the second Ionic, and the third Corinthian. The Emperor Titus added the fourth storey with its pilasters (*i.e.*, rectangular pillars half built into a wall) and alternating large and small windows.

From this it will be seen that the Roman usage in respect of columns differed from that of the Greeks in that (*a*) they had five orders in place of four, namely Tuscan, modified Ionic, modified Corinthian, and Composite which combined Ionic volutes with the Corinthian acanthus motif; (*b*) they mingled the orders in the same building; (*c*) they used columns in association with arches; and (*d*) they sometimes used columns for decorative reasons rather than structural ones. The Roman theatre was an advance on the Greek one, in which, as we have seen, the stage was separated from the auditorium, which was often simply a hillside. Built on flat ground, the high raised stage, decorated on the front with reliefs, formed a structural unit with the semicircular auditorium which was of the same height. Externally the appearance was similar to that of an amphitheatre.

Memorials. Greeks and Romans differed, too, in the type of buildings they erected to commemorate their famous men. The Greeks erected few, since they were wisely suspicious of heroes other than athletes, but the Romans built their triumphal arches, columns, and enormous tombs to perpetuate the memory of victorious generals or (in the case of the tombs along the Appian Way) that of wealthy families. The earlier arches, such as that of Titus in Rome (A.D. 81), had only one passage-way and little decoration, but the later ones—on which the "Marble Arch" of London is based—had three passage-ways and a profusion of reliefs and columns. These include the Arches of Severus and Constantine in Rome and one at Orange in France. Tombs were often extremely elaborate in design, some circular and others in the form of small temples.

The Basilica. The Basilica, a typically Roman structure, was an assembly hall serving the functions of a meeting-place, law-court, and covered market. In its earlier stages of development, it was simply a rectangular building divided within by two rows of columns into a central area and side aisles. One end was often semicircular with a dais where the leader of the meeting or the judge could officiate. The chief significance of the basilica is that it became the prototype for the early Christian churches of the western part of the Empire from the time of Constantine. In these the central area became the nave and the semicircular end the apse or choir where the altar took the place of the judge's seat. The nave would have a lofty timbered roof whilst the roofs of the side-aisles were low and often flat. The basilica church is the beginning of the Romanesque style and Romanesque churches of the early Middle Ages are sometimes difficult to distinguish from the basilica originals.

Painting and Sculpture.

Roman interest in sculpture derives from the sack of Corinth in 146 B.C. when Greek statues brought to Rome as booty quickly created a fashion and a flourishing business in copying masterpieces both in Rome and amongst the wily Athenians. These copies served a useful function in that it is mainly through them that we know anything of Greek sculpture, and of course, they played a part in inspiring the great artists of the Renaissance. But the creative Roman artist was thereby put at a disadvantage, being left with the alternatives of either going his own unrecognised way or following popular taste with imitations in Hellenistic style. The bad but fashionable artist flourished, with the result that, so far as sculpture and painting are concerned, Roman art is derivative and on the whole unremarkable. From this criticism we may exclude the portrait heads in which the Romans with their realistic approach excelled, and the reliefs of historical scenes such as those on the triumphal arches and Trajan's Column which are vivid and lifelike.

Wall paintings, of which almost the only examples extant are at Pompeii, are usually excellent copies of Hellenistic murals, but some depicting landscapes and buildings may be original Roman works. The latter are of interest in that landscape painting made its appearance relatively late in the history of art: for Mediterranean antiquity was founded on a concept of human values in which nature played only a subordinate part and the Hellenistic Greeks and the Romans were the first to break with this tradition, however tentative. Marine and rural scenes were also used in combination with geometrical patterns for mosaics on floors and walls of public or private buildings.

Latterly, Roman art came under Christian influence, especially from the time of Constantine, who in A.D. 313 officially recognised the religion. The general tendency (*e.g.*, in the paintings in the catacombs) was to concentrate on the spiritual and symbolic more than the dramatic or pictorial possibilities of a subject. Typical of later Roman sculpture is the attempt to engage the spectator, to "bring him into the picture." For example, a relief on the Arch of Constantine shows the Emperor making a speech with all the figures on the relief facing the spectator as if he were actually in the audience.

Much of the vulgarity of Roman art must be explained by the rise of a wealthy and untutored class such as inevitably occurs with the rapid development of a flourishing industrial and trading civilisation. This happened in Egypt of the Middle Kingdom, in the wealthy Hellenistic Empire, in Rome, and in 19th-century England. We may be sure that in all these periods the rich patron or buyer judged his acquisitions on the basis of "I know what I fancy" and that many mediocre artists were ready to satisfy this fancy whilst the creative artist was told that his works were incomprehensible. This split between popular taste and good (or informed) taste is the essence of vulgarity.

Roman Literature.

The Romans showed little interest in literature until about the 3rd century B.C. They had, of course, their old folklore and tales, but these played little part in their later literature, which was from the beginnings Greek. About 240 B.C. a Greek slave taken at the fall of Tarentum (Taranto) introduced Greek literature into Rome and translated the *Odyssey* into Latin. He assumed the name of Livius Andronicus and was the founder of the Roman comedy. We have seen how the comedies of the Greek Menander were imitated by the Roman comic dramatists Terence (d. 159 B.C.) and Plautus (d. 184 B.C.). Plautus wrote about twenty plays with the type of plot later to be imitated by Shakespeare, Molière, and the popular comedies of the Italian Renaissance—the Commedia dell'Arte. Typical is the story of his *Menaechmi* used by Shakespeare in his *Comedy of Errors* in which twin brothers, long separated, meet once more with resulting confusion.

After the end of the Punic Wars against Carthage (146 B.C.) Greek books were being widely read and the sons of the wealthy were often sent to Athens to be educated. This brought about a more sophisticated and eclectic outlook.

Last Era of the Republic: Cicero and Julius Caesar.

The first century B.C., the last era of the Republic, produced some of the greatest figures in Latin literature, such as Cicero and Julius Caesar, who excelled in prose. Cicero (106–43 B.C.) was famous as an orator in the senate, as a writer on political philosophy, and for his letters. Into the first category comes his *Orations against Catiline* and into the second his two books *On the State* and *On the Laws*. He was an inveterate writer of letters and these are perhaps the most interesting part of his work, giving as they do a vivid picture of life in Rome towards the end of the Republic. In the words of H. A. Davies: "With Cicero Latin reached its highest perfection both as a written and as a spoken language. It became the most perfect language of prose that the world has ever known. In profundity of thought Cicero was far inferior to the Greeks, but no one has ever excelled him as a master of language."

Perhaps the most familiar historian amongst Latin writers is Julius Caesar (100–44 B.C.), whose books on the Gallic War and the Civil War are commonly used as school texts, possibly because of Caesar's terse and simple style. His *De Bello Gallico* gives interesting accounts of the Celtic culture of Gaul and his own campaigns. But the impersonal manner in which it is written may cause some readers to lose enthusiasm for this important book.

Lucretius and Catullus, Masters of Poetry.

Lucretius (99–55 B.C.) expressed in hexameter verse the doctrines of Epicurus. His *De Rerum Natura* (On the Nature of the Universe) is, says Professor Grant, the supreme justification of Wordsworth's belief that "poetry is the impassioned expression which is in the countenance of all science." Beginning with an account of the atomic theory of Democritus, the creation of the world, and the beginnings of life, it goes on to deal with the early ages of man and civilisation. Its materialist approach made Lucretius' work unpopular in his own and mediaeval times, and even during the Renaissance when his style was praised his philosophy was not. But he was later to be admired by Hobbes, Voltaire, Leopardi, Shelley, Swinburne, and Matthew Arnold.

Catullus (87–57 B.C.) was the great writer of Latin love-lyrics which rival those of Burns and Heine in their ability to express intense moods. He used and adapted Greek metres and rhythms and thereby influenced later verse in Augustan times. There is none of the moralising in Catullus that one finds occasionally in Horace, of whom we shall speak later, nor does he, like Horace, indulge in patriotic odes or mannered poems on the virtues of country life. These differences are perhaps related to the times in which each lived. Catullus, "tenderest of Roman poets," as Tennyson described him, lived in a disintegrating society at the close of the Republic; he was, says R. G. C. Levens, an individualist clinging to the one standard he could feel secure, his personal integrity.

The Augustan Age: Virgil, Horace, and Ovid.

Probably no Latin, and very few other, poets have had the influence of Virgil (70–19 B.C.). His *Eclogues*, a series of ten pastoral poems inspired by Theocritus and set in a golden Arcadia, had an immense and immediate effect on Roman culture. The Fourth Eclogue prophesies the birth of a child who will bring to the world an age of peace and happiness, and from the time of Constantine right through the Middle Ages it was believed that the child was Christ and that in some respect Virgil was a forerunner of Christianity. He was regarded as the Prophet of the Gentiles, and it will be remembered that Virgil is Dante's guide in the *Divine Comedy*. It is, however, more likely that the child referred to was the infant Augustus. The *Georgics* are poems dealing with the realities of farm life in Italy and the beauties of the Italian countryside, but, of course, Virgil is best known as the writer of the *Aeneid*, perhaps the greatest of all epics after Homer's *Iliad* and *Odyssey*. The *Aeneid* tells the legendary story of the hero Aeneas, who, bringing his household gods from burning Troy, succeeds with their aid in founding Rome. Virgil goes on to tell how Rome is destined to rule the world—a sentiment which made him popular at a time when the Empire had just been founded and people were anxious to feel that the new Rome had a great future. The *Aeneid* exercised a tremendous effect both on Roman and mediaeval culture, and Virgil was regarded throughout these times as an almost superhuman sage, a supreme model for the poet, and a spiritual leader. It is misleading to compare Virgil's work with that of Homer, belonging as he did to a society utterly remote from Homer's; the *Aeneid* owes a great deal to the Hellenistic epic of Apollonius of Alexandria and to earlier Roman epics.

Horace (65–8 B.C.), son of a Greek freedman, is best known as a lyric poet. His *Satires*, which appeared about 30 B.C., were witty and effectual. Horace fought on the Republican side at Philippi, but being pardoned lived to become poet laureate to Augustus. He therefore wrote poems in accord with his position, some of which at a much later date were approved of by Frederick the Great and Louis IV as encouraging quietism under autocratic rule. Nevertheless, Horace, if less passionate than Catullus, is one of the greatest of poets.

Virgil's younger contemporary Ovid was born in central Italy in 43 B.C. and died in exile at Constanta on the Black Sea where he had been sent by Augustus for "a poem and a mistake." He was witty, a wonderful teller of tales, and, lacking any serious principles, differed both from the high-principled Virgil and the practical Horace, who knew on which side his bread was buttered so far as the Emperor was concerned. Ovid wrote many works, some of which have been lost, but amongst his extant elegiac poems are the *Amores, Heroides, On Cosmetics, The Art of Love*, and *The Cure of Love*. However, his greatest work is the *Metamorphoses*, a collection of classical tales in verse taken from Greek mythology which were later utilised by Chaucer and Boccaccio and inspired the painters of the Renaissance. The ideal of romantic love found in Ovid by the troubadours and minnesingers (although one may wonder where) influenced mediaeval notions of chivalry, and later Tasso, Shakespeare, Spenser, Keats and Goethe. Ovid is one of the main sources of classical mythology, but being a sceptic in regard to all religions, his stories of the gods were used only as material for his peerless art.

The Stoic Juvenal (d. A.D. 135), later in time, wrote passionate satire, but tended to spoil his own case by the savagery of his attacks, which spared nobody. Martial (d. c. A.D. 104) was a Spaniard who came to live in Rome in A.D. 64. His epigrams (in fifteen books) are characterised by the sting in the last line of the verse, and this form, in the shape of the lampoon, was popular in Renaissance Italy.

Historians and Biographers: Livy, Tacitus, and Suetonius.

Livy, who died in A.D. 17, wrote his *History of Rome from the Founding of the City* in 142 volumes, of which only a quarter now exist. His style has none of the brevity and simplicity of Caesar's, and his manner of presentation is often far from factual since, as an admirer of the Republic, he was not above accepting legends which a little investigation would have shown to be untrue. His works are important, however, as dealing with some of the significant periods in Roman history.

Tacitus (A.D. 55–120) in his *Annals* did for the early years of the Empire what Livy did for the Republic, and, like Livy, he tended to be more concerned with individual figures than with history. Tacitus was a son-in-law of Agricola, the Roman Consul of Britain, and his life of the Consul is one of the finest classical biographies. His *Germania* gives an account of the tribes in Germany and their way of life.

Suetonius (d. A.D. 150) was secretary to the Emperor Hadrian, and his *Lives of the Twelve Caesars* recounts gossip relating to the Caesars from Julius to Domitian. Perhaps for this reason it is still immensely popular and read by many who would regard Caesar, Livy, and Tacitus as bores. Suetonius has frequently been regarded as a sensationalist with a dubious concern for the truth, but the recent tendency has been to accept him as, on the whole, reliable. In any case his position as imperial archivist must have given him opportunities not open to others to examine primary material.

At heart the Romans were puritans, and when great wealth made the ruling classes increasingly corrupt and vulgar they became an obvious target for the satirists. These, particularly towards the end of the 1st century A.D., belonged for the most part to the rising middle classes who disliked militarism and the rule of money.

Prose Writers: Petronius, Apuleius, and Others.

Two of the greatest works from the Empire, both works of prose, are the *Satyricon* of Petronius and the *Golden Ass* of Apuleius. The identity of Petronius is not known for certain, but it is possible that he was a favourite of Nero's who on falling out of approval committed suicide in A.D. 65. Essentially a picaresque novel in Rabelaisian style, the *Satyricon* has been compared with Rabelais himself and with Fielding and Smollett. In our own day Cyril Connolly has placed Petronius with Tacitus as two of the Latin prose-authors who have a message for modern writers. Some poems by Petronius anticipate the mediaeval Latin lyric.

Apuleius, born in Algeria about A.D. 123, was a devotee of Isis and his *Golden Ass*, says Professor Michael Grant, is "the supreme efflorescence of the ancient prose-romance—'last child of the Greek genius'—and the only Latin novel that has come down to us complete." (Petronius' *Satyricon* is incomplete.) It delighted the people of the Renaissance, greatly appealed to the Elizabethans, inspired Raphael, and in some measure its style anticipated mediaeval Latin prose.

Other writers on various subjects whose works have (sometimes unaccountably) influenced later generations were Seneca, Quintilian, Pliny, and Vitruvius. Seneca, the hypocritical Spaniard, died in Rome in A.D. 65. He was tutor to Nero, and on the basis of his Stoic philosophy wrote moral essays on anger, on the brevity of life, and on clemency. He also wrote plays in the style of Euripides which appear to have had some influence on the Italian dramatists of the Renaissance and the French drama in the time of Louis IV. In his last days he plotted against Nero and was ordered to commit suicide, which he duly did. Quintilian's *Institutes of Oratory* influenced the views of educationists for many generations, and the *De Architectura* of Vitruvius, who lived in the 1st century B.C., was for long the leading text-book on architecture. Pliny the Elder's *Natural History* dealt with all the sciences and included for good measure gardening, medicine, and the fine arts; the book was highly thought of, not only by the Romans, but throughout the Middle Ages, although its contents are little but the ill-digested and uncritically accepted nonsense resulting from too many hours spent in reading. His nephew, Pliny the Younger, who died about A.D. 114, wrote a large number of letters in excellent prose describing life under the Empire as Cicero's did under the Republic.

Influence of Greece. So powerful was the influence of Greece that many Roman writers did not even write in Latin. Marcus Aurelius (d. A.D. 180), the Stoic emperor, wrote his Meditations in Greek, and Galen his physician used Greek for his great medical treatises. Plutarch (d. A.D. 120) after living twenty-five years in Rome, knew little Latin and his parallel *Lives*, a collection of biographies of twenty-three Roman and twenty-three Greek notables (used by Shakespeare for much of his material), was in Greek. *See* M12.

Early Latin Christian Literature. Early Christian works written in Latin include the *Confessions* and *The City of God* of St. Augustine (A.D. 354–430), the works of Tertullian (A.D. 160–225), and the Latin translation of the Bible completed by St. Jerome in A.D. 405 and known as the Vulgate. St. Augustine's works may be justly claimed to have influenced the world, and in the secular sphere his *Confessions* brought into existence a new type of autobiography copied much later by Rousseau. The rude and fanatical Tertullian can be of little interest save to theologians. Many of the Church Fathers belonged to North Africa, the source of by far the greater part of Latin Christian literature.

BYZANTINE ART.

Byzantine art developed in the eastern part of the Roman Empire after Constantine founded the city of Constantinople in A.D. 330 on the site of old Byzantium, now modern Istanbul. But even while there was one ruler in the East and another in the West (Milan and Ravenna), the Roman Empire was basically united until A.D. 476 when the West fell to the northern barbarians. From this time the Byzantine Empire, (which then included Greece, the Balkans, Asia Minor to the Euphrates, Syria, and Egypt), became and remained until 1453 the haven and protector of European civilisation against Slavs, nomads from the steppes of Asia, and the Arabs. In the 7th century Egypt, Syria, and Mesopotamia were lost to the Arabs; in 1204 the Crusaders captured Constantinople; and when it finally fell to the Turks in 1453 the former Empire was a mere strip of land around the capital. But it was perhaps the Crusaders who finally destroyed Byzantium; for after their onslaught it retained only a shadow of its former greatness.

Byzantine art had many sources, the strongest being Greek, Syrian, Egyptian, and Islamic. It was cosmopolitan and accepted many traditions, including pagan ones. ("We need a Christian and a pagan schooling: from the one we gain profit for the soul, from the other we learn the witchery of words," wrote Choricius.) But it was above all, Christian. To the mediaeval peoples of Europe prior to the 11th century, Byzantium played a part analogous to that played by Athens and Rome in classical antiquity. Her art was one of incredible luxury and fantastic splendour, yet Gibbon could claim in his *Decline and Fall of the Roman Empire* that "Byzantium was one of the most wretched and gloomy states that man has ever established."

Byzantine Architecture.

Constantinople, built on a peninsula, was protected on the west by a great wall built by Theodosius II (408–50) to replace the earlier one built by Constantine. Elsewhere it was surrounded by sea. The wall with its great round and square towers, although disintegrating, can still be seen with the Golden Gate and the Castle of the Seven Towers at the extreme southerly end. It was through this great white marble gateway that the Emperors made their official entries into the captial. Towards the eastern end of the peninsula were the large Forum Augustaeum with its Golden Milestone from which all the roads of the Empire started, the Imperial Palace, the Palace of the Patriarch, the Hippodrome or race-course, the Church of Sta. Sophia, together with baths, libraries, the Senate-house, and many other buildings. Beneath the city were the immense underground cisterns and defence works which, after the churches, were the most important achievements of Byzantine architecture. The cisterns, vaulted and domed with roofs supported by huge ornate columns, were designed to maintain water supplies during a siege. Some are still in use today.

Churches: the Cathedral of Santa Sophia. The greatest glory of Byzantine architecture is the great Cathedral of Santa Sophia—"One of the

great things of all time" as Lethaby described it. Built by the Emperor Justinian (483—565), it has a dome almost as large as that of the Pantheon, but unlike the Roman dome with its circular supporting walls, the Byzantine dome was placed on a square sub-structure consisting of four piers which support four arches. The central area is over 100 feet square, but is increased to the east and west by great hemicycles which double its length to more than 200 feet. (The custom, derived from temple architecture, of planning churches on an east-to-west axis was generally accepted.) The piers are 25 feet square, the dome 46 feet deep with its centre 179 feet above the floor, and the two hemicycles are roofed in by semidomes which meet the walls just beneath the central one. Still lower smaller domes of various sizes "heave up above one another like a cluster of bubbles." The hemicycles break off into smaller apses, and the central area has great aisles supporting galleries along each side.

Although Santa Sophia is enormous, Byzantine churches are ordinarily small. Amongst these are the churches of SS. Sergius and Bacchus (527) and of Sta. Irene (740) in Constantinople, S. Vitale at Ravenna, and the much later and larger St. Mark's at Venice (1042–71). St. Mark's, however, has been so overlaid by later additions that its exterior is almost wholly changed.

The Dome.

The Byzantine innovation in architecture was to evolve, from the wooden-roofed basilica, the domed and vaulted church, the prototypes of which were the Pantheon and the vaulted imperial baths. The plan was ordinarily cruciform with the dome placed above the central crossing, and the east end was rounded to form a single apse or more often three. Church interiors were lavishly decorated; the lower part of the walls with variegated panels of marble, the upper parts with mosaics and murals designed to illustrate the Scriptures. Columns were essentially eastern in character deriving from modifications of Hellenistic patterns, and although the Byzantian dome must have been influenced by Roman models, its perfecting in the new style owes much to Christian Egypt and Syria.

The Byzantine domed church spread as far west as the south of France (*e.g.*, the cathedral at Périgueux (1120), which has some resemblance to St. Mark's), and eastwards throughout the Moslem world as in the 7th-century Mosque of Omar in Jerusalem. It spread to the other lands—Persia, Egypt, North Africa, and parts of India—which came under the conquering forces of Islam, and there, of course, it was used in mosques and shrines and underwent modifications. Northwards it spread to Russia, where the oldest surviving church built at Kiev in A.D. 1000 is a copy of a Byzantine original. The same style has been followed ever since in southern Russia, and although different conditions further north necessitated considerable changes, it was Russia which became heir to the Byzantine way of life.

Painting, Mosaics, and Decorative Arts.

Byzantine art was utterly unlike anything that had gone before. The new style was well-developed by the 4th century, developing gradually during the reigns of Constantine and Theodosius the Great towards the great upsurge of the First Golden Age under Justinian in the 6th century. This continued throughout the following century, but received a setback during the next when the emperor decreed that painted or sculptured images of God, Christ, the Virgin, or the saints were to be forbidden. This was the Iconoclast controversy in which emperor, army, civil servants, and some bishops were violently opposed by the monasteries and European Greece. The worshippers of images triumphed, and in 843 the decree was lifted. It is usually stated that the lack of statues in Eastern churches was the result of this struggle, but according to Baynes there is no satisfactory evidence that statues were so used even before the controversy. However this may be, the lifting of the decree was followed by a Second Golden Age when Byzantium was at the height of her power and produced much of her greatest art; this period was terminated by the armies of the Fourth Crusade in 1204. From 1204 until the final downfall in 1453 the impoverished and diminishing Empire still produced great works, notably in such inexpensive fields as painting.

Painting. The art is an extraordinary mixture of the spiritual and the sensuous. It is essentially two-dimensional and never attained to any skill in representing figures in the round; it is passionately emotional in its use of colour, which is not used for purely decorative or descriptive purposes as in Egypt, Crete, or Greece, but rather to excite the observer. The artist was anonymous, his art was based on tradition, and he was kept within the tradition by strict rules which prescribed even the most minute details of how figures were to be represented. This was an art limited by religious orthodoxy, showing no interest in nature, but on the other hand unaffected by the power and prestige motifs of Egypt, Mesopotamia, and Rome. Paintings were on walls, icons, and illuminated manuscripts, all in much the same style and often by the same artist.

Icons.

Icons are religious paintings designed for devotional use either by the individual or in church rituals. In size they range from the very small to large ones in two or three panels on church screens dividing the nave from the chancel (these are known as diptych and triptych respectively). The icon style of painting derives from the tomb paintings of Hellenistic and Roman Egypt, where it had become the custom to leave a portrait of the dead over the mummy's face. Icons of the earlier periods are rare, those of the 6th century probably having been destroyed and those of the 9th–12th centuries mostly removed to Russia. They were essentially simple and the subject was ordinarily the Virgin and Child, or the Virgin, Christ, and John the Baptist. From the 13th century icons were more complex, dealing with New Testament scenes or scenes from the lives of the saints, and by this time schools of painting, each with their own style, were arising in other countries, including Russia, which accepted the Eastern Church. The 16th-century icons begin to show Italian influence just as Italian painting was influenced by Byzantine. Most icons were painted on wood, but mosaic was sometimes used, and some icons were of metal.

Interior Decoration. Like the Romans, the Byzantine architect was more concerned with interiors than the external aspects of a building—they "built from the inside outwards." Many of their churches had no significance until one entered them and the walls were so much blank space until they could be filled with paintings and mosaic. One of the earliest important works of Christian art is the burial chapel of Galla Placidia, sister of the Emperor Honorius, built at Ravenna in the 4th century. The mausoleum is the size of a small cottage, and the sacred figures on the walls bear little resemblance to the conventional ones which later became familiar to the West. The saints look like Roman philosophers and Christ is represented without a beard as a placid shepherd. Yet, says Eric Newton, "to enter the brick shell and to find oneself in an unearthly gloom encrusted with blue and silver and gold mosaics is to be taken at a leap right across the Greek peninsula into an atmosphere that only a semi-oriental vision could have conceived." The nearby church of S. Vitale built by Justinian a century later shows in its mosaics a movement away from Roman models towards increasing symbolism of the new type and what Newton describes as an orchestral use of colour. Roman realism had never got beyond the use of old pagan symbols in which figures of Apollo or Orpheus were labelled Christ and the disciples resembled Roman senators, but Byzantium created something new. S. Vitale, with its mosaics of Justinian and his

ex-actress wife Theodora, so impressed Charlemagne that he had a replica built at Aix-la-Chapelle.

Mosaics.

The Byzantine use of mosaic was novel in several respects. The Romans had used it to fill in spaces where paint was unsuitable; they had used it in a manner which was essentially that of the painter; and they had used it in small amounts and particularly on floors as a mere decoration. Byzantine art used it as a medium for visual symbolism on a gigantic scale and with a technique specifically intended for a medium which is naturally rigid and inflexible and not at all like paint. These Mosaics are impressive almost regardless of the quality of their detail because of the cumulative effect of their profusion. Mosaic, said William Morris, is like beer—it is no good unless you have a lot of it. Much of Byzantine art must remain beyond our experience unless we are indefatigable travellers, since it is meaningless in bits and pieces removed from their total background. However, some of the best examples, other than those already mentioned, are to be seen at St. Agnese and St. Prassede in Rome, Daphni near Athens, Cefalu and Monreale in Sicily, and St. Mark's in Venice. These range in time (in the order given) from the 7th to the 13th and 14th centuries.

Other Decorative Arts.

Byzantine illuminated manuscripts provide further proof of their painters' skill and do not differ essentially in style from the paintings on walls or icons. Books were lavishly bound in carved wood or ivory, in metal decorated with precious stones, in leather, or cloisonné enamel. The latter technique was particularly well developed in Byzantium and the excellence of the results even in the smallest of objects is all the more remarkable in view of the process which involves an outlining of a design in fine gold wire set in a gold base with the intervening spaces or cloisons filled in with coloured vitreous pastes which are then fired. Ivory carving for smaller objects and metal-work for objects as varied as enormous church doors, crosses, and icons of all sizes were specially suited to the Byzantine genius, as also was their remarkable skill in textiles for which they were famed. Indeed, one of the most important industries was the production of silk and the making of vestments and brocades for the clergy and officials, tapestries and other decorative materials. Originally silk had been imported from China by way of Turkestan and Persia, but according to tradition wandering monks smuggled silkworm eggs into the Empire within their canes and thus began a flourishing industry which accounted in no small degree for the prosperity of Byzantium. Designs were woven or embroidered and took the form of stylised animals or plants or geometrical figures. Ceramics, glassware, seals, and even coinage all show the aesthetic sensibility of their creators.

Byzantine Literature.

Byzantium was a highly literate society and left many important works of theology, history, and poetry. The language used was classical Greek, and Latin slowly died out after the reign of Justinian. But very little of this considerable literature, which tended towards the archaic and artificial, is of interest to the general reader. Perhaps the main Byzantine contribution in this field was the preservation of the great literature of classical times and the detailed accounts left by historians of their own age.

Three contemporary historians documented the reign of Justinian—Procopius, Agathias, and Menander Protector. *The Wars* of Procopius is the main source of information on the Emperor's wars to restore the Empire to its previous frontiers, and *The Buildings* gives an account of Justinian's public buildings. Agathias was also a poet who collected a number of "the more modern and recently composed epigrams" (here the word simply means a short poem) as Meleager had done some six hundred years earlier. These and other collections were brought together in the 10th century by Cephalas and form what is now known as *The Greek Anthology*. One of the last Latin epics was the *Johannid* of Corippus, which recounts the distasteful events of the Emperor Justinian's war in Libya which decimated the population. In the 10th century Suidas produced a dictionary which includes many quotations from writers now lost. Michael Psellus (d. 1078) was a Platonist who wrote on wide range of subjects.

PERSIAN AND ISLAMIC ART.

Persia became a powerful Empire under Cyrus the Great (550 B.C.) and his successors Darius and Xerxes, as the ruins of the great cities Persepolis and Susa reveal. At Persepolis the royal palace was approached by a flight of over a hundred steps leading to the gateway of winged bulls with human heads, the entrance to the columned halls within. The stone reliefs of tribute bearers to the king which adorn the great stairway and the famous frieze of archers from the palace of Darius I at Susa (now at the Louvre) are typical of the art of the period, which was under the influence of the defeated Assyrians. In 330 B.C. Persepolis was sacked and burnt by Alexander the Great and his conquest brought in Greek forms. Little was heard of the Persians until A.D. 224 when a new ruler seized power and became first of the powerful Sassanid line. Amongst the buildings of this period is the palace of Ctesiphon, which is remarkable in that two rectangular blocks with decorated façades are joined together by an enormous vaulted arch open to the front, where the king held public audiences. Also typical are the stucco carvings and the large rock carvings commemorating events in the king's life; vessels of gold, silver, and bronze show excellent workmanship.

The Moslem Era: Merging of Islamic and Persian Cultures.

In the 7th century (622) the prophet Mohammed welded the polytheistic nomads of Arabia into a single military force accepting one god. In little more than a century Islam had invaded Persia, the near East, North Africa, and most of Spain, leaving Byzantium with the Balkan peninsula and part of Asia Minor.

These fanatical warriors had no skill in art and therefore had to rely on native craftsmen to satisfy their needs. Both Pagan and Christian buildings were looted and some of the first examples of Islamic architecture were given colonnades of pillars removed from widely divergent sources, some of which had to be raised to the necessary height on added bases. The early mosques were designed by Byzantine and other architects, and the Dome of the Rock in Jerusalem (691), the Great Mosque in Damascus, and the Aksa Mosque, also in Jerusalem, are Byzantine in style. When the Crusaders arrived in Jerusalem they took the Dome of the Rock to be the original temple of Solomon, and under this delusion an essentially Byzantine building was copied all over Europe. The Arabs also passed on to western Europe the pointed, as contrasted with the rounded, arch which two centuries later was to become the characteristic feature of Gothic architecture.

Islamic culture had many sources and showed different local characteristics based on pre-existing native art forms. It borrowed the aisled sanctuary from the Roman basilica, the minaret from the bell-towers of Syria, the stucco carvings, vaulting, and the pointed arch from Persia. When, in the 9th century, the unity of Islam began to break down, even more distinctive local styles began to appear. Tenth century Egypt had an art of its own, Spain evolved a style known as Moorish which later spread to North Africa, and in India under the Moguls of the 16th century

Hindu and Persian influences mingled with Islamic to produce the characteristic Mogul art of which the Taj Mahal built by Shah Jehan is the best-known architectural example.

Persian Renaissance.

Art in Persia flourished under Moslem rule, although the Persians, who were Zoroastrians and non-semitic, never took kindly to the imposition of Islam and always remained somewhat unorthodox. From the 10th century Persia was by degrees occupied by groups of Turkish tribes, and one dynasty, the Seljuks, conquered the country in the 11th century, embraced Islam and introduced new forms in architecture, such as the tomb tower roughly cylindrical in shape and made of bricks arranged in decorative patterns, the cruciform mosque in which each side of the court has a vast niche based on that of the vaulted hall of Ctesiphon, and the square mausoleum with a door in the centre of each side and a domed roof. The Seljuks were masters in such media as silk, metals, and pottery, which was sometimes decorated with miniature scenes. Arabesques in colour or low relief with flowing lines, and patterns of flowers, leaves, branches, animals, and scroll-work fancifully intertwined were common as decorations. Further stimuli were given to Persian art by the Mongol invasion (1220) under Jenghiz Khan and under the dynasty established by Tamerlane (*c.* 1385–*c.* 1500). Persian work in miniatures was becoming increasingly important and many fine mosques were built, notably in Afghanistan and at Samarkhand and Bokhara in what is now Russian Turkestan. The 15th-century mosques were particularly splendid, being cruciform in shape with two-storeyed arcades between the arches decorated with mosaics of coloured tiles which covered the walls and domes. Persian illuminated manuscripts and miniatures of this period are exemplified by the work of the great painter Bihzad, whose illustrations to the poems of Nizami may be seen in the British Museum.

But perhaps the greatest period of Persian art came just before the close. Persia had become the melting-pot of many races, the clearing-house for the art of the whole eastern world, the teacher of Byzantium and Islam and indirectly western Europe. During the 16th and 17th centuries all the arts flourished, particularly under the great native ruler Shah Abbas, who redesigned the city of Isfahan. Pottery, carpet-making, painting, and the illumination of manuscripts in designs which latterly were influenced by China reached their highest level. Isfahan was sacked by the Afghans in 1722 and the old culture declined steadily from its former glory.

Persian art delights with its exquisite sense of beauty and its very un-Oriental sense of humour. The artist was a master in the use of colour, and art was used as a medium for bringing joy into every aspect of life, which was itself regarded as an aesthetic experience. A suitable epitaph for the Persia that is gone might well be that of Tacitus for the dead Petronius: "Most men toil for it, but this man loitered into fame. Never the glutton or the profligate—he was the scholar rather, the artist of exquisite living."

Islamic Art Elsewhere.

The religion of Islam is basically puritanical and the Arabs themselves were not an artistic people. What is described as Islamic art is more correctly regarded as the art of widely different peoples adapted to the new religion—an old form poured into a new mould. Arab puritanism refused to permit any representation of living beings, animal or human, a refusal which severely limited the scope of the artist, whose art had to be wholly confined to decoration and never showed the marvellous variety found in other cultures. Everywhere one finds designs of the greatest intricacy; walls, arches, doorways, books, objects in metal, pottery, glass or leather, textiles and carpets are decorated with interlacing lines, leaves, branches, texts from the Koran, and sometimes stylised non-realistic animal figures. These arabesques originated with Moslem artists of 10th-century Egypt. But sculpture, apart from decorative reliefs, did not exist, nor did large-scale painting, although miniature painting flourished in Persia. Another type of design was the purely geometrical one of repetitive many-pointed stars or octagonal shapes often seen in pierced window grilles or in the mosaic work of fountain basins some of which are extraordinarily beautiful .

Some time after the Prophet's death there were quarrels between rival sects as to the succession. For some time the Caliph ruled from Damascus, but during the 8th century the Caliphate shifted to Baghdad. In the following century Spain established a Caliphate of its own. Although the civilisation of Islam is often said to have been superior to that of the West at the same time, this statement can only be accepted with reservations. Certainly the Moors of mediaeval Spain were superior culturally to the Christians of Europe, and Baghdad was the centre of a sophisticated civilisation, as were to a lesser degree Cairo and Damascus, but the great masses of North Africa and Arabia remained unchanged.

Architecture: the Mosque.

The most important form of Islamic architecture is the mosque. The bare essentials of a mosque are a space within which the faithful may pray and some feature to indicate the direction of Mecca towards which they must face. The first "mosque" was the court of Mohammed's house in Medina, but with the spread of Islam it became necessary to build new structures, which, however, remained simple, being rectangular walled spaces with overhanging palm leaves and branches on the wall facing Mecca. These protected the worshippers from the sun. More complex but still simple mosques were built in Syria on the plan of the basilica with a vaulted roof, side aisles formed by columns, and niches or mihrabs for prayer on the appropriate side. Another early mosque is the one at Damascus built in 708; here the paved rectangular court is surrounded on three sides by a covered portico. On the remaining side is an area surmounted by a dome and divided into three aisles with the prayer niche at the end of the nave and a pulpit led up to by steps to the right of the niche. At the opposite end of the courtyard is the minaret. This plan is one of the commonest in mosque-building, and here again the prototype was the aisled basilica. The Dome of the Rock (691) in Jerusalem is octagonal in shape, with a large dome resting on an inner circle of columns and arches; this is fundamentally the plan of S. Vitale in Ravenna, and the older Aksa mosque of Jerusalem is built in Roman style. Another Byzantine type of mosque was built by the Ottoman Turks in the form of a large square structure covered with a great dome—an example is the Suleiman Mosque in Istanbul.

The cruciform mosques of Persia have already been mentioned, and Persian (Sassanian) influence is also seen in the great arcades of pointed arches and the pointed windows of the outer walls of mosques in Cairo and elsewhere. A notable example is the large mosque of Ibn Tulun built in 876–79 at Cairo—that is, during the reign of King Alfred in England—which anticipates Gothic architecture in some of its features by several centuries. One of the finest buildings in Cairo is the Al-Azhar Mosque and University (970), but there are many others in this city. (Egypt shared too with Persia in the production of unorthodox bronze sculptures of animals which often have their surfaces covered with arabesques and writings.)

Moorish Art.

Spain was conquered by the Moors in 711, and this culture is important for the influence it had on Christian Europe. France, Germany, and other countries were stimulated by the intellectual and artistic life centred in such cities as Granada, Toledo, Seville, and the capital Córdova. In Toledo and Córdova especially, the learning of the East, compounded of Persian, Indian, Greco-

Roman, and specifically Arab elements, was passed to Christian scholars from the 12th century onwards. Weaving of brocades and carpets and leatherwork were carried to great perfection in Córdova; damascene art originating in Damascus was used in Toledo particularly in the ornamentation of sword-blades with inlaid designs of gold and silver. Other minor arts were the making of jewellery and of articles in gold, silver, and brass, the carving of ivory, and pottery sometimes decorated in gold lustre.

The 9th-century Great Mosque of Córdova, perhaps the best example of Islamic architecture in the West, is based on the plan of the Great Mosque in Damascus. Used as a Christian cathedral since the 13th century, it has a sanctuary with nineteen naves supported by many pillars and arches in the horse-shoe and cusped forms typical of Moorish architecture. Similar but smaller mosques are found in North Africa, which was also under Moorish influence. Many of these have distinctive square minaret towers decorated with blind arches or arcades, windows, and carved panels and a lantern at the top.

The Alcazar of Seville and the better-known palace of the Alhambra at Granada, both built about the 13th century, are famed for the beauty of their columned courtyards, arcades, and fountains.

Islamic Literature.

As with the other arts, only a small proportion of Islamic literature is actually the work of Arabs or even written in Arabic. An immense amount of work was done by Arab scholars, particularly in Baghdad and Córdova, in translating scientific and philosophical manuscripts from the Greek and Latin originals, but, apart from the Koran, almost the only poetic or fictional works known to readers in the West are Persian.

On the whole, the Arabs were not interested in Greek or Latin literature outside the fields of science and philosophy, but it was the translations of these works and the original work of such Arab writers as Rhazes (d. 923) and Avicenna (d. 1037) in medicine, Averroës (d. 1198) in philosophy, that brought a new stimulus to learning in Christian Europe. Indeed, in this respect Islam was a far more potent force than Byzantium.

Much of the Persian output was poetry, and the *Rubáiyát* of Omar Khayyám is known throughout the world. Omar, who died in 1123, is more highly regarded by the Persians as an astronomer and mathematician, the great poets being Firdawsi (d. 1020), who wrote historical poems, and Hafiz (d. 1389), the Persian Catullus. Perhaps Omar and Hafiz appeal to readers unacquainted with Persia because they deal with the fundamental realities of love and death rather than the history, ancient legend, and effusive flattery of nonentities found in the writings of technically better poets. Another masterpiece of world literature is the *Arabian Nights*, a collection of tales drawn from Indian, Persian, Egyptian, and other sources. The setting is Baghdad at the height of its power, and Sindbad, Ali Baba, and Aladdin are characters known to everyone.

MEDIAEVAL ART.

I. THE DARK AGES.

The Middle Ages may be taken to be the period between the fall of the Western Roman Empire in A.D. 476 and the fall of Byzantium in 1453. The earlier part between A.D. 500 and 1000 is sometimes known as the Dark Ages. It was a time of disorganisation and movements of peoples when the administrative structure of the Empire had broken down, and Europe was pillaged by Goths, Vandals, Vikings, and Danes. Learning, even mere literacy, was confined for the most part to monasteries and convents, and art showed no one style but a conflict between several which began to resolve itself only towards the end of the period. Byzantium and Italy preserved their old links with the classical past, Spain was under the influence of the Moors, and northern Europe, including the British Isles, returned to an earlier peasant art style. But in the end the main deciding factors were the return by way of Italy of the classical and Christian tradition through the energy of such men as St. Benedict (480–557) and the Celtic tradition of the peoples from the west and north.

The extraordinary thing was that the relatively primitive Celts played as large a part in the return to a civilised life as did the Italians. They produced a distinctive Christian art which, with the austere religion of their Church, passed by way of Iona and Northumbria (northern England and southern Scotland) to the continent, where St. Columbanus (d. 597) founded the great monasteries of St. Gallen, Reichenau, Luxeuil, and Bobbio from which the pagans of the Rhine valley were Christianised.

Celtic Art: Clash of Two Traditions.

Celtic Art had developed from that of the iron-age Celts. It was essentially a decorative art of purely abstract designs applied to small objects in everyday use such as household utensils, weapons, bridles, and so on.

The invading Vikings, too, were excellent craftsmen in wood and metal, which they ornamented with complex patterns of dragons, birds, or serpents endlessly intertwined. The dragon in particular had the magical function of frightening off evil spirits and hence appeared on the figureheads of ships and on sledges. These art forms come within Herbert Read's definition of "peasant art" and show its four basic characteristics: the decorated objects are utilitarian, the designs are abstract, they are unchanging over many centuries and they show an extraordinary universality. Thus, the wood carvings of the Norsemen are similar to those of the New Zealand Maoris and a piece of 18th-century pottery from Somerset may be almost indistinguishable from pottery made in 10th-century China. This art came under the influence of Christianity and the East, in part due to contact with the Roman Church in Northumbria (when Byzantine motifs were introduced) but at an earlier date by way of the Scottish St. Ninian and others (who brought from the continent Egyptian forms of worship, Egyptian texts and art through contacts with St. Martin and, indirectly, St. Hilary). The monks of Celtic Ireland and Northumbria, using their own idiom and that of the Norsemen, produced a new religious art with results which are best seen in their illuminated manuscripts and monumental stone carvings.

The Lindisfarne Gospel made in Northumbria about 700 and now in the British Museum is one of the best examples of manuscript painting; here, for example, we see the cross on one page built up of an amazing network of intertwining dragons set against a background of even more complex patterns. Human figures, too, are treated in the same abstract manner, the body becoming a mere excuse for pattern-making in which folds in the robes appear as twisted ribbons and the face is an expressionless mask with hair and even ears treated as scrolls. The Irish Book of Kells, dating from about the same time, is similarly decorated, and identical patterns are found on the stone crosses still standing in Ireland, northern England, and southern Scotland, which are amongst the earliest examples of monumental carving in Europe. Some combine the wholly abstract Celtic designs with the new eastern and Christian symbols: "in a prickly nest of geometrical lines, two birds of paradise will settle, carrying in their beaks a bunch of Eastern grapes. David comes with his harp, and the three children in the furnace; Adam and Eve, and the sacrifice of Isaac, are represented in panels reserved among the bands of abstract ornament; and finally the stone is dominated by Christ in Glory and the company of angels." So one cross is described by Herbert Read, who adds: "no monuments in the world are so moving in their implications; they symbolise ten thousand years of human history, and represent that history at its spiritual extremes nearest and farthest from the mercy of God." It

was this clash of two traditions, the eastern and the peasant, that changed art in Western Europe. Fine crosses can be seen at Otley in Yorkshire, Ruthwell in Dumfriesshire, Abercorn in Midlothian, Sandbach in Cheshire, Irton in Lancashire and Eyam, Bakewell, and Bradbourne in Derbyshire.

Architecture.

The monastries of the early Celtic Church were simple and often little more than a cluster of stone bee-hive huts, an oratory, and a stone cross. Elsewhere in England and Western Europe buildings were more elaborate, but little remains of them today. By the time of Charlemagne (768–814) Frankish rule extended from France to Holland, Belgium, western Germany, Austria, Bavaria, Switzerland, and northern Italy, yet in this whole area only two important buildings are older than the 11th century: the Cathedral at Aix-la-Chapelle (Aachen), copied by Charlemagne from S. Vitale in Ravenna, and the small church at Germigny des Près in France, built 801, and showing Moorish influence. England was in a somewhat better position, although the remains are small and not outstandingly beautiful. The oldest church, erected before the Romans left in 410, is at Silchester near Reading, and its foundations indicate that it had a nave, side-aisles, a transept, and an apse. It was only 45 feet in length. The rest of the buildings are Saxon dating from the years 600–800, after which the Danish invasions destroyed many and effectively prevented further building until just before the Norman Conquest. Most of the early churches are found in Kent, the part of Western Europe incomparably the most rich in buildings of this period. They include the 7th-century churches of SS. Peter and Paul, St. Mary, and St. Pancras in Canterbury, St. Andrew at Rochester, St. Mary at Lyminge, and St. Mary at Reculver. Outside Kent there is the church at Brixworth in Northamptonshire, one of the best-preserved; and churches in Escomb and Monkwearmouth in Durham. The Saxons had no tradition of building in stone, and the works in Kent were built under the guidance of architects brought by St. Augustine; those in Northumbria with the help of masons from Gaul. Many had square towers, and the usual plan was a small-scale basilica with nave, apse, and lateral porches or transepts. Smallness and crude workmanship are typical of the early Saxon style, but the superior buildings erected just before the Conquest probably owe their existence to the more stable conditions in Europe following the coronation of Charlemagne in 800. Some of these are at Eltham in Norfolk, Peterborough and Glastonbury, Wing in Buckinghamshire and Worth in Sussex. All but the last two are in ruins.

Literature.

During the early Saxon period there existed in the monasteries of the British Isles a higher culture than anywhere on the continent of Europe. Christianity had made progress in Britain many years before its adoption by the Roman Empire early in the 4th century, but its organisation copied from the monks of the Egyptian desert was based on the monastic community rather than the bishopric. We have seen that Eastern ritual and forms of art were brought to Britain with this movement, and so too were the classics, the study of which was encouraged in centres in Wales (Caldey Island) and Scotland (Withern in Galloway), from which it spread to Ireland. There were therefore several literary traditions in Britain at this time: the native Celtic in Ireland and Wales; the Latin of the monastic communities; and the Anglo-Saxon.

In Wales and Ireland Christian influences mingled with the old pagan ones more smoothly than elsewhere and produced a remarkable literature, dating from the 7th and 8th centuries, but with its roots in the prehistoric past. A notable example is the Irish prose epic the *Tain Bo Cualgne* about a society resembling that of the Homeric world. At much the same time the Arthurian tales must have been circulating in Wales, and the Norse sagas were being told, but since they were not written down until rather later they will be mentioned elsewhere.

Anglo-Saxon Literature. Anglo-Saxon, although the predecessor of modern English, cannot be read without making a special study of the language. Its copious literature ranges from the sea-poetry of *The Wanderer*, the battle-poetry of *The Battle of Maldon*, the epic poetry of *Beowulf*, and the religious poetry of *The Dream of the Rood* to historical works and translations from the Latin. The 8th-century *Beowulf*, a great work of English literature written by an unknown author, tells of the deeds of the hero Beowulf and of his death. It is full of the haunting sense of tragedy and mystery so typical of Anglo-Saxon works. Bede's (673–735) *Ecclesiastical History* and other works give a valuable account of the early history of the country, and the *Anglo-Saxon Chronicle*, commissioned by King Alfred, records the history of Wessex and his wars against the Danes. Alfred himself translated Latin works into the vernacular, and in this way such writers as Bede (who had written in Latin), Boethius, St. Augustine, and Pope Gregory became available to those who did not know Latin. The poet Caedmon, a cowherd in Bede's monastry in Yorkshire, wrote the *Song of Creation*, of which only a fragment remains, and *The Dream of the Rood*, possibly by Cynewulf of Northumbria, is another great landmark in English literature.

Early Mediaeval Latin Literature. Throughout the Middle Ages Latin poetry continued to be written in the monastries, and thus, whilst the ordinary man rarely moved more than a few score miles from his birthplace, the monkish scholar could travel without let or hindrance from one country to another using the common tongue of Latin. He was a member of a commonwealth in which national boundaries were of little significance. The poetical tradition, as Helen Waddell's *Mediaeval Latin Poetry* shows, can be traced in almost unbroken line from Petronius—who was, of course, not a Christian. Alcuin (d. 804), a Yorkshireman, St. Columba of Donegal (d. 597), and many others who remained anonymous were amongst the Britons who contributed to this tradition. Alcuin became tutor to Charlemagne and played a considerable part in the spread of learning throughout the Frankish Empire.

Amongst the influential thinkers and prose writers in the 6th and early 7th centuries were Boethius (d. 525), Cassiodorus (d. 583), Isidore of Seville (d. 636), and Pope Gregory the Great (d. 604). Boethius, born in Rome and possibly a Christian, was sentenced without trial and put to death by Theodoric the Great on false charges of treason; his book *The Consolations of Philosophy* written whilst awaiting his death is perhaps the only work of this time which is still read. Cassiodorus was a statesman and scholar who held high office under Theodoric and his successors and founded a monastery at Vivarium in southern Italy, where he and his monks strove to ensure that ancient learning was preserved and transmitted. Isidore of Seville, a bishop and the author of the *Etymologies*, once as influential as the *Encyclopeadia Britannica*, was an important figure throughout the Middle Ages, although his assumption that phenomena could be explained by understanding the derivation of their names was obviously absurd. Pope Gregory's many works on theology were fundamental in the Church until the writings of Aquinas.

The Conflict Resolved: Romanesque Art.

Later Celtic art shows how an austere and abstract peasant style mingled with the passionate emotionalism of the desert fathers of North Africa to produce something new in European art. This was an element which could have come neither from Rome nor Byzantium; for it increasingly represented real people with real feelings. Classical art of course did not ignore the emotions, but it generalised them to express emotions common

to all men rather than one particular man's feelings at a particular moment of time. Byzantine art, too, was emotional but excited the observer by the use of vivid colours rather than by anything personal in its stylised figures. It is a curious fact that moving back in history seems to take one even further from the appearance of the historical Christ—Christ the poor man who walked the dusty roads of Galilee. In the catacombs He is represented in the symbolic form of a fish because the five letters of the Greek word *icthus* (fish) are the first letters of the Greek title "Jesus Christ, the Son of God, Saviour," and in early Roman and Byzantine pictures He is shown as beardless—an Apollo far removed from the Man of sorrows of the Bible. Contrast with this the relief on a bronze door of the church at Hildesheim (*c.* 1000) which shows God confronting Adam and Eve after the Fall. The tree and the serpent are unrealistic, mere shorthand symbols, and the figures of Adam and Eve show no classical beauty but rather the bowed posture of two wretched human beings. Adam points to Eve and Eve to the serpent. Before them stands the awful figure of God pointing an accusing finger at both. There is nothing symbolic or "artistic" here, but a terrifying reality produced by an artist who was not primarily concerned with beauty but with teaching a lesson.

In manuscript painting the original formality and abstract patterns gave way to a more personal and emotional art in which the scrolls and intertwining lines were used to heighten intensity of feeling. St. Matthew with a formal halo round his head and the appearance of a Roman senator in his toga becomes in later representations an excited man without a halo but with large hands and prominent eyes bending over his script to write the Gospel. The hair and the folds of the robe are represented in zig-zags and scrolls to increase the impression of excitement. As E. H. Gombrich says, the new mediaeval style "made it possible for art to do something that neither ancient Oriental nor classical art had done: the Egyptians had largely drawn what they *knew* to exist, the Greeks what they *saw*; in the Middle Ages the artist also learned to express in his picture what he *felt*." In the secular field, the famous Bayeux Tapestry conveys the same impression of an art, not always brilliant and often naïve but nevertheless capable of conveying a message dramatically and with the utmost economy of means. The Tapestry is a piece of embroidery, stitched instead of woven, as true tapestries are, and depicts the events of the Norman Conquest; it is 231 feet long and 20 inches wide and was probably made in Kent at some time about 1080. The original is in the town of Bayeux, but a representation can be seen in the Victoria and Albert Museum in London.

Romanesque Architecture.

Romanesque architecture, known in Britain as Norman, can only be understood against its social background. First, the Church was still militant; secondly, it was primarily a rural Church, since there were few large cities; and thirdly, those who built the churches in northern Europe were men who knew Roman designs but had largely lost the Roman skills in building. Romanesque churches therefore tend to be small and simple; they have heavy walls and little ornamentation; the windows are tiny, and the church looks best from a distance. (The novice may conveniently think of Romanesque buildings as horizontal in the sense that they would fit very nicely into a series of parallel straight lines; of Gothic as vertical; and of Byzantine, with their domes and rounded arches, as circular.) It was in north and central Italy that the Roman basilica developed into the cross-shaped Romanesque church. Side-aisles became more solid to support the weight of a stone roof which had replaced the wooden one, and for the same reason more complex systems of vaulting were devised with great pillars and rounded arches to take the strain. Latterly the roof was almost wholly supported by these pillars and would have remained in position had the walls disappeared and the apse opened up into a varying number of chapels. The term "Romanesque" was devised just over a hundred years ago by de Chaumont to describe the architecture of Europe between the time of Charlemagne and the rise of the Gothic style towards the end of the 12th century and of course implies an art which developed from that of the Romans. But the Italians never regarded Gothic highly and Romanesque churches continued to be built there until the beginning of the 15th century although in a modified form.

Some of the most interesting Romanesque churches can be seen at Pisa with the "leaning tower" (11th century), Florence (where the 11th-century San Miniato, based on the basilica model, is rectangular instead of cruciform), Lucca (12th century), and Milan (the 12th-century San Ambrogio, most famous of all Italian Romanesque churches). At Verona is the church of St. Elmo, at Pavia, San Michele, and further south in Italy and Sicily the Romanesque style blends with the Byzantine and Lombard. The most purely Roman churches are in Provence at Arles, Toulouse, and Vezelay, and the most purely Lombard (outside Pavia) are in Normandy. Germany has Romanesque churches in the valley of the Rhine at Speyer, Mainz, and Cologne, which possesses both St. Maria-im-Kapitol and St. Cunibert, the latter showing Moorish and Byzantine influence. In Spain the most famous church is Santiago de Compostella, one of the great shrines of the Middle Ages; elsewhere in that country the Romanesque style was overwhelmed by the Moorish.

English Romanesque. By the 11th century the Normans had settled down in the north-west of France and in 1066 they brought to England their own version of Romanesque. Already they had built churches at Jumièges and Caen and the results of this experience can be seen at Durham (begun 1093), Ely, Winchester, and elsewhere. It must be remembered, however, that very few old churches retain their original form; when they were not destroyed, they were rebuilt or added to, and at various periods donors added chapels, tombs, or rood screens in the style of their time. Nevertheless, the main characteristics of the Norman version of Romanesque remain: round arches, massive cylindrical columns, thick walls (although both columns and walls were often hollow shells filled inside with rubble)—and always the basic pattern of the square and the circle. Some churches were wholly circular, as the Temple Church in London or the chapel at Ludlow Castle. Early roofs were flat, but in the High Romanesque style of Durham rib-vaults were used in which arches based on pillars crossed each other and the intervening triangular spaces were filled in with light material. The rib-vaults of Durham's choir (*c.* 1104) are the earliest in Europe, although their designer was obviously not fully aware of the possibilities of the new technique.

A high square tower with thick walls and narrow round-arched windows is the essence of the Norman castle. Around this keep a wall enclosed a large space towards the front known as the bailey; here attackers could be seen, if they had penetrated so far, and shot down. Beyond the wall there might be a moat or ditch. In these places lived Norman lords in such luxury as could be provided by tiny unglazed windows, cold stone walls covered with tapestry, and the wind and smoke from an open fire. Since castles and palaces were liable to be destroyed, few remain; the Wartburg in the Black Forest is one of the rare Romanesque palaces.

Decorative Features. Late innovations in the Romanesque style were the Norman discovery of the rib-vault mentioned above and the increasing ornamentation of churches in France. One of the best examples of this is the façade of St. Trophime at Arles (*c.* 1180) illustrating Christ in glory surrounded by symbols of the four Evangelists in the tympanum or space above the doorway. Lower down are the twelve apostles, a row of the damned in chains on Christ's left, and a row of the blessed on His right. On either side of the door are figures of the saints to intercede on behalf of the faithful at the Last Judgement. The figures are

ponderous, but to the illiterate masses of the times they provided a graphic summary of Christian teaching. By the middle of the 9th century Oriental motifs had become popular following the establishment of friendly relations between Charlemagne and Harun-al-Rashid the Caliph of Baghdad; these basically Persian designs were copied from imported carpets and tapestries.

MUSIC.

This is a convenient point to say something about the beginnings of music, including Oriental music, although the latter properly belongs to that part of the section dealing with the arts of the Orient. Music must be one of the earliest arts related as it has always been to movement—the dance is one of the most natural forms of self-expression and the dance is inconceivable without rhythm. So, too, it must have seemed natural to relieve the tedium of work with songs which were related to the movements involved, as is done in the Hebrides and elsewhere to this day, and the war-dance had the very practical function of arousing the emotions of the warrior. But of the very earliest music we know little. When people became literate, their writings tell us (as in the Bible) what instruments were used, but we do not know their melodies, since until quite a late period in human history there existed no true form of musical notation. As a matter of fact, we do not really know how Bach's music sounded only ten generations ago, and while we can listen with pleasure to the plays of Sophocles or Aristophanes, it is likely that Greek music would seem a poor, thin affair today in spite of the importance attached to it by Aristotle and Pythagoras.

The musical instruments used by most civilisations since early days have been percussion (drums, bells, or cymbals, and a primitive type of xylophone); wind instruments such as the pipe or flute, and such stringed instruments as the harp or lyre. The trumpet was used quite early too, but because of its limitations was more often used for ceremonial occasions than for producing music.

Western Music.

Greek music, and indeed European music for many centuries after, was monodic, that is, all voices and instruments produced the same tune and there was no harmony or counterpoint as we understand the terms. Although the Greek philosopher Pythagoras had found that the fourth and fifth notes within an octave would make a harmonious sound together with the fundamental, his discovery was not put into effect until hundreds of years later when it became the basis of the theory of Western music.

European music progressed from the monodic to the symphonic when the Roman scholar Cassiodorus (*c.* 477–*c.* 570) showed that it was unnecessary for all to sing either the same tune or for men and boys (*i.e.*, basses and tenors, or altos and sopranos) to sing an octave apart, that fourth and fifth intervals, as Pythagoros had demonstrated, were also convenient and pleasing to the ear. So, about the 9th century, a type of group singing known as organum (organised music) was introduced in which the voices moved in parallel, note for note, at the musical interval of a fourth and a fifth. Still later, but for the first time in the 11th century, melody in counterpoint was introduced when the original plainsong melody was accompanied by simultaneous voice parts, each independent but linked by strict rules of harmony.

In early times the Church had disapproved of music as a trivial form of folk-art, but later it had to capitulate and by the 13th and 14th centuries such composers as Guillaume Dufay (a Netherlander in the Pope's service) were introducing popular music in the form of the motet in which the tenor (Latin *tenere* = to hold) maintained a melody whilst two or three voices wove variations about it. Martin Luther in the 15th century wrote of this type of polyphony (many-voice music): "Is it not remarkable that one voice can sing a simple tune while three or four others, singing along, joyfully enfold this simple tune, playing and leaping around and embellishing it wonderfully." One of the earliest compositions of this type still known to us is *Sumer is icumen in*, written by a monk of Reading in the mid-13th century. By the beginning of the 14th century the Ars Nova (new art) was being introduced which brought in faster tempos and new harmonies and paved the way for the full flowering of the Italian madrigal. Popular music, too, as sung by the minnesingers of Germany and the troubadours of France, advanced in spite of the disapproval of the Church, and the greatest composers were Flemish and French. Josquin des Prés (1450–1521) was admired even in Italy and approved of by Martin Luther, who himself composed hymns which became the foundation for much of the music of J. S. Bach almost exactly two centuries later. Josquin's pupil Adrien Willaert (1480–1562), born in Flanders, was the founder of the Venetian School and directed the music at St. Mark's, where he developed the madrigal and introduced antiphonal singing for divided choirs, each in one arm of the cross-shaped cathedral. Gabrieli (1557–1612) brought instrumental music to the fore with his compositions for brass, and with Palestrina (1524–94) we enter the field of modern music.

Musical Notation. By the 6th century there existed a large body of music handed down from many sources and maintained in the monasteries. It was this that Pope Gregory the Great caused to be written and codified so that the Gregorian chant became the musical core of all Catholic services (as to a lesser degree it still is). The eight Greek modes were still used, but notation was unsatisfactory, melody being indicated either by letters—a b c d e f g—above the words or by neums, a kind of musical shorthand peculiar to each choirmaster. Gregory, however, had made a beginning in musical notation—and in order to forestall those who are going to say that someone else devised a system of notation in Babylonia centuries earlier, let us say that Gregory certainly did not cause musical notation to be invented, but "Gregory" is the name we are going to give the person who did. Gregorian chants are sung today, Babylonian ones are not. The modern type of notation written on parallel lines was devised shortly after Gregory's time by Guido (*c.* 990–1050), a Benedictine monk and teacher of music of Arezzo in Tuscany.

Oriental Music.

Music in the Orient is based on entirely different values from our own. In China, for example, the pentatonic scale was used (based on our c, d, e, g, a). This, incidentally, is still the basis of Gaelic music in Scotland and Ireland. In India the octave is divided into twenty-two intervals roughly approximate to quarter-tones. In Oriental music in general the emphasis has been on melody and rhythm, while harmony, and counterpoint, which have been characteristic of European music since the Middle Ages, are little heeded. Therefore, although Indian and Chinese music shows great sophistication in its own way, it is not readily appreciated by most Europeans. But Oriental music differs from European in even more profound ways. It has no composers or compositions. Professor Mukerji, in his book *Modern Indian Culture*, states: "Of composers in the European sense, *i.e.*, as a class of artists whose function is not execution, we have had none." A piece of music is a set of variations on a traditional theme and even its execution depends on the mood of the performer, a particular event, or the time of day. The ability of the performer counts for little, and Rabindranath Tagore goes so far as to say: "In India, any finesse in singing is regarded with contempt; singers are not ashamed if their top notes are cracked, their bass notes unnatural, their gestures violent. They take it to be their sole function to display their mastery over the forms and formalities of classic tradition."

So, although we can readily appreciate Chinese painting or pottery, the translation of a Chinese

poem, or Indian philosophy and architecture, we cannot so easily understand or assess Chinese or Indian music. Yet music has been treated as a serious art form by its performers, and under the T'ang (618–907) and Sung (960–1297) dynasties in China—the golden age of Chinese music as of Chinese art—there were orchestras of as many as three hundred players, as well as chamber music and a kind of opera.

Oriental music, as such, has had little influence on European civilisation, but Greek and Hebrew patterns have influenced our religious music (the Gregorian chant), and it is obvious to any visitor to Spain that Islamic patterns have had a profound effect on Spanish music.

This very brief introduction may suggest three points: first, sophisticated music was the latest to develop of all the arts; secondly, that although men must have been singing and playing musical instruments for many centuries their music (largely improvisation upon the theme as in the East today) remained unwritten and did not become till much later pleasing to the modern ear; thirdly, that a major part in creating music, as we understand it, was played by the peoples of northern Europe. The period we shall discuss later was one in which the art of the Gothic "barbarians" was supreme and Italy became the pupil.

II. GOTHIC ART OF THE MIDDLE AGES.

Architecture.

Doubtless there are still those who think of the Gothic style as springing out of nothing, as imitating the dark forests of northern Europe, or as demonstrating a new level of spirituality. But new styles in architecture do not come about in this sort of way, for money and knowledge come first, the essential inspiration later. As we said, Romanesque churches were built by predominantly rural communities with little money, and those who built them were only beginning to learn how to support a heavy stone roof without equally heavy walls. Gothic churches were built in the new cities by wealthy communities and by architects who had learned from the experience of late Romanesque times how to support the roof by means of pillars and arches. Gothic was a logical development of the late Romanesque style although one which was little appreciated by those who lived south of the Alps. Vasari, one of the best pupils of Michelangelo, had this to say about it: "These Goths, untutored in the true classics, have evolved a style of their own which is a mere hodgepodge of spires and pinnacles and grotesque decoration and unnecessary details which are completely lacking in the simple beauty of the classical world." To the peoples of southern Europe the Goths were a horde of savages who had destroyed the perfect unity of ancient times; north and south, classical and romantic, are divisions which even today separate the art of one part of Europe from the other.

Gothic art developed during the second half of the 12th century when Norman and Romanesque buildings began to appear clumsy and obsolete in spite of their new and more elaborate ornamentation and new ideas of vaulting. The Crusades were coming to an end; the Moslems were no longer troublesome except in the east; the Normans had settled down and ceased their raiding activities; wealth was increasing; cities were developing, and land was becoming dearer. As in modern New York, it paid to build upwards, to plan vertically rather than horizontally. Gothic architecture was not created *because* new techniques in architecture made walls relatively unimportant, *because* there was more money, *because* cities had to be limited in size, or *because* the times were more settled—but these were the indispensable conditions without which it could not have existed at all.

We have seen how the rib-vault was used at Durham. Both nave and aisles were divided into rectangular bays, at each corner of which pillars supported transverse, diagonal, or longitudinal ribs to form a framework on which a light roof was built. The ground-plan of the church resembled a cross-word puzzle with a pillar at the corner of each square, and the main weight of the roof was carried by pillars and vaulting instead of by the walls. Thick walls became unnecessary and large windows with elaborate stained-glass designs could replace the small ones. But these were possibilities which were not exploited by the Romanesque architects and the new technique was brought to perfection only in Gothic buildings. The pointed arch was not used in Romanesque at all and came, as we have seen, from Islam. It had two important advantages: first, it exerts less sideways thrust than the rounded one; secondly, it causes the height of the roof to become irrelevant. The round arch, being a portion of a semi-circle, must always have a height which bears a fixed relationship to the distance between the walls supporting it, so that walls 30 feet apart must support an arc whose radius is 15 feet. Romanesque churches always looked horizontal because a high roof would have been weighty and its supporting columns set too far apart. The Gothic church made use of light materials to fill in the triangular spaces between the ribs of the roof, could afford to be indifferent about height or width, and could neutralise whatever thrust the pointed arch exerted upon its walls by means of flying buttresses. Buttresses propped up the walls of a church in the same way that poles set at an angle prop up the walls of old barns in Germany or Switzerland today.

National Characteristics. Gothic architecture first developed in the area around Paris. Churches showing both Romanesque and Gothic features are said to belong to the early or transitional period. Such buildings include the cathedrals of Chartres, Laon, and the Benedictine church of St. Denis just north of Paris—the first of the large Gothic churches. The transitional period ended at some time about 1200, and the following century was perhaps the greatest; for during the reign of Louis IX (1226–70) the cathedrals of Rheims, Notre Dame at Paris, Beauvais, and Amiens were built, as was the lovely Sainte Chapelle not far from Notre Dame. From France the style spread to other lands, in each of which it developed its own characteristics. Thus English Gothic churches tended to have massive towers and graceful spires, and, as at Salisbury, were often set in open ground with lawns. Flemish and Dutch churches were built of brick, whilst the German cathedrals of Strasbourg and Cologne followed on the whole the French tradition, although Cologne, begun in the 14th century, was not finished until as late as 1870. Italy resisted Gothic ideas, but the cathedral of Milan, begun in 1386 but only finally completed in 1813, is mainly Gothic-style and highly decorated, and in Spain Gothic fused with Moorish to produce strange variations on the original. The Gothic style was not, as is sometimes supposed, a style designed entirely for religious purposes; for city walls, gates, castles, town halls, and private houses were also built in the Gothic manner. The Gothic town halls of Ypres and Ghent and the castle in Ghent are good examples, and in Bruges streets of Gothic houses are still used today.

Early English Gothic. In this country, too, Gothic was initially regarded as a term of abuse, and Evelyn described it as mere "congestions of heavy, dark, melancholy and monkish piles, without any just proportion, use or beauty." The various styles of Gothic were detailed in the early 19th century by Thomas Rickman, who devised such terms as Norman, Early English, Decorated, and Perpendicular, but it is now convenient to speak simply of Early Gothic as lasting to 1350 and Late Gothic which persisted up to the Renaissance. The Black Death of 1348 forms the dividing line and leaves two centuries on either side for each period. Gothic was found in most countries where the Roman Church was supreme, but not in Russia or the Balkan countries, where the Greek Church was in power; in Italy it never became important, since the classical tradition always prevailed and the classically based Renaissance was enthusiastically accepted there more than a hundred years before it made much

impression elsewhere. Gothic is essentially a French style, and it is not too much to say that the cathedrals of Germany and Spain are on the whole inferior examples of French originals. Even their architects might be French; for, contrary to popular belief, many mediaeval architects are known by name, and sometimes their drawings have survived. They were usually laymen rather than clerics.

The main English Gothic cathedrals were built somewhat later than the French ones (although of course a church might be in the process of building for centuries). Thus Lincoln choir and apse were begun in 1192, Salisbury about 1220, and the west front of Wells slightly earlier; York transepts date from 1230, the nave from 1291. Westminster Abbey choir and transepts (1245–69) belong to an earlier period than the nave which, however, is more or less in the same style. In addition to the differences already mentioned, English Gothic cathedrals tend to be narrower, longer, and lower than their French counterparts; they often have cloisters (since many English cathedrals were built as monastic churches); they have single aisles without side chapels where the wider French ones have double aisles with chapels; they have a single large tower or up to three smaller ones whilst the French may have as many as seven or nine; and they are more elaborate in the matter of interior decoration. Throughout the centuries Gothic walls and roofs became progressively lighter. This development can be observed when one compares the solidity of an early Gothic building such as Salisbury Cathedral with the elaboration on a later one such as the chapel at King's College in Cambridge. With less wall-space buttresses became larger and bolder, often with pinnacles which (as Martin Briggs points out) were not put there to point the way to Heaven but to provide additional strength in pressing down the structure carrying the roof. A parallel development was the increase in window-space, partly because the possibility existed, partly to give more light and to provide a field for the expert in stained-glass work. Nevertheless, most of the 13th-century windows were filled with the greenish-grey *grisaille* glass still seen in the Five Sisters window at York Minster. The details cannot be discussed here, but colour and light came in as stonework grew less; plate-tracery gave way to geometrical tracery, and geometrical tracery to the more elaborate curvilinear form. Many of these techniques came, as had the pointed arch, from Islam. Stained-glass windows told the story of the Bible, as did the wall and roof-paintings at St. Albans and elsewhere. For there were still many illiterate people who, like the mother of Villon, found in the windows of their parish church "a painted Paradise with harps, and Hell where the damned souls are boiled: one gives me joy, the other frightens me." This was where the poor and ignorant learned their theology even in the 15th century.

Late English Gothic. We are taking the time of the Black Death (*c.* 1350) to divide early from later Gothic, and it only remains to mention a few of the early secular buildings, notably Markenfield Hall near Ripon (*c.* 1310), the fortified manor-houses of Oakham and Stokesay, and Little Wenham Hall in Suffolk (late 13th century), all of which are in the same style as the cathedrals. On the continent, Prague has a synagogue (*c.* 1316) which is pure Gothic. Later Gothic in England is mainly non-monastic and it is no accident that three of our finest buildings are royal foundations testifying to the decline of priestly power and the immense increase of secular power in the time of Henry VII. These are Henry's Chapel at Westminster (*c.* 1500), St. George's Chapel at Windsor (1481–1537), and King's College Chapel at Cambridge (1446–1515). From about 1540, the time of the dissolution of the monasteries, there are no important churches until the Great Fire of 1666 brought about Wren's revival of church-building in the Renaissance style.

The so-called Perpendicular style is peculiar to England and found nowhere else, but the flamboyant architecture of the late 14th century in France is so similar to the English Late Decorated of almost a century earlier that the two must be connected. In fact, since such places as Rouen and Abbeville exemplifying the style were at that time under English rule the possibility becomes a certainty. The best-known building in Perpendicular is the mid-14th-century Gloucester Cathedral and the Late Decorated English style can be seen in such small forms as the Easter Sepulchres of Nottinghamshire, the Percy Tomb in Beverley Minster, some tombs in Westminster Abbey, and the church at Heckington in Lincolnshire—the finest Late Decorated building in Britain. The great east window of Gloucester is still the largest in the world. Timber roofing was also typical of late English Gothic, which in this respect often surpassed many of its continental counterparts. Carved angels, wooden tracery, and heraldry as seen in Norfolk were used to enhance the appearance of these roofs. In secular art Stokesay Castle (*c.* 1250) and Penshurst Place in Kent of more than a century later brought about an advance in comfort unknown to the Normans. Apart from dwelling-houses we have the late Gothic buildings of Winchester and Eton and several of the oldest colleges at Oxford and Cambridge, all dating from the beginning of the 15th or the end of the 14th.

Gothic Sculpture and Painting.

By the 13th century France was the richest and most important country in Europe, and the University of Paris was its intellectual centre. The great Gothic churches were being built and imitated in Germany and England. New ideas in sculpture and painting came from the new style and work was increasingly done from nature. But in Italy churches were still decorated in the old tradition derived essentially from Byzantium and Paris was ignored. The essence of Gothic art was naturalism; it expressed feeling. It was not realistic in the Greek sense, where a careful study of the proportions of many athletes decided what was "real," and it was not always realistic in being anatomically correct. Statues in churches might be elongated to fit into Gothic niches, but they represented people who might be seen in the streets, whereas earlier artists had depicted saints, generals, or politicians according to the popular belief of how such characters were supposed to appear. In early Christian art the scenes of the Nativity, Crucifixion, and Resurrection were familiar, and the characters depicted were known by special symbols; Peter bore the keys, Paul, a sword, and Mary Magdalene a jar of ointment. A king had a crown and sceptre, a bishop a mitre and crozier. But they were not real people and might even have their name written beneath their picture to make sure there was no mistake. The earlier artist learned from his teacher how to depict certain stock types and a carefully handed-down method of doing so.

Giotto: A new era in art.

Italian painters and sculptors were late in accepting the lessons of the Gothic miniaturists, who, from the time of the Book of Kells (an 8th-century Irish Gospel) had become increasingly naturalistic in their treatment of animals, plants, and trees, and the lessons of the early Gothic sculptors whose work, although stiff in superficial impression, nearly always shows in the face a certain gracious naturalism. The Greek—that is, the Byzantine manner—was still used in the mosaics of 13th-century Italian churches. Nevertheless, Byzantine art had taught the Italians much about technique, especially about the principles of light and shade (chiaroscuro). So it was a great Florentine painter, Giotto di Bondone (1266–1337), who under his master Cimabue (d. 1302) was able to bring together these two traditions. Giotto was also a sculptor and played the major part in making Florence the centre of a new Gothic sculpture and painting. In one sense he was the *first* artist—*i.e.*, the first to be accorded public acclaim as a genius rather than as merely a craftsman. Of Cimabue almost nothing is known save that he was mentioned by Dante and painted some of the frescoes in the church of St. Francis at Assisi, where the rest were completed by

Giotto. (A fresco is made with coloured distemper paints which are applied to a wet surface and therefore becomes in effect an integral part of the wall to endure as long as the wall itself.) Representations of the saint were particularly suited to a naturalistic treatment, since Francis had been known as a man who had really moved about the villages of Umbria, and the twenty-eight frescoes proved in this way a revolution in the history of art. *St. Francis Preaching to the Birds* is one of the best-known, but doubtless his greatest work is in the Arena Chapel at Padua and at the Bardi Chapel of the Church of Santa Croce in Florence. The lower part of the campanile of the Duomo in Florence together with the sculptured panels were completed from his designs before his death.

In Siena, the rival at that time of Florence, the style of the northern artists had aroused interest, but not to the extent of breaking so violently with the Byzantine forms as had Giotto. Duccio, contemporary with Giotto, tried to modify the old art in the new direction, and the altar-panel of the Annunciation painted for Siena Cathedral in 1333 by two younger masters of his school, Simone Martini and Lippo Memmi, shows how successful he was in its lovely combination of naturalism and formalism.

Sculpture in Italy was also influenced by the new style. It can be seen in the carvings on the pulpits in the cathedrals of Pistoia, Siena, and Pisa carried out by the two Pisanos, Niccola and Giovanni (father and son), which are Gothic in spirit, and in the bronze doors with scenes of the life of John the Baptist of the baptistery in Florence by Andrea Pisano (d. 1348). The latter show the simplicity and avoidance of overcrowding which he must have learned from Giotto. It is also thought that the reliefs on the lower part of the campanile may have been executed by Andrea Pisano from the designs of Giotto.

But the inherent Italian suspicion of the northerners was such that on the whole Gothic influence declined after the death of Giotto. For a century, although the new style remained it did not fructify. Gothic sculpture too declined after the death of the younger Pisano in 1330.

Flemish Painting.

On the other side of the Alps revolutionary developments were being made in Belgium by Jan van Eyck (*c.* 1390–1441), who, with his brother Hubert, made religious miniatures which, as they became larger, showed a gradual transition from the art of the miniaturist to that of the painter. To Jan van Eyck, rightly or wrongly, is ascribed the discovery of oil painting which is used in his huge altar-piece with many scenes in the cathedral of Ghent. The subject is the adoration of the Lamb, Who, standing on an altar, is surrounded by worshipping saints and pilgrims. Although at first sight the style of this great work appears not very different from that of the miniatures of a generation earlier in its love of detail, its gay colours, and crowded figures, we soon see how the landscape in the background is a real, not a schematic one and the figures in the foreground are real people. Van Eyck did not break completely with the older traditions, but he developed them to such a pitch of perfection that the ideas of mediaeval art were left behind.

The use of oil made it possible to take more time over a painting, since it dried less quickly than tempera, made painting more accurate, and made it easier to shade off one colour into another. Some of van Eyck's greatest works in the new medium were his portraits, one of the most famous of which is *The Betrothal of the Arnolfini* (1434) in the National Gallery of London. Two other great Flemish painters were Rogier van der Weyden (d. 1464), best known for his *Descent from the Cross* in the Escorial near Madrid and Hans Memling (d. 1494), last of the great mediaeval Flemish masters. Memling's typically sentimental angels can be seen in the paintings for an altar at the Antwerp Museum.

At the same time Flemish sculpture was flourishing, although it has never been as well known as Flemish painting. Chief amongst the sculptors was Claus Sluter (d. 1400), who worked at Dijon, where he was associated with the court of the Dukes of Burgundy, as van Eyck had also been. His masterpiece is the six-sided Moses Fountain, once the base of a large crucifix, at Champmol near Dijon; each side is carved with the figure of a prophet which in its passionate emotionalism differs from the more stiff and rigid figures of the Gothic cathedrals. They are realistic, and it is likely that Sluter had gone to the ghetto to study Jewish types from life. The Tomb of Philip Pot in the same area by an unknown Flemish artist is another remarkable work.

Mediaeval Literature.

The early Middle Ages was a time of supreme importance in European literature. Latin was still used in the churches or by scholars, but elsewhere it was breaking down into the Romance languages and the spoken languages of the Germanic, Slavic, and other peoples were being put into written form. The literary tongues of modern Europe were being born. Of course, the classical Latin of Cicero had never been spoken by more than a relatively small number of people even within Italy, and ordinary men used the Vulgar Latin, which now began to emerge as French, Spanish, and Italian. The Germanic languages of Britain, the Low Countries, Germany, and the Scandinavian lands became literary during the first half of the Middle Ages, and we have mentioned the Celtic writings of about the same period. Much of this literature was secular and popular—a putting down of old tales and legends previously passed by word of mouth as the Homeric epics must have been, and they were usually anonymous. The French *Chanson de Roland* (*c.* 1100), tells how Roland under Charlemagne attempted to recover Spain from the Moors; *Poem of the Cid*, the first great poem in Spanish, written by an unknown author a few years later, deals with the same struggle. These are examples of the *chansons de geste*, the battle-tales of the warriors of the 10th to the 12th centuries, and are among the great literary works of Europe.

In a different tradition but of the same period are the Scandinavian sagas and eddas (the former dealing with men, the latter with gods and heroes); there are many of these, mostly anonymous, but the *Heimskringla* saga is by Snorri Sturluson and gives an interesting picture of the Viking raiders and their voyages.

The epic in France and Spain soon decayed, and by the 12th century its successor, the courtly romance, was beginning to appeal to the more settled society of the age of chivalry. These heroic, fantastic, and sentimental tales dealt with the theme of romantic love—a theme which had not occurred to the earlier warriors—by drawing on classical sources or on ancient tales. Chrétien de Troyes (*c.* 1170) used Celtic stories of King Arthur first mentioned in Geoffrey of Monmouth's *History of the Kings of Britain.* He is the best known of these story-tellers, but we can see how, as it developed under his hand and those of other French and German writers, the legend changed from its more primitive form into accounts of knightly chivalry and courtly love far removed from the moral outlook of the old tales. The related Celtic love-theme of Tristan and Iseult was also used by Chrétien and in Germany by Gottfried von Strassburg (*c.* 1200) in his *Tristan.* The *Nibelungenlied* is an anonymous German heroic epic based on pagan tales of the adventures of Siegfried of the Netherlands. All these old themes have been used throughout the centuries as a kind of background in European culture from early days to Tennyson, Wagner, and Cocteau. It remains to mention *Aucassin et Nicolette*, a great anonymous 13th-century French romance; the fables (*fabliaux*), also of the 13th century, which originated in northern France and were popular amongst the burghers of the new towns; the satirical beast tales such as Reynard the Fox; and the Goliardic songs with a pagan touch of

which the best-known is the famous *Gaudeamus Igitur* still sung by students.

Troubadours and Minnesingers.

We mentioned earlier the Latin lyrics, which range from the sacred to the profane, from Petronius and Boethius to Bernard of Clairvaux and Peter Abelard. Many are anonymous, but some of our present-day hymns are translated from these lyrics. Thus "Jesus, the very thought of Thee" is sometimes attributed to Bernard of Clairvaux, and "Jerusalem the Golden" to Robert de Morlaix (although the *Sabbato ad Vesperes* of Abelard seems to be much the same poem). However, the first great body of lyric poetry in the vernacular dates from the beginning of the 12th century. It was the poetry of the troubadours.

This poetry has an extraordinary history, rising as it did in Provence quite suddenly and dying out equally suddenly with the Albigensian Crusades of 1207 when Pope Innocent III carried out his terrible butcheries. Its origins owe something to folk-poetry and to the Latin lyrics, but most of all to eastern forms borrowed from the Hebrew and Arabic poems of southern Spain or brought from the Middle East during the Crusades. The first known troubadour was William, Count of Poitiers (1071–1126), but many know also of Richard Coeur de Lion's activities in this direction. This type of song (for it was accompanied by music played on a lute by the low-born jongleur) was carried by the highly-born troubadours from France to Italy and Spain, and in Germany the equivalent of the troubadour was the minnesinger. Their songs told of courtly love, of the love of the minstrel for a lady, of her scorn, and of his undying affection; in the Moorish tradition, nightingales, roses, and other symbols of the type one knows from Persian verse were common. The German songs are characterised by a more human approach; for the first time we get *Liebe* or ordinary love replacing the courtly type. The greatest German poet in the minnesinger tradition was Walther von der Vogelweide (*c.* 1170–1230). Strangely enough this wonderful German lyricism disappeared and there is hardly any German lyric poetry of any significance between the 13th and the 17th centuries. All this, obviously, is vastly oversimplified; for although *Aucassin et Nicolette* has been named and *Le Roman de la Rose* by Guillaume de Lorris influenced Chaucer and both of these were part of the fine literature of northern France in the 13th century, we have no space to tell how the courtly poets of Galicia in Spain using a dialect now known as Castilian caused this to become the accepted Spanish of today.

The Range of Mediaeval Experience.

The later Middle Ages produced many great men, but here we are only concerned with literature and art. So we must leave out Albertus Magnus, the Bavarian Dominican philosopher, who was one of the founders of modern science, Roger Bacon, the Englishman, who rejected belief in authority in science in favour of observation, Thomas Aquinas of Naples, the founder of modern Catholic theology, and the tragic and brilliant Peter Abelard (except for his hymns, already mentioned). But we must consider Dante Alighieri (1265–1321) of Florence, Geoffrey Chaucer (*c.* 1343–1400), and his later contemporary, William Langland.

Dante and Giotto belonged to the same city and lived at the same time, but Dante spent many years in exile in northern Italy; he was undoubtedly the greatest writer of mediaeval times, representing the very spirit of the era. His first important work, the *Vita Nuova*, is about his platonic love for Beatrice, who came in his mind to represent an ideal of perfection. She was his "Lady Philosophy" and inspiration, and this book contains some fine poetry. His *De Monarchia* deals with politics, and the *De Vulgari Eloquentia* advocates giving up Latin in favour of the Italian in which he wrote both the *Vita Nuova* and the greatest of his works, *The Divine Comedy*. This is one of the fundamental books of European literature. Boccaccio and Petrarch were both contemporaries of Dante, but since they exemplify a new age they will be dealt with later.

Geoffrey Chaucer's *Canterbury Tales* is of almost equal importance, and its outline is well known, telling as it does stories recounted by a group of pilgrims travelling from the inn at Southwark (Chaucer was a Londoner) to Canterbury. It, too, gives a splendid pageant of mediaeval types in the 14th century but whereas Dante's vision was symbolical, Chaucer's was more earthy. On the other hand, Langland's *Piers Plowman*, like Dante's work, is visionary and has the intention of criticising social conditions in terms of a dream.

The End of the Middle Ages.

The Middle Ages did not end nor did the Renaissance begin at any special time. A dying class, without quite knowing why, loses confidence. Its breakdown leads to an art lacking in purpose and exhibiting insecurity about present and future. (This, rightly or wrongly, is the impression held by the Communist world of today about the art of the Western world with its lack of a single coherent idea, which we for our part may interpret as a sign of strength.) The decaying art of the Middle Ages shows these tendencies, being obsessed either with a longing regard for the dead past or a fearful concern for an uncertain future. On the one hand, increased interest in the feudal romance, on the other, death and doom.

Romances were popular with the nobility. *Amadis of Gaul*, a Portuguese tale, was widely read, as was the story of King Arthur as retold by Sir Thomas Malory (d. 1471). Froissart's *Chronicles* dating from the same period, although historical, were used with the romances to raise the flagging confidence of the old ruling classes. In the Church, John Wyclif (d. 1384) and others were beginning to affirm that if those in authority did not act in accordance with the laws of God they had no right to their position—a bad pope or king had no power to make demands on others. This was in opposition to the old belief that a pope is a pope and a king a king regardless of his character. The new attitude was expressed in such works as *On the Imitation of Christ*, by Thomas à Kempis of the Lowlands, which, in effect, emphasised the importance of good works and prayer before theology or right belief: "Profound words do not make a man holy, but a virtuous life makes him dear to God."

This concern with personal morality is seen in the popular drama of the time: the mystery plays and the morality plays. The mystery or miracle plays dealt with Biblical stories, and cycles of these running from the Creation to the Last Judgment were performed by simple workers or the guilds in the market-places of towns on special occasions. They were a form of popular art, sometimes tragic, sometimes vulgar, sometimes comical. The words of Isaac to his father made many weep:

> "Now I wold to God my moder were her on this hyll!
> She woold knele for me on both hyr kneyes."

The morality plays were more abstract. The most familiar in Britain, the 15th-century *Everyman*, tells how Everyman is called by Death and can persuade none of his friends, Worldly Goods, Good Fellowship, Kindred, Knowledge, Beauty, Strength, to go with him except Good Deeds (all represented by actors). Such plays had an influence on the later drama. They were sponsored by the Church, which in earlier days had tried to suppress acting.

There was a certain lugubrious sentimentality about the art of this time. Devils and dead bodies appeared everywhere, and the Last Judgment, but the main theme was the dance of death depicted vividly and frequently in woodcuts or on tombstones. Death was feared, jested about, but very present in the minds of the men of the late

Middle Ages, of whom the last example must be one of the greatest of French poets, François Villon (1431–85), associate of robbers, murderers, and prostitutes. Born poor, a dissolute cleric, sentenced to death for participation in a brawl, reprieved, and dying poor, he wrote great verse, notably in the two *Testaments*. Villon's question "Where are the snows of yesteryear?" was echoed by Dunbar, the great poet of Scotland, the poets of Spain, and by Skelton in England. It was the motto, says J. H. Cohen, of a dying world-order for which Villon could speak with authority, since the lessons of his age exactly matched his personal experience.

A New Sense of Individual Personality.

A new way of life and a new way of thinking had been developing in Italy from about 1300 and had spread to other parts of Europe by 1600. We have spoken of Dante already because he was essentially mediaeval in his way of thought, whereas Petrarch, his contemporary, we shall speak of later because he was a modern man of the Renaissance. What were these new beliefs?

Briefly, a new middle class of burghers or merchants was arising; the feudal system was breaking down so that kings turned to this class for help rather than to the nobles; the Church was losing its previous high position and its priests, instead of being the main patrons of art and the main source of learning, were often ignorant; the new intelligentsia were not priests but wealthy townsmen.

The discovery of individual man, brought about by the developing capitalist system, was the essence of the Renaissance. Previously, individuals, as contrasted with groups or categories, had not existed, now they did. The unity of Christendom gave way to groups of nations loudly acclaiming their independence of the Pope or any other external power—and this, of course, was behind the Reformation. As G. D. H. Cole has put it: "The trader became a Protestant not because he put it to himself that Protestantism squared better than Catholicism with his business interests, but because he was already thinking individualistically in connection with the everyday problems of life."

In art this meant that what had always been a social activity became a more individual one; music or painting or writing were no longer traditionally based on fixed standards, but became increasingly the expression of powerful single minds. In mediaeval times it would not have been possible for the artist to be "misunderstood" by his public, for he was using notions accepted by all, but after the Renaissance the artist in effect was increasingly asserting: "This is what *I* feel—take it or leave it!" Bach's music might have been thought poor by some of his contemporaries, but it could not have been rejected as music as that of many later composers has been. The early fuss made about Cézanne, van Gogh, or Epstein would have been incomprehensible to people who might have said of an artist that he was a bad craftsman (that is, that he was doing the right thing incompetently), but not that he was not an artist at all, that he was a person who was doing something quite meaningless.

THE RENAISSANCE.

Literature and the New Outlook: Petrarch.

We have seen some of the economic causes of the Renaissance and their effect upon culture. The movement began in northern Italy in such rising commercial centres as Venice, Florence, and Milan, but the countries of northern Europe and Spain lagged behind. In fact, it was not until the beginning of the 16th century that such events as the voyages of Vasco da Gama and the conquest of Mexico by Cortes shifted economic power to the western coasts of Europe, bringing about the changes in outlook which had earlier influenced Italy.

The two main psychological trends of the Renaissance were a belief in the importance of man, and an obsession with the works of the classical past. Both implied a denial of the standards of mediaeval times, and one of the earliest initiators of the revolt was Francesco Petrarca (1304–74), commonly known as Petrarch. A Florentine, who had spent much of his early life in France, he became a priest, and his love for Laura (whom he had once seen) became a ruling passion in his life. But his love, although unfulfilled, was more of this world and less otherworldly than Dante's had been; he was "half captivated by the world, half impelled to renounce it." He was not concerned with Heaven and Hell but essentially with his own reactions to life, and his grief at the death of Laura was a private purgatory, not a theological one. He was the first of modern poets, the perfector of the sonnet form, and had a far more immediate effect on European literature than Dante. Petrarch, living in the Middle Ages, was the first man to regard his own times as a period of barbarism from which he looked back longingly to Augustan perfection, and he travelled widely through Europe seeking classical manuscripts. He was the writer of the first of patriotic odes *All 'Italia* which identifies Italy with ancient Rome. Here personified is Renaissance Man: passionate, orientated towards this world rather than the next, admiring the culture of classical times, and fervently patriotic in a period when national states as we know them were being born. Petrarch wrote a great deal: an epic *Africa* imitating Virgil, biographical sketches, and poetry. But most of all he is famed for his sonnets. Giovanni Boccaccio was deeply influenced by Petrarch and died a year after him. He, too, wrote a good deal, but is best known for his *Decameron*, which tells how, during the Black Death in Florence, three young men and seven young women fled to a country villa and there amused themselves by telling ten tales each day for the ten days of their exile. This book is one of the masterpieces of Europe and is widely read today, both by those who admire the prose, which is one of the finest in Italian literature, and by those who enjoy the tales, which are for the most part highly spiced with sex and scandal. Boccaccio exemplifies another trait of Renaissance man—irreverence. In effect, he takes a number of stories collected from feudal romances and tears their ideals to shreds. Honour, chivalry, priestly continence, are all treated with biting sarcasm and humour.

The Classical Revival.

In mediaeval times libraries had been housed in monasteries, and what was read of classical works was limited by ecclesiastical instructions as to what was suitable; there was no widespread curiosity about them. Galen was studied for medicine, Aristotle for philosophy, and various works on Roman law or early Christian theology, but little else. Greek was little known, although it was still the tongue of Byzantium. The Renaissance changed this, and Europe was ransacked by scholars, such as Petrarch, seeking for manuscripts which had been overlooked or hidden away. Libraries were collected by members of the new bourgeoisie who were willing to pay high prices, and, above all, from 1393, Greek was taught in the university at Florence. Needless to say, this influx of classical literature and learning influenced European culture considerably, even if it sometimes degenerated into a kind of dilettantism which, as one might expect, was not so enthusiastically accepted in northern Europe.

Patrons.

Those who financed these new studies and the new art were patrons of great wealth, such as the Medici family, which ruled Florence, the heart of the Renaissance, from 1434 to 1494. Cosimo de Medici, financier and patron of artists and scholars, built the monastery of San Marco, and his grandson, Lorenzo the Magnificent, extended his patronage to many of the greatest figures of the Renaissance. Noting the example of such powerful families, kings, dukes, and popes were quick to follow their example.

Renaissance Thought: Machiavelli and Castiglione.

Two further writers of the Renaissance in Italy who demonstrated other traits of the period were Machiavelli (1469–1527) and Castiglione (1478–1529). The name of Niccolo Machiavelli is known to everyone, generally in an unpleasant connotation. His book *The Prince* asserts in effect that in war the end justifies the means, that moral considerations are irrelevant in attaining one's goal. This also was a break with former times, when rulers, no matter what they did, at least paid lip service to the moral code. Now expediency was all. Machiavelli was a fervent patriot who hated the disunity of Italy and closed *The Prince* with Petrarch's lines: "the ancient flame is not extinguished yet that raised the Italian name!" *The Art of War* and the *History of Florence* have little popular appeal today, but to us Machiavelli's greatest significance is in demonstrating a new attitude and in the fact that he is regarded, with Dante, Petrarch, and Boccaccio, as a master of the Italian language.

Baldassare Castiglione's book *The Courtier* defined the Renaissance gentleman. He was the courtier who behaved with charm, naturalness, and dignity, who was in varying degrees a philosopher, poet, or one accomplished in music. This is far from the ignorant fighting nobleman of mediaeval times, but it was to this ideal that Renaissance Man aspired. Sir Philip Sidney of England was respected in his life and almost worshipped after his death as the epitome of these virtues. He was the friend and supporter of Giordano Bruno whilst he was in England and before he was betrayed to be burned at the stake for his remorseless attacks on mediaeval philosophy.

Italian Drama.

The Italian drama of the late Renaissance was, on the whole, poor stuff based on such classical models as Plautus, Terence, and Seneca. The leading dramatist was Ludovico Ariosto (1474–1533), who wrote four of the best comedies. However, the importance of the drama at this time was that although itself of little significance, it had considerable repercussions in Spain, England, and France. Shakespeare's *Comedy of Errors*, *The Taming of the Shrew*, and *Much Ado about Nothing* are all based on Italian comedies, as *Titus Andronicus* with its gory details is based on Italian tragedy. Ben Jonson stole the plot of Ariosto's *Il Negromante* (The Necromancer) for his *Volpone*. These plays acted indoors before a small audience and essentially like our modern theatre had no connection with the religious dramas of the Middle Ages. They were purely secular and, in effect, a revival of the old classical drama which had been suppressed by the early church. The pastoral or lyrical plays are of interest in that, towards the end of the 16th century, with the appearance of the great musical genius Monteverdi, they developed into the beginnings of modern opera. The popular Commedia dell' Arte, which had no written script, developed, with its characters, into the Harlequinade and Pantomime.

Italian Painting and Sculpture: Masaccio, Ghiberti, Fra Angelico, and Donatello.

Italian art of the Renaissance from Masaccio (d. 1428) to Michelangelo (d. 1564) marks one of the highest levels of attainment in the history of Europe. Masaccio—the name means "clumsy Thomas"—was a great genius who died before he was twenty-eight, yet in the Florentine church of Sta. Maria Novella there is a wall-painting of the Holy Trinity with the Virgin and St. John beneath the cross, which is compelling in its new awareness of perspective. Masaccio was the first original artist since Giotto (we have seen how for a century after the master's death Florentine painters were largely imitators), but in part his success was due to the great architect Brunelleschi, who had for the first time worked out scientifically the principles of perspective. The Greeks knew about foreshortening, and the Hellenistic painters could create the illusion of depth, but nobody prior to Brunelleschi had known the mathematical secret of how to create the illusion of a row of trees (for example) leading backwards into the picture until it disappears on the horizon. Masaccio was also an expert in painting effects of light and shade (chiaroscuro), as his frescoes on the walls of the Carmine Church show. An awareness of perspective is shown too in the reliefs on the bronze doors of the baptistery in Florence by the sculptor Lorenzo Ghiberti (1378–1455). The scenes on the double east doors taken from the New Testament are so beautiful that Michelangelo said they were fit to adorn the entrance to Heaven. Ghiberti remained true to the principles of Gothic art, but he was prepared to make use of the new discoveries of his time. On the other hand, the painter Fra Angelico of Fiesole near Florence (d. 1455) knew about the new discoveries but made little use of them.

Angelico was a friar of the Dominican order, self-trained, who divided his time between tending the sick and painting. He is probably the only artist who has ever achieved the honour of beatification by the Church, and when in 1434 the Dominicans of Fiesole, a small town high above Florence, were given by Cosimo de' Medici the monastery of S. Marco in Florence itself, it was Angelico who was given the task of painting the walls. He painted a sacred scene in each monk's cell, and these show a sense of colour and a spirit of gentleness and simplicity which has appealed to observers through the centuries.

From 1450 onwards the influence of classical Greek and Roman art was becoming more pronounced in Italy. The essentially Gothic sculptor Niccola Pisano carved a figure of Hercules on the pulpit of the baptistery in Pisa as early as 1260, and Ghiberti's bronze doors in Florence show Isaac with a remarkably Apollo-like torso. Gradually, the simplicity of Giotto, the gothic artist, began to blend with the idealistic humanism of Roman art. Among the earliest results of this intermingling were the works of Donatello (d. 1466) the nickname (for Florentines delighted in giving their great artists nicknames) of Donato di Betto Bardi. Donatello or "little Donato" went to Rome with Ghiberti to study Roman antiquities and, returning to Florence, became the most significant sculptor of the 15th century. Among his masterpieces are the statue of *St. George* in the Church of San Michele in Florence; his *David* (Bargello, Florence), which breaks with the Gothic tradition of sculpture tied up with architecture (since it was designed to stand in the open to be viewed from all angles); and his noble bronze equestrian statue *Gatamelatta* in Padua, almost the first equestrian statue to be made since the days of ancient Rome.

Masaccio, Ghiberti, and Donatello were worthy members of the group surrounding Brunelleschi, men who were not copying Roman art but using it to their own ends in their desire to conquer reality. Donatello's fame in his lifetime is evidenced by the fact that, like Giotto, he was frequently invited to other Italian cities to create works of art such as the bronze relief on the font at Siena illustrating Herod's feast.

The Return of Terra-cotta.

One of the most remarkable developments of this time were the works in terra-cotta of the della Robbia family, and Donatello himself. Luca della Robbia (d. 1482), the founder, had carved decorations for the Cathedral of Florence, but the family also produced lovely works in clay to which they applied a beautiful glaze. At first these were white reliefs on a blue background, but later other colours were used. Predominantly the designs were of angels, cherubs, and babies, and outside the Foundling Hospital at Florence there can still be seen the work in this medium of Andrea della Robbia, nephew of the above. Objects in terra-cotta on a smaller scale, being cheap, became available to the less-wealthy classes.

The School of Padua: Mantegna. In Padua classicism was taken more literally and there was

an almost archaeological interest in the past. A number of rather inferior artists began to fill their pictures with allegedly "classical" objects such as broken arches and columns, but, at a higher level, there were those who wished to show the past as it was. Whereas a painter like Giotto had been basically concerned with the inner meaning of a scene and little, if at all, with its correctness in terms of historical accuracy, the great painter Mantegna (d. 1506), who had studied archaeology, tried to create real life scenes. His figures are correctly dressed, and the background of monuments and buildings is authentic. His series of wall-paintings in the Eremitani church in Padua, destroyed during the last war, illustrated scenes from the life of St. James and showed how Mantegna had really taken trouble to discover how Roman arches and Roman soldiers at the time of St. James appeared (he had made a special study of ancient monuments for the purpose). These lost paintings were amongst the greatest of all time; they made one feel the real spirit of Rome rather than the stock grandeurs of his colleagues, who had supposed that broken columns were enough. About this time, but in the region of Florence, another great painter Piero della Francesca, who died in 1492, was doing much the same thing. His wall-paintings in the Church of S. Francesco at Arezzo, notably *Constantine's Dream*, equal Mantegna's work in historical accuracy.

Botticelli and Uccello. A contemporary of Mantegna, who lived in Florence in the time of Lorenzo the Magnificent, was Botticelli (a nickname meaning the "little barrel") not recognisable under his true name of Alessandro di Mariano dei Filipepi (d. 1510). Botticelli had a great influence in his time and carried out many commissions for the Medici, his best-known works being *The Birth of Venus* and his *Spring* (Uffizi, Florence). Both these works deal with classical, not religious subjects Another Florentine, Paolo Uccello (1397–1475), whose paintings *The Rout of San Romano* and *Saint George and the Dragon* are in the National Gallery in London, was noted for his concern with perspective. It is recounted how, when his wife used to call him to come to bed, he would exclaim: "What a sweet thing perspective is!"

THE HIGH RENAISSANCE: (*c*. 1490–*c*. 1520).

This is the name usually given to the period when the previously developing tendencies culminated and came to flower. The main figures in the art of this time were Leonardo da Vinci, Raphael, and Michelangelo.

Leonardo (1452–1519), the illegitimate son of a Florentine notary, shows another of the characteristics of Renaissance man: universality. He was a painter, an architect, a philosopher, a poet and composer, a sculptor, an athlete, a mathematician and inventor, and an anatomist. These are the qualifications he gave when applying to Lodovico il Moro, Duke of Milan, who was seeking a city planner and civil engineer. Perhaps because he was so many-sided, his artistic output was small, and he is best known for his *Last Supper* painted on the wall of the refectory of the Monastery of Sta. Maria delle Grazie in Milan, his famous *Mona Lisa* in the Louvre, and his *Virgin of the Rocks*, also in Paris. These show two of Leonardo's particular abilities: the ability to express psychological nuances in the features of his subjects, and the ability to deal with the problems of light and shade.

The extraordinary thing is that, although Leonardo was much admired, few people in his time had any notion of his universal genius. The main reason for this was that much of his work was relegated to the Notebooks which he did not publish and which were written from right to left in what is known as "mirror writing" because it can only be read in a mirror. The anatomy of the body (he himself carried out dissections), the growth of the child in the womb, the laws of waves and currents, the laws of flight, all were studied by this astonishing man, who believed nothing but had to see for himself. In one of his Notebooks we find one of his observations which shows that he forestalled the theory of Copernicus. It reads: "The sun does not move."

Michelangelo (1475–1564) was the name given to Michelagniolo Buonarroti, the great painter and the last great Italian sculptor, who was also a poet. Born of a poor but genteel family in Tuscany, he was as an infant sent out to a wet-nurse, the wife of a stone-cutter, and this he was accustomed to say gave him his passion for sculpture. He was as restless as Leonardo and moved from Florence to Bologna, and from there to Rome and Siena, but his apprenticeship began in Florence in the workshop of one of the leading Quattrocento masters, Domenico Ghirlandjo. Like Leonardo, too, he studied anatomy, but instead of spreading his talents over a wide field as Leonardo had done, he became obsessed with the problem of how to represent the human body. In Michelangelo classical idealism, mediaeval religious belief, and renaissance energy met to produce some of the finest art ever known. At the beginning of the 16th century the architect Bramante, together with Raphael and Michelangelo, were all working in Rome at the same time on the new St. Peter's Cathedral and in the Vatican, whilst the only considerable activity elsewhere was in the Venetian School and the School of Parma, where Correggio was active. The paintings on the ceiling of the Sistine Chapel—a surface of about 6000 square feet—are perhaps the most impressive of Michelangelo's works, but the finest is certainly the painting of the *Last Judgement* behind the altar of the same building. Michelangelo always thought of himself primarily as a sculptor; his marble *Pieta* (St. Peter's) and the statue of *David* (Academy, Florence) are famous, as are the great figure of *Moses* in the church of St. Peter in Chains (originally intended for the tomb of Pope Julius II), and four figures, Day and Night, Dawn and Twilight (originally intended for the tombs of the Medici at San Lorenzo in Florence).

Raphael (1483–1520) of Urbino did not at first understand the new art which was arising in Florence, since he had been taught at Perugia by Perugino, who had not himself absorbed these ideas. It was only when he came to Florence that he came under the influence of Leonardo and Michelangelo. Raphael's Madonnas, which have gained him popularity with all ages for their simplicity and grace, include the *Madonna of the Grand Duke* (Palazzo Pitti, Florence), the *Sistine Madonna* (Dresden), the *Madonna with the Goldfinch* (Uffizi, Florence), and the *Ansidei Madonna* (National Gallery, London). He painted the frescoes on the walls of the *Stanza della Segnatura* in the Vatican, those in the adjoining rooms and elsewhere, and his finest portrait is that of Castiglione. But perhaps because of his more traditional training he never quite attained the stature or the passion of Michelangelo.

Venice: Giorgione, Titian, and Tintoretto. While this work was going on largely in Florence and Rome, the School of Venice, then a wealthy commercial city, was also producing great painters. Using a new oil colour, these artists were noted for their subtle chiaroscuro effects, and their gorgeous colours. Amongst them were Giorgione (*c*. 1478–1510), Titian (1477–1576), Tintoretto (1518–94), and Veronese (1528–88). Giorgione's *Tempest* is in the Venice Academy, Titian's celebrated altarpiece, the *Assumption of the Virgin* is in the Church of Sta. Maria dei Frari in Venice and his portrait the *Young Englishman* can be seen in the Pitti Palace in Florence. Tintoretto's *St. Mark Directing the Search for his Body* at Milan shows him to have learned from Titian, although his style is less vigorous; and Veronese, the grandiose and colourful, painted a group of these Venetian painters in his *Marriage at Cana*, now in the Louvre.

By the year 1517, Luther's attacks on Catholicism had taken effect and the Reformation in northern Europe was well under way. Ten years later Charles V sacked Rome and the High Renaissance was at an end. The Counter-

Reformation of the Jesuits re-introduced clerical control, and the Renaissance pendulum was swinging towards England.

Italian Architecture of the Renaissance.

As in painting and sculpture, the architecture of the Renaissance was based on classical notions, and since the Italians had never cared for Gothic, they were only too eager to return to old, if modified, forms. The first architect of this period was Filippo Brunelleschi (d. 1446) of Florence, where a number of his buildings may be seen. As a young man he had visited Rome with his friend Donatello with the idea of finding in classical buildings some method of raising a dome over the cathedral of his city, which had remained unroofed for nearly a century and was now open to competition for a design. From this visit Brunelleschi acquired an intense admiration for the works of ancient Rome, although he never followed their patterns slavishly, as can be seen in the ingenious double dome which was finally placed on the cathedral. This consists of an inner saucer-shaped dome of stone and an outer one in Gothic line on an octagonal drum. The Foundling Hospital already mentioned in connection with its decorations in della Robbia's terra-cotta had a porch supported by a long row of Corinthian columns, in the spandrels (*i.e.*, the spaces between arches) of which were the terra-cotta bambini. The Pazzi chapel in Florence is also by Brunelleschi, built in 1420. At about this time (1414) the manuscript of Vitruvius' *De Architectura* was discovered in the monastery of St. Gall in Switzerland and had an immediate effect This ancient Roman book ran through many editions and led to further books, such as the one by Palladio (1560) which had such a profound influence on English architecture. So important were the results of Vitruvius' works that Renaissance architecture has been described as "the architecture of a book."

Palaces. Most typical of Renaissance building in Italy is the domestic palace. These palaces mingled mediaeval concepts with classical ones, and one of the first was the Medici palace in Florence built in 1472 by Michelozzo de Bartolemmeo where the horizontal lines and the heavy cornice are obviously classical in inspiration. Drawn between a mediaeval concern for physical security and a more modern demand for the comfort of a settled existence, such buildings looked like fortresses with their thick stone walls and barred windows. There were three storeys, of which the upper two were for the living-rooms, and the whole was grouped round an open courtyard with a statue in the centre and a large gateway to the street.

The Rucellai Palace built later by Leone Alberti (d. 1472) has windows with rounded arches separated from each other by pilasters or built-in columns such as one sees in the Colosseum. Alberti was one of the great architects, a humanist and a strong supporter of classical design; he is associated with the Greek-cross plan in church-building, in which there are four arms of equal length in place of the Latin-cross form of Gothic and Romanesque, with its long nave and short transepts. Alberti also made popular the church façade in the form of a Roman triumphal arch, the main doorway being wide and high, those on each side smaller. Designs of this time were borrowed from classical sources, and such motifs as the egg and dart, leaf and dart, hawk's beak, and honeysuckle were widely used.

The basic principle of three storeys arranged round a central court continued during the High Renaissance, and the Farnese palace in Rome built by Antonio da Sangallo (d. 1546) is in this form, which, however, was elaborated by Donato Bramante (1444–1514), the great architect who worked in Rome at the time. Both Bramante and Raphael (who was also an architect) used double columns in the upper two storeys, with a plain ground storey in place of the rather monotonous single pilaster between two windows. The same design was used in the Grimani palace in Venice, but the Venetians, who delighted in ostentation and elaboration of ornament, took pleasure in the buildings of architects such as Sansovino, who overloaded his works in this way. Bramante's admiration of circular classical buildings like the Pantheon caused him to design the small round church known as the Tempietto near the Vatican. It has a dome resting on a tall circular drum.

St. Peter's Church, Rome. It was Bramante, together with Raphael and Michelangelo, who played the major part in the erection of the greatest church in Christendom, St. Peter's Church in Rome. This had a long history originating with the basilica erected by Constantine over the tomb of St. Peter, which lasted throughout the Middle Ages until its precarious condition made Pope Julius II decide to replace it with a new one. The great building took many years to erect, and the dome, planned by Bramante, was unfinished at his death. Its nave is 80 feet wide, and the central crossing is covered by one of the largest domes in the world, 138 feet in diameter, with its top 405 feet from the ground; the courtyard, with its circular colonnades, was added by Bernini in the next century (1629–67).

Other Representative Figures of the Age.

Typical of the late Renaissance were the buildings of Palladio (d. 1580), whose greatest work is the famous Villa Rotunda near Vincenza, which has a central hall based on that of the Pantheon and four identical sides, each with a porch in the form of a classical temple façade. It is a beautiful, but hardly a practical, building; for by this time the desire to impress and the fussiness which always seems to be associated with the art of a period which has over-reached itself interfered with the ordinary function of building as a practical art.

To the same period belongs a man who was a sculptor and goldsmith, not an architect—the quarrelsome and boastful Benvenuto Cellini (d. 1571), whose memoirs are readable if not always veracious. However, he is important as a representative figure of his age, and one of the few objects from his hand still known is the beautiful golden salt-cellar made for Francis I, king of France, and now in Vienna.

THE RENAISSANCE IN NORTHERN EUROPE.

Literature: Erasmus, Rabelais, and Sir Thomas More.

We began our account of the Italian Renaissance by discussing literature—not because this was the most important art form of the time but because it is the writer more than anyone else who gives an idea of the spirit of his age. In the north, three men who were representative in this way were Erasmus of Rotterdam (1466–1536), François Rabelais of France (1490–1553), and Sir Thomas More of England (1478–1535).

Erasmus was born out of wedlock, the son of a priest. This in itself was no great matter, since the condition of illegitimacy has been that of many great men from Boccaccio and Leonardo to the Emperor Constantine the Great, the "natural" son, to use the kinder mediaeval term, of a barmaid. But to Erasmus it did; for those who had good reason to be rid of him got him into a monastery where he was tied by vows before he knew where he was. All his life he remained a Roman Catholic, yet he was in a sense the founder of the Reformation, and above all a humanist. The thought of Erasmus has two main sources: a thorough grounding in the classics and a pietistic attitude towards religion given him by the brethren of the Common Life, to whose school he went at Deventer. The humanism of the classics, added to the new religious emphasis on good works before correct belief, caused him to castigate with his wit the corrupt practices in the Church of his day and many other aspects of social wrong-doing. *In Praise of Folly* is the most famous of his books

in its satirical account of human stupidity, but the *Handbook of a Christian Soldier*, a guide to practical piety, had much influence amongst the rising middle class, and its general tendency was towards a return to primitive Christianity and a study of the Bible. Erasmus' belief in the improvement of mankind through education led to his friendship with John Colet, Dean of St. Paul's and founder of St. Paul's School in London, where a humanist approach was inculcated.

These attitudes, the criticism of corruption in the Church, the emphasis on good works rather than ritual or belief, the return to simplicity in religion, the study of the Bible, and the importance of education, were the keynote of the Reformation. The leaders of the northern Renaissance advocated humanism but feared paganism, and the Renaissance here was more one of ideas than of art. Even in art a certain severity and abstract beauty of idea (as in the Virgins of van Eyck and Dürer) is more prominent than any sort of sensuous beauty. There were few patrons in the Italian sense save for a handful of potentates and burghers and the wealthy Fugger family, and little of note in architecture—which for the most part continued in a slightly modified Gothic—or in sculpture, which cannot compare with the Italian. Erasmus himself was lacking in aesthetic appreciation: he loathed church music and could not understand why money raised for organs would not be better spent on "poor starving creatures."

Sir Thomas More, Lord Chancellor under Henry VIII, was also a friend of Erasmus, like him was critical of Church abuses, and wrote his *Utopia*—a very important book in which he described an ideal state in order to criticise the society of his own day—to this end. But, refusing to take the oath of Supremacy recognising the Church of England, he was executed. Later he was beatified by the Roman Church and canonised in 1935 by Pope Pius XI.

Erasmus, Colet, More, and others were humanists intent on re-establishing a commonwealth of scholars whose common tongue would be Latin, but another group was, although influenced by Erasmus, essentially bound to its own national life. This latter includes Rabelais, Montaigne, Bacon, and the great writers of England and France. We will speak of Rabelais now, the others later.

Francois Rabelais (1490–1553) was the most significant French writer of the Renaissance and entered a monastic order at the age of seven. On reaching years of discretion, he found his situation displeasing and ran away to study medicine in Paris. He was a worldly monk, a physician, and a humanist who was also secretary to Cardinal du Bellay. Rabelais stood for learning and the right to criticise, and the only person he refers to with unfailing respect throughout his works is Erasmus. Although a Catholic to the day of his death, he mocked at monks and friars as drunkards, lechers, or frauds, and his two great works *Pantagruel* and *Gargantua* (usually read in this country in the translation of Sir Thomas Urquhart known as *The Heroic Deeds of Gargantua and Pantagruel*) are works of genius. Purporting to be the lives of two giants, father and son, they are really an excuse for discussing everything under the sun and mix parody with satire, and comic invention with a coarseness reflecting Rabelais' vast lusts which amuse rather than disgust him.

Artists of the Reformation: Dürer, Holbein, Brueghel.

In Germany, Philip Melancthon (d. 1560) was appointed to the chair of Greek at Wittenberg through the promptings of Erasmus. Turning increasingly towards the doctrines of the Reformation, Melancthon became a friend of Luther and of the greatest artist of the Reformation, Albrecht Dürer (1471–1528) of Nuremberg. Dürer travelled in Italy, but was always basically German, and his finest work is probably the panels of four apostles gifted to the town hall of Nuremberg. His *Self-Portrait* is a remarkable psychological study, and he produced many woodcuts and etchings of great delicacy and beauty. Dürer was admired even in Italy, where Raphael was effusive in his praise and Bellini became his intimate friend. Nature, he believed, was the only possible mistress for the artist, and when a true imitation of nature has been achieved "then it is no more his own, but has become art."

Dürer had been preceded by Martin Schongauer, the first artist to give up much of his time to engraving, now possible through the 15th-century invention of printing, and the period between *c.* 1450 and 1550 produced the greatest German engravers and painters: Dürer himself, Holbein, Altdorfer, Cranach, and others. Hans Holbein the Younger, whose father had also been an artist, belonged to Augsburg. Born in 1497, he too visited Italy, and his work is comparable with that of Dürer. Holbein finally settled in England as Court Painter to Henry VIII and produced many portraits of the great Englishmen of that time, including the monarch himself and the family of Thomas More. Since the Reformation had overtaken him by the time he arrived in England, he could no longer paint Madonnas like the one in his most famous work *The Virgin with the Family of Burgomaster Meyer*, now in Darmstadt.

German painting has peculiar characteristics. It is very emotional, it is obsessed with death, and it has an indefinable quality of fantasy seen, for example, in the magic forests, knights, and fauns of Altdorfer. Landscapes are given an impression of infinite space, and the most extraordinary colour effects are used to heighten emotion, as in Grunewald's *Crucifixion*, where the body is painted dark green. Attention to detail was a lesson probably learned from Flemish masters, of whom we have already mentioned Van Eyck, Van der Weyden, and Hans Memling at the close of mediaeval times. It remains to mention a Flemish artist, Pieter Brueghel the Elder (1525–69), about whose life little is known save that he had been to Italy and remained unimpressed by its influence. His main pictures are of peasant life (*e.g.*, *A Country Wedding*, now in Vienna), yet even his large *Massacre of the Innocents* remains purely northern in its inspiration. But, having reached the Reformation, we must turn now to post-Reformation art and the Baroque period of the 17th and 18th centuries.

THE BAROQUE AGE (*c.* 1600–1750).

The Art of the Counter-Reformation.

Styles in art obviously cannot be crushed into terms of time. The Renaissance, which began in Italy in the 14th century and was at its heyday in the 15th and 16th centuries (Italian *quattrocento* and *cinquecento*), was only just beginning in England when it was dying in Italy. Here maturity in design, so far as Renaissance style in architecture is concerned, began with Inigo Jones (*c.* 1620), developed under Wren, and only began to fade out in late Georgian times. In terms of history we shall take the Baroque Age to extend from about 1600 to 1750, roughly from the death of Michelangelo to the death of Bach, solely because the Baroque style in art was predominant during that era, although not necessarily in any given area. In terms of style, Baroque (the word means a huge pearl of irregular shape) is the art of the counter-Reformation, the movement initiated primarily by the Jesuits in order to reform the Church and bring the straying sheep back into the fold. It is an emotional and dramatic style essentially propagandist in intention; buildings are heavy and pompous in general form and are plentifully covered with voluptuous sculpture on which draperies float rather than hang and festoons of fruit and flowers are everywhere. Columns are no longer plain or fluted but twisted and spiral and are added, together with windows and recesses, not for any structural purposes but as ornament.

In painting, the genuine drama and emotion of the style of such artists as Michelangelo and Tintoretto was imitated until it degenerated into the insincere and theatrical art of Caravaggio,

Guido Reni, and Murillo. Another trait of Baroque art is the emphasis on the whole at the expense of the parts. In a Renaissance palace each storey is considered separately and, like the Roman Colosseum, has its own type of pillars or pilasters; a Baroque building would have immense pillars or pilasters passing from the bottom to the top. A Baroque painting is as closely knit as a jig-saw puzzle; the total effect may be magnificent, but, unlike a Renaissance picture in which each figure made sense, a figure isolated from a Baroque one would look odd.

Since Baroque is the art of the counter-Reformation, it is found only in those countries in which this movement was successful: Italy, Austria, Flanders, and Bavaria. There was no Baroque in England, although traces of its influence are seen, for example, in Blenheim Palace by Sir John Vanbrugh and in Birmingham Cathedral. So what we are really concerned with here is Baroque in most of western Europe and Renaissance in England; in fact, post-Reformation art.

In dealing with the arts of Egypt, Greece, or Rome the task was relatively easy, since we were taking single cultures and watching the slow development of their art. Even in mediaeval times, Europe was some kind of unity. But from the Renaissance when individual countries in the modern sense began to arise the problem becomes different; for what we see is great movements (Renaissance, Baroque, Enlightenment, the Romantic movement) sweeping over Europe and arriving in a number of countries at widely different times and becoming considerably modified by their new background. What are we going to do about the great, but little known, literature of Spain, the literature of Germany, the architecture of Russia? The only solution seems to be that when we come to a great figure such as Cervantes or Goethe, who were of world-wide importance, we must then turn back and give a rapid survey of their predecessors. From this point on, we must skip backwards and forwards over the centuries. We are forgetting strict chronology and are talking in terms of cultural movements.

Characteristics of Baroque Art. Baroque is grandiose, designed to impress, ornate, and the arts in a Baroque building are so interrelated and fused with each other that it is difficult to separate them. The building is conceived as a whole in which architecture merges into sculpture and sculpture into painting. It was designed to sweep the spectator off his feet by its grandeur. So with painting: "a good picture makes better religious propaganda than a sermon," said Frederigo Zuccaro of the Academy of St. Luke. But it was during this period that Italian art and influence began to decline partly due to the loss of trade with the Orient following the discovery of the way round the Cape by Vasco da Gama, and partly because Italy, unlike England, France, and Spain, remained un-united. The tradition of Italy's cultural greatness remained, the reality decayed.

Nevertheless, Rome at this time was becoming a city of magnificence. Streets, squares, fountains, palaces, churches, were being built, and the church of the Vatican was being given great colonnades and sculptured saints with flowing robes very different from the straight lines of Gothic. One of the creators of the new style was the sculptor and architect Lorenzo Bernini (1598–1680), of whom we spoke earlier, father of Baroque. The moving spirit behind it was Inigo Lopez de Recalde, better known as St. Ignatius of Loyola and founder of the Society of Jesus; for it was often the Jesuits who scrutinised plans and provided the money. (Hence in many parts of Europe the Baroque church in a town is still known as the "Jesuit church.") Bernini's canopy over the High Altar at St. Peter's (1630) is perhaps the first Baroque work of art, but the Barberini Palace in Rome, the colonnade in front of the Vatican, *The Fountain of the Four Rivers* in a Roman square, together with the statues of *Apollo and Daphne* and the *Ecstasy of St. Theresa* all attest to his skill. To heighten the effect of his work Bernini employed every artifice he knew, and stucco, variegated marbles, and gold-leaf were lavishly used.

If the earliest Baroque artists were Italian the motivation, through St. Ignatius, was Spanish. Spain had spent eight hundred years in fighting the Moors and doubtless for this reason the fierce and passionate feeling for the Catholic religion is still evident today. To the Spaniards, the Protestant was simply another type of infidel, and St. Ignatius Loyola was the spearhead of the attack against the new heresy. But by this time Spain was almost bankrupt through the mismanagement of her foreign possessions, and in addition had made the grave mistake of purging the non-Spanish Moors and Jews who had contributed so much to her civilisation. There was no money left to build, and so the main art of this time was painting but she could and did encourage the counter-Reformation and with it Baroque art throughout Europe. Spain had never been deeply influenced by the Renaissance, and architecture during the Renaissance period was characterised by the addition of a certain restlessness and ornate decoration imposed on the existing Gothic. This style, known as *Plateresque*, was exported to Latin America, where it can still be seen, but in Spain itself it was soon superseded by Baroque. The Escorial, the palace built in the early 16th century near Madrid by Philip II is, as one writer says, "a solitary example of a style which was eminently fit for the self-imposed prison of a religious maniac but not for human habitation." It is a dreadful bleak building which exemplifies the austere aspect of the Spanish character as the Carthusian monastery at Granada with its mixed Moorish and European elements exemplifies the flamboyant.

Spaniards like large buildings, and Seville has the world's largest Gothic cathedral, although those at Burgos and Toledo are not much smaller. In sculpture, the Portico de la Gloria, the carved door of the Cathedral of Compostello where St. James is believed to be buried, is one of the masterpieces of mediaeval sculpture. The influence here is French, and it was not until the 16th century that a distinctively Spanish style evolved with the work of Alonso Berruguete. This Spanish sculpture was entirely religious, usually in wood, and statues were coloured and often given real hair and clothing. Notable too are the altar-pieces, ceilings, pulpits, and stalls of carved wood with designs of great beauty and richness.

Baroque Painting: Calvaert, El Greco, Velasquez, Murillo.

The originator of Baroque painting was a Fleming, Denis Calvaert (1540–1619), who worked in Bologna and his work was carried on by the three Carraccis who were his pupils. The style of this school is dramatic, pompous, highly emotional, and shows the other traits of Baroque—balanced composition, ecstatic facial expressions, wild gestures, and remarkable effects of foreshortening. *The Madonna with Saints*, by Lodovico Carracci, is a typical example of their work which was carried on by Guido Reni (1575–1642), whose *Head of Christ* and *Aurora* are famous. Caravaggio's (1569–1609) *Entombment* is representative of the work of one of the best of these artists who influenced the art of other parts of Europe, notably the Netherlands. Rembrandt himself owed not a little to Caravaggio, as did Zurbaran in Spain.

The great Spanish painters of this time were the finest in Europe: El Greco (1548–1615), Velasquez (1599–1660), and Murillo (1618–1682). Dominicos Theotocopulos, known as El Greco (the Greek) because he was born in Crete, took up residence in Toledo, where he was in trouble with the authorities of the Church for certain "improprieties" discovered in his work. Fortunately Philip II asked him to paint an altar-piece for his private chapel and thus extended royal protection without which things might have gone hard for the painter (although the finished work was not, in fact, accepted). In a sense, El Greco is the first "problem" painter, the first artist whose works were judged not in terms of "good" or

"bad" but as "peculiar"; he was for a long time believed to be mad, and even now is somewhat of an acquired taste. The figures, elongated or triangular in form, are surrounded by a riot of contrasting colours and the total effect is highly dramatic. His style has been interpreted in terms of Byzantine, Venetian, and other influences, but since Byzantium had been dead for over a century, any influences from this source must have been by way of Venice, where they continued to linger. Important amongst his works are the large *Burial of the Count of Orgaz* and the smaller *Jesus Bearing the Cross*. Most of El Greco's work embellished the city of Toledo, where he was finally recognised as a genius and given a funeral "worthy of a nobleman rather than a painter" as his contemporaries observed.

Don Diego Rodriguez de Silva y Velasquez became a nobleman in his lifetime. He was a member of the Court, chief supervisor of the royal living-quarters, and as an intense realist little influenced by Italian ideas. He produced a whole gallery of Spanish social types (*e.g.*, his *Maids of Honour in the Spanish Court of Philip IV*). His *Rokeby Venus* is in the National Gallery of London and *The Water-seller of Seville* in Apsley House. The Baroque element in Velasquez' work is best seen in his painting *Las Meninas*, which shows the artist himself painting the Infanta Margarita, a reflection of the royal parents in a mirror in the background, two Maids of Honour trying to distract the attention of the little princess, two tutors, and, most fantastic of all, two dwarfs.

Whilst Velasquez was making impressive pictures of the Spanish Court, Murillo, the devout and sentimental, was with such works as his *Immaculate Conception* impressing the multitudes with the glory of the Church. These painters had a considerable effect on the art of the Netherlands then under Spanish domination. But whereas previously the art of this area had been Flemish (*i.e.*, from the area now known as Belgium), the fight for independence which gave freedom and Protestantism to the north (Holland) also brought about a great Dutch art. The 15th-century art of the Lowlands was Flemish, the 16th century showed equal ability of Flemish and Dutch, and in the 17th century the Dutch were supreme.

Spanish and Portuguese Literature.

To the average Englishman Spain is represented by one book—*Don Quixote*, by Miguel de Cervantes (1547–1616). Spain remains in some respect outside the literary tradition of Europe although few nations have produced greater poetry. The plays of Calderón (1600–81) (*Life is a Dream*, *The Prodigious Magician*) and of Lope de Vega, who, two years older than Shakespeare, wrote over 1,500 plays, are of main literary interest today. In devotional literature the *Life* of St. Theresa (1515–82) is one of the most readable of religious works, and the poems of St. John of the Cross (1542–91) together with his prose are great works of mysticism. The Portuguese writer Camões (d. 1580) wrote the *Lusiads*, one of the important epic poems of the Renaissance. In *Don Quixote*, Cervantes created one of the first figures in literature who can be regarded as a person, an individual character. The book recounting his adventures is one of the finest in European literature, a great comic epic which reduced the courtly traditions of the Middle Ages to dust but also showed the new Renaissance man to be equally unreal.

The Netherlands.

Italy, Spain, and Portugal were losing their former power, but Holland, having achieved independence from Spain, was prospering in her lucrative trade with the Dutch East Indies, which she had seized from Portugal. Protestant Holland was tolerant and members of many oppressed religious groups sought refuge there: Jews, Flemings, Anabaptist sects, and Catholics were permitted to live in peace to the great advantage of the Dutch. Printing flourished, since there was no censorship, and the great universities of Leyden, renowned for medical studies, and Utrecht, renowned for law, attracted students from all over Europe. Hugo Grotius (1583–1645) was the founder of international law and in his books asserted the principles of human rights in war and peace, the freedom of the seas, and the importance of morality in international affairs as contrasted with the Machiavellian thesis of expediency.

Dutch Painting: Jan Steen, van Ruysdael, Vermeer, Rembrandt.

As it was in painting that the Dutch excelled, it is worth while noting some of their characteristics in this art. First, its patrons were not noblemen but well-to-do merchants and manufacturers of the new middle class; secondly, and perhaps as a consequence of this, the subject-matter tended to be everyday scenes of ordinary life; thirdly, religious subjects, disapproved of by Calvinists, were much less common than in Flemish or Italian art. Hence we find still-lifes, portraits, city scenes, domestic interiors, tavern scenes, and landscapes. The Dutch, in fact, were almost the first Europeans to paint landscapes as such for their own sake and not merely as a backcloth in the main part of a picture. One aspect of this homely type of art is known as genre-painting—the realistic representation of common people and is best seen in the humorous pictures of Jan Steen (1626–79).

Some of the finest works in landscapes and portraiture were carried out by artists of the Haarlem school. After Rembrandt, the greatest landscapist was Jacob van Ruysdael (d. 1682), known for his *Mill near Duurstede* and the remarkable *View of Haarlem*, three-quarters of which is taken up with depicting cloud-effects. Frans Hals (d. 1666) is noted for his portraits, which give an insight into the characters of his time just as those of Velasquez do in very different circumstances. *The Laughing Cavalier*, *Pieter van der Broecke* (at Kenwood, London), and *Mad Babbe* all reveal a strikingly new technique in portraiture. The figures are natural and do not look (cf. Holbein and Velasquez) as if they had been posed. The last traces of the old tradition of painting an individual of a particular status as he *should* appear have gone and we see real people as in a snapshot taken in the fraction of a second. The manner is impressionistic and had a considerable influence on the later Impressionist school. Little is known of Hals save that he was frequently unable to pay his bills and in his old age was granted a pittance by the municipal almshouse whose governors he painted.

Jan Vermeer (1632–75) of the school of Delft was a painter of the first rank. He produced few pictures and none of any important scenes, but his work shows the triumph of technique over subject-matter: the simple subjects become of only secondary importance in relation to the sheer delight shown by the artist in the beauty of the visible world. Vermeer's paintings include *Head of a Young Girl*, *Young Woman with a Water-jug*, *Young Woman at a Casement*, *The Cook* and *View of Delft*.

There were schools of painting at both Leyden and Utrecht, the latter being noted for its still-lifes, but the most important was that of the wealthy city of Amsterdam to which belonged the greatest painter of Holland and one of the greatest who ever lived: Rembrandt van Rijn (1606–69). His paintings were portraits, landscapes, and large groups, and many were on religious themes. Although fond of scenes of everyday life, he had a distaste for the genre type of painting with its humorous and somewhat condescending representations of common people and its pleasure in rich colour for its own sake rather than as an effect to enhance the whole. Rembrandt was to begin with a fashionable painter, but his realism offended many of his sitters, and he left behind him on his death only some old clothes, his painting gear, and his immortal pictures. The path from relative wealth to lonely old age is depicted in his series of self-portraits, which with his other paintings and etchings (*Jan Six, an Amsterdam Patrician*, *St. Simeon in the Temple*, *Lesson in*

Anatomy, *The Night Watch*, *Christ Preaching*) reveal his immense genius. Rembrandt is always sincere and realistic, he cares little about formal beauty, and when compared with Italian painting many of his figures must shock; but then old age, poverty, weariness, hunger, and sorrow are not inherently lovely save with the beauty of the spirit with which Rembrandt so plentifully endowed them. He was masterly in his treatment of light and shade, and the deep shadows and high lights of his paintings are used to emphasise the impression he wished his subject to give. Rembrandt, even in his religious pictures, took his figures from life, and the Jews in the etching *Christ Preaching* are copied from real people in the Jewish quarter of Amsterdam where he lived for many years.

Flemish Painting: Rubens and Van Dyck.

The Belgians or Flemings, unlike the Dutch, remained Catholic, and the great Flemish artists of this time were Peter Paul Rubens (1577–1640), and the more aristocratic Anthony Van Dyck (1599–1641), both of Antwerp. Rubens was a prolific painter and his workshop had many assistants—virtually, it was a picture-factory. He was probably more strongly influenced by the Italians than by his Flemish predecessors, but he did have in the highest degree the Flemish skill in expressing the texture of cloth and living flesh. This is seen in his delightful *Head of a Child* (Valuz, Liechtenstein Gallery), probably his own daughter, which in its vitality far outsteps the formal portraiture of earlier times. The Italian love of the grandiose is evident in his *Crucifixion* and *Descent from the Cross* in the Cathedral of Antwerp. Van Dyck was a pupil of Rubens and became Court Painter to Charles I of England, where his name was anglicised into Sir Anthony Vandyke. His rather superficial delicacy and elegance was exactly suited to the paintings he made of the noblemen of this society. It was essentially an aristocratic art, and his *Charles I of England* in the Louvre is one of his best-known works. Rubens' figures are robust, full of life, and sturdy, Vandyke's express the ideals of noble blood and gentlemanly ease.

Architecture.

Baroque architecture and its final phase Rococo, which will be dealt with later, is admirably represented in the private houses and municipal buildings of Holland, such as the town hall of Bolsward and the Butcher's Hall in Haarlem. But some of the greatest glories of this style are to be found in Bavaria (the churches of Ottobeuren, Zwiefalten, Neresheim, Steinhausen); in the Austrian churches which, under Italian influence, were sumptuous and sombre; and in Switzerland (Ittingen, and the library of St. Gall). As has been mentioned, Baroque structures were built as single entities, and in many of these buildings the interior decoration is more remarkable than the architecture. Nevertheless, buildings such as the church at Einsiedeln in Switzerland together with the others named above are superior in that country to the mediaeval heritage.

The English Renaissance: Elizabethan Literature.

The glories of the Elizabethan age need not be emphasised here. By this time the Anglican Church had been established, Catholics and nonconformists were disapproved of, Drake and Raleigh were plundering the Spanish colonies, and the Armada was to be defeated. There was increasing prosperity, and the nation which, up to the time of Henry VIII had been noted for its gross table manners and lack of elegance, was becoming sophisticated, luxurious, and cultured. Music flourished as it has never done since, and the drama reached heights of excellence which make this not only one of the great periods of English history but of world history; it was the English Renaissance. Typical of the style of this time was an ornate and flamboyant quality copied from the Italian and known in England as "euphuism," in Italy as "Marinism" (after the name of a poet who affected it), and in France as "préciosité"; it was pure Baroque, but although used by William Shakespeare from time to time, most of his work rose high above contemporary mannerisms. We have already seen how many of the plots of the Elizabethan dramatists were of Italian origin. Here little will be said about Shakespeare (1564–1616), of whose life in any case so little is known that ingenious persons have sought to attribute his plays to others. Shakespeare is too great to need any commendation, and for the same reason we shall only mention the Authorised Version of the Bible made in the reign of James I (1611). Yet the works of Shakespeare and the Bible have been the most powerful force in English literature, and the Authorised Version is certainly the finest translation ever made if not the world's greatest literary work. Christopher Marlowe (1564–93), died before his thirtieth year, killed in a tavern brawl at Deptford; he is, after Shakespeare, the greatest Elizabethan dramatist and his *Dr. Faustus*, *Tamburlaine the Great*, and *Edward II* are still performed. Ben Jonson (1573–1637) was a friend of Shakespeare's, Poet Laureate from 1619, and achieved the distinction of being buried in Westminster Abbey. His comedies *Every Man in his Humour*, *The Alchemist*, and others were based, like those of Molière, on the Italian Commedia dell'Arte, but since tastes in comedy change more quickly than in tragedy (nothing could be more boring than Shakespeare's comic scenes today), Jonson, in spite of excellent adaptations, is of mainly historical interest.

Other important works of the early part of this period are the *Faerie Queen* of Edmund Spenser (1552–99), the *Essays* and *Novum Organum* of Francis Bacon (1561–1626), the *Voyages* of Richard Hakluyt (d. 1616), and *The Book of Martyrs* of John Foxe (1516–1587). Spenser is, of course, one of our greatest poets; Bacon in his philosophy suggested that the doctrines of religion could not be arrived at by logic, that theology and science are separate fields, and that induction (*i.e.*, the arrival at general conclusions from the collection of many facts) is the true method of science; Hakluyt was the first English naval historian; and Foxe, whose book was once thought "improving" amongst Protestants is one of those religious writers whose works in their descriptions of martyrdom leave one with a vague impression of indecency. The *Ecclesiastical Polity* of Richard Hooker (d. 1600) is famed for its prose but otherwise of little interest to the general reader.

Renaissance Music.

The two greatest names of this period when music as we understand it was being born were those of Orlando di Lasso of Flanders (d. 1594) and Giovanni Pierluigi da Palestrina (d. 1594). Lasso's *Seven Penitential Psalms* are his best-known composition, and with it we see the beginnings of harmony in which the composer thinks of music in terms of the sound at a given moment—vertically rather than horizontally, chords rather than polyphony. This new style was followed by Palestrina, the very non-celibate choir-master of the Pope's Capella Giulia, whose *Mass for Pope Marcellus* was accepted as a model. It was Palestrina, too, who perfected the madrigal, a composition for unaccompanied voices that made use of polyphony as well as simple chords. This new type of secular music was sung in Italy, Flanders, France, and, above all, England. In the 16th century, also, instrumental music independent of singing was first written, the instruments used being viols, virginals, recorders, and lutes. William Byrd (1543–1623) is one of the most important English composers of madrigals, although he was also an innovator in instrumental music who wrote compositions for strings, for the virginal, and for solo voice. The songs which he wrote to be sung in stage plays paved the way for Italian opera, initiated by Claudio Monteverdi (d. 1643) with his *Orfeo* and *Arianna*, the performances of which were attended by thousands and admired throughout Europe. Monteverdi was the first composer to use an orchestra with carefully specified music and to design recitatives which,

instead of merely imitating the rise and fall of the human voice, had a real emotional impact. The beginnings of opera and oratorio date from this time, as also does the no-longer existent masque for which in England music was written by Henry Purcell (d. 1695), organist of Westminster Abbey, composer, and greatest of our musicians.

Later Baroque: the Rise of France.

The age of Louis XIV marks the ascendancy of France over Italy, Spain, and the Netherlands. When Louis came to the throne in 1643, France had been involved in the disastrous civil wars which followed the Reformation and was no longer prosperous. Richelieu, however, solved the problem by granting the Huguenots (French Protestants) certain liberties and, above all, by increasing the power of the throne at the expense of the nobles. He was the founder of absolutism in France. The Court of Louis XIV revolved around the person of the monarch; it was highly formal and magnificent, and in its elegance and refinement put an end to the old court life of coarseness, drunkenness, and fighting. The *Essays* of Michel de Montaigne (1533–92) belong to an earlier period, and the essay form is of his own invention. Montaigne was a moderate Catholic who remained neutral during the religious wars, a lawyer and country gentleman, twice mayor of Bordeaux, and when towards the end of his life he was offered a court appointment it was refused in favour of a quiet life on his own estates. His position is that of a Stoic and rationalist accepting the facts that the earth is not the centre of the universe and that man is not very different from other animals. He was tolerant, believing that facts can only be interpreted in terms of their time and place, and above all he was interested in himself as a sample of the species man; for, as he said, " Every man bears within him the complete pattern of the human condition." Montaigne is a great master of style, and his essays are as readable now as when they were first written.

Painting: Poussin, Claude.

The great French painters of the age were Nicolas Poussin (1594–1665) and Claude Gelée (1600–82) better known as Claude. Poussin lived in Rome and was one of the neo-classical or academic school which attempted to improve on nature with an artificiality based on a study of classical statues. Such paintings as *Et in Arcadia Ego* in the Louvre depict quite unreal shepherds and beautiful young women in an Arcadia which belong only to the imagination. The skill with which the work has been carried out is remarkable, but its nostalgic concern with a totally unreal past invokes little response today. Claude, too, lived in Italy, but in spite of his studies from nature in the countryside around Rome, chose to depict dreamlike visions of the past. Yet his landscapes set a new standard by which real scenery was judged for a century after his death. Many wealthy Englishmen modelled their parks or gardens on those in Claude's works, and, as Gombrich says: " many a piece of the lovely English countryside should really bear the signature of the French painter who settled in Italy." His paintings are represented in the National Gallery.

Architecture: Versailles and the Louvre.

The palace of the Louvre had been started a century before (1546) by the French architect Lescot, but later Bernini (d. 1680) was brought from Italy to continue the work which he conceived in a grandiose style paying little attention to mere comfort or convenience. The more effective palace of Versailles designed by Jules Mansart, whilst characteristic of its age, is less flamboyant than the Baroque of Italy. Formal gardens were popular, and were laid out in geometrical patterns of flowers and shrubs with statues scattered throughout. Mansart also is responsible for the Church of the Invalides in Paris (1706).

French Drama and Literature: Molière, Corneille, Racine, Pascal and others.

To a considerable extent the centre of artistic life in the days of Louis XIV was the salon in which women played a leading part and drama, music, prose and verse were cultivated. It was a centre of polite conversation, elegant manners, fine clothes, and learning. The great dramatists of the age were Molière (the stage name of Jean-Baptiste Poquelin—1622–73), Pierre Corneille (1606–84), and Jean Racine (1639–99). Molière began as an actor and was influenced by the Italian Commedia dell'Arte, from which he derived his stock characters: boastful captains, pedantic doctors, retired tradesmen. Unsuccessful in their production of other plays, his company staged some of Molière's in which he took the chief comic parts, and these were so satisfying to the public that he was asked to appear before the king. Molière developed a style in comedy all his own, satirising people of many types: corrupt noblemen, religious hypocrites, doctors, lovers. Amongst his best-known plays are *Tartuffe*, *Le Médecin malgré lui*, *L'Avare*, *L'Ecole des Maris*, *Le Misanthrope*, *Le Malade imaginaire*. With *Tartuffe* he achieved complete maturity, giving real individuality to his characters, and annoying those against whom the play was directed. When Molière started to write, comedy had been regarded as a trivial aspect of the drama, when he died it had become an important part of theatrical art.

Corneille and Racine are very great playwrights whom it is nevertheless difficult for those who are not French to appreciate. Their themes are mostly taken from classical literature (although Corneille was through this medium preaching against the new totalitarianism of Richelieu), their style is rhetorical, and their characters are unnaturally noble—" Corneille painted men as they ought to be," said one critic. The intelligent Englishman finds these plays perfect—almost too perfect—in construction, perfect in economy of words, and much too perfect in their simplicity of plot, which tends to be centred round a simple moral problem rather than the behaviour of real people. No wonder the dramatists of France thought Shakespeare barbarous! Corneille wrote *Le Cid*, *Horace*, *Cinna*, and *Polyeucte*; Racine *Alexandre le Grand*, *Phèdre*, *Iphigénie*, *Andromaque*, *Britannicus*, *Athalie*. Whatever our imaginary Englishman may think, Racine is the greatest of French dramatists and one of the greatest of all time.

Nicolas Boileau (1636–1711), who wrote a number of foolish satires is important as the lawmaker of taste in this age when classical concepts were dominant. His *Art of Poetry* argued that good style is characterised by naturalness, truth, beauty, and reason and influenced both Dryden and Pope. In religious matters Jacques Bossuet (d. 1704) took a right-wing point of view, supporting the Church and Crown, Fénelon (d. 1715) was progressive in his views on education, war, and politics, and Jansen (d. 1638), a Netherlander, expressed his unpleasant views based on St. Augustine's doctrine that free-will does not exist. Jansenism is of importance mainly because it was accepted by Blaise Pascal (1623–62), whose *Provincial Letters* and *Pensées* are among the greatest glories of French literature.

The letters of Mme de Sévigné (d. 1696), the maxims of La Rochefoucauld (d. 1680), and the character sketches of Jean de La Bruyère (d. 1696) are all typical of the polished and cynical prose of the time, during which, however, Charles Perrault was also writing the fairy tales—or retelling them—of Bluebeard, Cinderella, and Little Red Riding-Hood. The tales and fables of Jean de La Fontaine (d. 1695) provide another example of the literature of the days of Louis XIV; his earlier efforts are mildly indelicate stories drawn from Rabelais and Boccaccio in verse couplets, but later, in his first book of fables dedicated to the seven-year-old Dauphin, he made use of the animal tales of Aesop and other Greek writers. La Fontaine is remarkable in that he is able to please everyone; his fables delight children, please students by their style, and older people find in them witty comments on human life.

English Literature of the Restoration Period: Bunyan, Milton, Dryden.

This period in England was a troubled one which saw the reign of James I, the execution of Charles I, the Commonwealth under Cromwell, the Restoration under Charles II, and the "Glorious Revolution" of 1688. Basically the issues were about the relationship between king and government and the nature of the church of England, and in an age of political experiment it was natural that political philosophers should arise. The most important of these were John Locke (1632–1704) and Thomas Hobbes (1588–1679). Hobbes' *Leviathan* supported the side of absolutism claiming that man's life is "nasty, brutish, and short," that men are instinctively aggressive, and that therefore a strong government is necessary to keep them under control. Locke, on the other hand, was a liberal who believed that sovereignty lies with the people, that their religious beliefs are their own affair, and that political decisions should rest with the majority. His *Essay on Civil Government* expresses these views.

We saw that a problem had been made over the authorship of Shakespeare's plays on the grounds that the real Shakespeare must have been too uneducated to write them. But such a view underestimates the extent to which the language and knowledge of a period can impregnate the common mind and deeply influence the mind of a genius however small his education. An example of this is John Bunyan, whose *Pilgrim's Progress* and *The Holy War* are two of the greatest allegories in European literature. (*See* **M12**.) John Bunyan (1628–1688) was a travelling tinker and preacher who was thrown into prison on the Restoration, but he had obviously studied his Bible to some effect, and *The Pilgrim's Progress* contains some of our finest prose. Nobody who has read this book will ever forget the death of Mr. Valiant-for-Truth for whom "all the trumpets sounded on the other side."

John Milton (1608–74), a very different man, since, although a Protestant, he had a deep knowledge of the classics, is one of our greatest poets. His long poems *Paradise Lost* and *Paradise Regained* are unlikely to be read in full by the general reader of today, but his sonnets, his *L'Allegro*, *Il Penseroso*, and *Lycidas*, will last as long as our language. Milton was probably influenced in his *Paradise Lost* by the great Dutch poet Joost van den Vondel (d. 1679), whose *Lucifer* is the peak of Dutch poetry. Samuel Butler (1612–80)—not to be confused with the Victorian one—wrote *Hudibras*, a long satirical poem directed against the Presbyterians, which, whatever its virtues, is little read now.

John Dryden (1631–1700) is another of our great poets whose important satires *The Hind and the Panther* (about the Church of Rome and the Church of England), and *Absalom and Achitophel* (about the Whigs) belong strictly to the category of "Eng. Lit."—like *Hudibras*, they are dealing with issues which are no longer important. Yet much of his verse and his translation of Virgil can still be appreciated. Dryden's life follows the changing ideas of his time: first a Puritan, then a Royalist, and, under James II, a Catholic, he got what he deserved—a tomb in Westminster Abbey. Another great poet of the time was Alexander Pope (1688–1744), whose *Rape of the Lock*, *Essay on Man*, and *Essay on Criticism* in their stylised elegance will continue to be read when his translations of Homer are not.

Architecture in England.

The situation in England was different from that in other European countries in that the Renaissance and the Reformation virtually arrived at the same time. Consequently, as Trevelyan says, "Shakespeare's England had a charm and lightness of heart, a free aspiring of mind and spirit not to be found in the harsh Jesuit–Calvinist Europe of that day." We have seen how the famous treatise of Vitruvius' *De Architectura* influenced the architecture of this time, and the earliest works of the Renaissance in England were carried out by Florentine craftsmen such as Pietro Torrigiano, who designed for Henry VIII the tombs of Lady Margaret Beaufort and of Henry VII, both in Westminster Abbey. This was at a time when Gothic churches were still being erected by English masons, but the terracotta medallions and busts of Roman emperors built into the walls of Hampton Court (a Gothic building) were nevertheless made by the Renaissance Italian, Giovanni da Majano, under commission from Cardinal Wolsey. Up to the date of Henry's death the building work done by Italians was confined to the relatively small ornamental details. A later, and on the whole unfortunate influence, came from Germany, France, and the Netherlands, when refugees from Catholic persecution came to this country to produce such perverted versions of classical art as Wollaton Hall near Nottingham or the "Tower of the Five Orders," applied to the Gothic front of the Bodleian Library at Oxford by English imitators. However, we owe to these refugees many charming carved Jacobean pulpits and the brick gables of East Anglia which resemble those of Bruges.

Tudor Domestic Architecture. In Elizabethan times the belief in "sweetness and light" began to spread to the country house, formerly a virtually fortified dwelling grouped around a courtyard with a drawbridge, moat, and battlements, and a single important room, the "great hall." The quadrangular plan remained but the rooms became spacious and beautiful and gardens were an integral feature of the design. The "long gallery" on the first floor which ran from end to end of the house overlooking the gardens was the great glory of Elizabethan and Jacobean architecture. In Aston Hall near Birmingham the gallery is 136 feet long, and the symmetrical lay-out of the building is in strong contrast to the irregularity of late Gothic houses. The horizontal lines of Italian are apparent, but the mullioned windows, gables, turrets, and pinnacles are pure English. These great houses scattered throughout the country vary according to the materials of the locality: brick in East Anglia, rough masonry in Yorkshire and Westmorland, more delicate masonry in the Cotswolds, timber or "half-timber" work in Kent and Cheshire. Amongst them are Haddon Hall, Bolsover Castle, and Hardwick Hall in Derbyshire; Hatfield House in Hertfordshire; Holland House in Kensington; Fountains Hall in Yorkshire; and Montacute, Longleat, and Barrington Court in Somerset.

Jacobean to Georgian: Inigo Jones and Christopher Wren. The Gothic tradition in architecture was long in dying and continued even after Inigo Jones (1573–1631) had introduced the doctrines of Palladio. In fact, in remote areas Gothic features persisted in buildings of up to 1700 or later. But Renaissance style can be seen at Caius College, Cambridge; Wadham College, Oxford; the halls of Gray's Inn and the Middle Temple, the Staple Inn, and the hall of the Charterhouse (all in London); and the Whitgift Hospital at Croydon, the Abbot's Hospital at Guildford. Of Inigo Jones little is known save that he was born in Smithfield and his father, a clothworker, was fined for using bad language. He was connected, too, with the theatre and was the inventor of movable scenery; amongst the few buildings which can be certainly ascribed to him are the Banqueting House in Whitehall, the Queen's House at Greenwich, and the original St. Paul's Church in Covent Garden. The style is always severely classical unlike that of Sir Christopher Wren (1632–1723), who treated architecture in a much more free and unacademic way. Wren built in a definitely Protestant fashion and would have no truck with Jesuitism or Baroque fashions; as an architect he was an amateur who did not receive his first commission until he was forty years old (although it is fair to say that by this time he was a founder-member of the Royal Society, a professor of astronomy at Oxford, a renowned mathematician, an inventor, and had shown great talent for drawing). He was that rare creature, a universal genius, and England's greatest architect. Amongst his works are the chapel of Pembroke College, Cambridge, the Sheldonian Theatre at Oxford, the cathedral of St. Paul's and the church

of St. Mary-le-Bow (built after the Great Fire of London) part of Hampton Court, the library of Trinity College, Cambridge, the "Tom Tower" of Christ Church, Oxford, Greenwich Hospital, Chelsea Hospital, and Kensington Palace with its famous Orangery.

THE AGE OF REASON, 18TH CENTURY.

Influence of Descartes and Voltaire.

We shall take the Age of Reason or the Enlightenment to extend from the end of the Baroque period to the beginning of the French Revolution in 1789. But the word "reason" should not be understood in terms of modern rationalism, for in the 18th century, under the influence of Descartes (d. 1650), the word meant not the discovery of general principles based on many facts but rather the deduction of many "facts" from first principles. Thus Descartes based his philosophy (in his *Discourse on Method*) on the thesis: "I think, therefore I exist." Christianity by this time had been somewhat discredited by the religious wars, its numerous sects, and by the new scientific discoveries. The works of Kepler, Galileo, and Newton had caused men to believe that, whatever the origins of the universe and whoever its Creator, it must be governed by fixed laws to which there can be no exception. The existence of God was not denied, but it was denied that He intervened in the running of a universe for which he had made adequate arrangements in the beginning. Miracles were out of fashion and religious rites were regarded as superstitions. This type of belief is known as "deism," but, however reasonable it may have appeared, it flourished in a society which was prepared to accept highly irrational beliefs in witchcraft, astrology, and alchemy.

Typical of the thought of this age are the works of Tom Paine (d. 1809), Pierre Bayle (d. 1706), and Voltaire (d. 1778). Paine was one of those Englishmen accepted on the other side of the Atlantic as an American because he chose latterly to live there; he is as "American" as the Scotsman John Paul Jones who founded the navy of that country. Paine's *The Age of Reason* is a well-known rationalist work which takes the view that Christ was a "virtuous and an amiable man" whose beliefs were not substantially different from those preached by other good men from the earliest times. Bayle's *Historical and Critical Dictionary*, which nobody is likely to read now, was of great importance in its day in asserting that religious beliefs were myths and that people should be allowed to think as they please.

Voltaire, the pen-name of François Marie Arouet, is the key-figure of his time and dominated the 18th century from the Regency to the Revolution. The pupil of a Jesuit school, he was twice in the Bastille, and then spent some time in exile in England, where he met such men as Pope, Swift, and Congreve, learned to speak English and admire Shakespeare, and developed an affection for English political institutions expressed in his "Letters on the English." Voltaire's works which earned him fame and disapproval were his *Life of Charles XII of Sweden* and his *Age of Louis XIV*; he also for his sins spent some time at the court of Frederick II of Prussia, who fancied himself as a writer and wished to profit from the Frenchman's tuition. But the only work by which Voltaire is remembered now is his *Candide*—a novel in which he struck back, following the disaster of the Lisbon earthquake, at the belief of the philosopher Leibnitz that "all things work for the best in the best of all possible worlds." Candide, brought up by his professor to accept this belief, goes through the most appalling series of tragedies before he realises its absurdity. *Candide* is one of the great European novels and its end, in which the hero decides to leave the idiocies of the world and cultivate his own garden, is well-known. But mostly Voltaire is known as the great opponent of sham and hypocrisy, the enemy of the royal courts of Louis XIV and Louis XV, and the originator of the phrase "Ecrasez l'infâme"—crush the infamous thing—with which he ended so many of his letters.

Historians: de Montesquieu, Vico, Gibbon.

Another sceptic, De Montesquieu (d. 1755) was also an admirer of the English, and his *Spirit of Laws* expresses this admiration. Together with the Italian Giambattista Vico of about the same period he was one of the first historians to seek for some logic in history; both were, in a sense, the predecessors of Karl Marx (a very great man whatever one may think of his theories). These men saw that history is more a matter of movements than famous people and that factors quite outside our control influence our behaviour. But one of the greatest historians and perhaps the greatest writer of this time was Edward Gibbon (1737–94), whose *Decline and Fall of the Roman Empire* is one of the most important historical works ever undertaken. It is a fine piece of English prose, based on his beliefs that Rome was a peak in civilisation, that it was destroyed by the Goths and Christianity, and that the Middle Ages and the Byzantine Empire were utterly barbaric. These ideas are typical of the period, although not on the whole acceptable now.

English Philosophers and French Encyclopédistes.

The conflicting philosophies of the 18th century, whatever their superficial differences, belong to their age. We have already mentioned Hobbes with his purely materialist approach and Locke's political philosophy. But Locke's other work *Essay Concerning Human Understanding* was important in that it took issue with the teaching of Descartes that there are innate ideas. The mind, according to this book, is initially a blank slate on which sensations are imprinted through experience. George Berkeley (d. 1753), in his *Principles of Human Knowledge*, asserted that the only things that exist are ideas (but then Berkeley was an Irishman); and David Hume (d. 1776) of Edinburgh, in his *Treatise of Human Nature*, founded modern philosophy. His completely sceptical and empirical approach is as typical of British philosophy as the wordy metaphysics of Kant and Schopenhauer are typical of German.

This was also the age of encyclopedias, the attempt to compress all knowledge into a few volumes. Diderot, de Condillac, and d'Alembert managed to do this in 17 volumes of text, 11 volumes of plates, 1751–72. Their work was based on that of Ephraim Chambers, whose *Cyclopaedia* was published in London in 1728. The French *Encyclopédie* was the most influential work of the Age of Reason setting out its ideals of deism, belief in progress, and distaste for absolutism and the Church.

Painting.

In spite of royal absolutism, this was increasingly a middle-class age, and the paintings of Jean Chardin (d. 1779) and Jean Baptiste Greuze (d. 1805), like those of the Netherlands at an earlier period, are essentially genre in style, depicting ordinary people and scenes. But the other side of the penny was the aristocratic art of Louis XV known as *Louis Quinze* or "Rococo". This style is late Baroque which has lost its solemnity and become subject to foreign influences—notably Chinese. Furniture, painting, architecture, become, as one might expect in the art of a decaying aristocracy, fantastic, restless, refined, and light. In architecture, Rococo is seen at its best in Vienna, Munich, Prague, and Dresden, but in Britain the style is represented by neo-classical Palladianism—only a near approach. In painting the best expression of Rococo is found in the works of the French painters Watteau, Boucher, and Fragonard.

Painting in France: Watteau, Fragonard. Jean Antoine Watteau (d. 1721) is the originator of the Rococo style in painting. His colours are delicate, his settings idyllic, royal, or connected with the theatre; they have no connection with reality and depict an imaginary life in which the sun always shines, men and women are always beautiful, and shepherdesses dance endless minuets. Neverthe-

less. Watteau was a great painter who has to be accepted in his context of grace and gallantry. François Boucher (d. 1770) was a favourite of Madame de Pompadour, produced many pictures in the "nymphs and shepherds" style characteristic of Watteau, and was famous as a decorator of boudoirs. His friend Jean Honoré Fragonard (d. 1806) had a taste for the picturesque in nature and devoted himself to painting pictures of contemporary life. Baroque was flamboyant but robust. Rococo frivolous.

Painting in England: Hogarth, Gainsborough, Reynolds. Previously there had been little tradition of painting in England, and the victory of Protestantism had made things even worse; for the Puritans could only understand the function of the artist as providing likenesses or improving the mind. Even portraiture had been mainly carried out by foreign artists such as Holbein and Vandyke. So when William Hogarth (1697–1764) came on the scene as an engraver who had to make his living by illustrating books it was necessary for him to create a type of art which would appeal to his countrymen, an art which would point a moral. His series of paintings *Rake's Progress* show the apparently inevitable development from laziness to crime and death (they may be seen in the Soane Museum in London) and his *Four Stages of Cruelty* illustrate the development from teasing a cat to brutal murder. However, Hogarth's fame during his life-time rested more on the engravings copied from his paintings than on his actual work, which was not taken seriously. Sir Joshua Reynolds (d. 1792) took the great masters of the Italian Renaissance as his models, he believed that there are certain rules of taste and that only the grand and impressive could be Great Art. But living at a time when portraiture was fashionable and other kinds of art were not, he, like his younger contemporary Thomas Gainsborough (d. 1788) painted elegant and graceful likenesses of the well-to-do though Gainsborough much preferred painting landscapes. Many of the paintings of Reynolds and Gainsborough can be seen in the National Gallery and the Wallace Collection in London. Gainsborough was the country-lover, Reynolds the man-about-town.

The End of Rococo.

The Rococo Age closes with the sculptor Jean Antoine Houdon (d. 1828), whose fine bust of Voltaire is in the Victoria and Albert Musuem, and the painter Jacques David (d. 1825), whose *Death of Socrates* shows the formal and classical approach typical of this dying period. But in England this was the time of the great Anglo-Irish writers, Swift, Sheridan, Goldsmith, and Congreve, and of the very English Samuel Johnson and his even greater biographer the Scotsman James Boswell. Jonathan Swift (d. 1745) was born in Dublin, educated at Trinity College, and became Dean of St. Patrick's in 1713. His *Gulliver's Travels*, *Tale of a Tub*, and *Journal to Stella* are representative of his skill in political satire and his extraordinarily tortuous mind, with its mixture of sentimentality, cruelty, and obscenity. Richard Brinsley Sheridan (d. 1816) is one of England's greatest playwrights, whose *School for Scandal* is still a favourite, although *The Rivals* brought about his ownership of Drury Lane, and Oliver Goldsmith (d. 1774) author of *The Vicar of Wakefield* and writer of the play *She Stoops to Conquer* is a close second. William Congreve (d. 1729) was famous in his time for his comedies, and like other people whose works we no longer read is buried in Westminster Abbey. (By and large it is true to say that very few people who matter at all today have had this honour.) This is true of Samuel Johnson (1709–1784), whose *Dictionary* was published in 1755, who was buried at Westminster, who wrote nothing which is readable nowadays—not even his novel *Rasselas*—and who is mainly of interest as the subject of James Boswell's *The Life of Dr. Johnson*. Boswell (d. 1795), the drunken, profligate Scot produced the finest biography in European literature, and his *Boswell Papers*, a collection of his journals and letters brought together at Yale University, are also well worth reading.

Music of the 18th Century.

The 18th-century orchestra was not the orchestra we know today. Its basis was the harpsichord; the violin was only beginning to displace the viol; and woodwind instruments, although they played an important part, were still crude. The piano, in which the strings are hammered instead of plucked, as in the harpsichord, had been developing since 1709 when the Italian Bartolomeo Cristofori produced an instrument which solved one of the fundamental problems of the piano—how to get the hammer to move back after the string has been struck. Later versions of the clavier and clavichord, as these early instruments were called, were almost all designed in Germany; the modern type of piano (or something like it) dates from the model designed by Silbermann of Bavaria about 1790. (By 1824 there were numerous manufacturers all over Europe supplying the needs of the ordinary citizen to whom the possession of a piano soon became a badge of prestige.)

The End of Baroque: Corelli, Scarlatti, Bach, and Handel. The works of the Englishman Henry Purcell (1658–95) brought about developments which led to the later achievements of J. S. Bach, whose death in 1750 is generally taken as the end of the Baroque period. Other important names of this phase are the Italian Corelli (1653–1713), the first great violinist and composer for the violin; Alessandro Scarlatti (1660–1725), another Italian, composer of operas, and his son Domenico (d. 1757), harpsichord player, important in the evolution of the sonata; the French harpsichord composer Couperin (1668–1733), contemporary of the Rococo painter Watteau, and Handel (1685–1759).

J. S. Bach was one of the greatest composers of all time and represents the consummation of the fugue form. Like Purcell, he was an organist and composed many pieces for this instrument. It was during his stay in Leipzig, where he was organist at the Thomaskirche, that he produced most of his finest works. He played an important part in improving the standards both of composition and playing for the organ, which he also used, together with strings and wind-instruments, as an accompaniment to solo and chorus voices in his cantatas. Among his many works are the Brandenburg concertos, the Mass in B minor the St. Matthew and St. John Passions, and the Italian Concerto. Bach had numerous children, several of whom had considerable musical talent if not their father's genius.

Handel spent most of his life in England. He was famed for his operas and oratorios, musical forms which date back to 16th-century Florence. Handel with his *Messiah*, *Saul*, *Samson*, *Judas Maccabaeus*, and many other compositions in this form, is undoubtedly the greatest composer of oratorios who ever lived. His operas are now seldom performed, although he composed over forty. The famous "Water Music" is alleged to have been composed to placate George I, who, as the former Elector of Hanover, was piqued because Handel had chosen to abandon Hanover for life in England. In old age Handel, like Bach, became blind; he is buried in Westminster Abbey.

The Classical Period: Haydn, Mozart, and Schubert. The period which opened with the passing of Bach and Handel was a classical period, one which saw the perfection of the sonata and the symphony, the creation of chamber music, and the clavichord and harpsichord superseded by the pianoforte. The composer's patrons were princes and noblemen at whose courts the new musical forms developed; even religious music was as often composed for performance in a princely court as for the use of churches. The important names of this period are C. P. E. Bach (d. 1788), son of the great Bach, who gave the sonata its first clear expression; Haydn (1732–1809), who founded symphonic orchestral music; Mozart (1756–91), whose instrumental writing for sheer beauty is unequalled; and towards the end of the period, Beethoven (1770–1827), who took classi-

cal forms and transfigured them into something quite new; and Schubert (1797–1828), creator of the German *Lied*, who represents the link between classicism and romanticism.

Haydn's birthplace was a small town on the Austro-Hungarian frontier where his father was a wheelwright. After leaving home he lived in poverty in Vienna, making small sums of money by teaching young ladies to play the clavier. His early compositions, like those of Mozart and Beethoven, were strongly influenced by the music of C. P. E. Bach, and at the age of 27 he became court composer to a Bohemian count. This position was followed by a more lucrative one at the court of Prince Esterhazy, a Hungarian whose patronage was to influence Haydn for many years. In middle age he became friendly with Mozart, who was only half his age and the two, although totally different in character, somehow supplemented each other and brought about considerable changes in music. Haydn is best known for his two great oratorios *The Creation* and *The Seasons* (written in his old age), his string quartets, and his symphonies, of which he composed 104. His visits to England proved of great importance; for it was there he first met Handel and was deeply impressed by a performance of the *Messiah* in Westminster Abbey. It was England, too, which first recognised him as a composer of the first rank and gave him the rare honour of a doctorate at Oxford University for which his "thesis" was the Symphony No. 92.

The life of Mozart was very different from that of his friend Haydn. Born in Salzburg, he was a musical prodigy, and from the age of four toured the courts of Europe. At the age of 26 he went to live in Vienna, where he died in poverty in his thirty-sixth year. His unpleasant money-grubbing father never ceased to advise him as to conduct in his many letters: Mozart was too easy-going and was told "you are too ready to answer jestingly on every occasion"; another letter reminds the composer "never lose sight of your main object which is to make money"; and yet another "do not neglect the popular style which tickles long ears."

A vist to Mannheim, the birthplace of German opera, had an important influence on Mozart, for it was there that he conceived the idea of producing German operas which would rival those of Italy and France. The result was three of the greatest of all operas: *The Marriage of Figaro*, *The Magic Flute*, and *Don Giovanni*. His finest symphonies—No. 39 in E flat, No. 40 in G minor, and No. 41 in C major (the Jupiter)—were composed in six weeks during the summer of 1788. Mozart also composed string quartets, piano concertos, and an immense number of dances, songs, and *divertimenti*. Towards the end of his life he engaged in another frenzy of composition to complete for the coronation of the king of Bohemia the opera *La clemenza di Tito* which he did in eighteen days whilst travelling from one town to another. Returning to Vienna in an exhausted state, he was approached by a mysterious stranger dressed in grey who commissioned him to write a Requiem Mass for an anonymous patron. Mozart became obsessed with the belief that this individual was God Himself and that the requiem was for his own funeral. Taking to bed he waited for the end, which came on December 5th, 1791, but not before he had composed the beautiful Requiem and almost completed it. He was buried in a pauper's grave, the location of which was immediately forgotten because the funeral party, discomfited by a shower of rain, left before the actual burial. With Beethoven we come to the end of the classical period; for, although his earlier works were composed in the classical style, he was basically a romantic. Accordingly, he, as well as Schubert, will be mentioned later in the section.

THE ROMANTIC AGE, 1750–1848.

Influence of Rousseau.

We shall quite arbitrarily take the Romantic Age as extending from the Age of Rococo to the revolutions of 1848. Equally arbitrarily we shall say that, just as Descartes was the herald of the Age of Reason, so Jean Jacques Rousseau (1712–78) was the herald of the Age of Romance. This period was a time of revolt against monarchical absolutism, against classical culture, and against the superficial rationalism which drew conclusions from so-called "first principles" instead of from facts. The statement "man is born free but everywhere he is in chains," often attributed to Marx, properly belongs to Rousseau. This was an outburst of emotion and a revolt against calm civility and the polite behaviour of an aristocratic order which no longer appealed to the common man. In religion "enthusiasm" had formerly been regarded with disapproval, but John Wesley (d. 1791) with his brother Charles proved that Methodism with its emotional approach brought instruction to the masses in a way they understood. Indeed, it might be said that Wesley, at this time when the English Industrial Revolution was beginning, caused the Revolution to be peaceable as in other countries it was not. Rousseau's *Confessions* for the first time in history depicted a complete man, his *Emile* is virtually a text-book of modern education, and his *La Nouvelle Héloïse* says, in effect, that if social conventions clash with love, it is the conventions which are wrong. Some may find Rousseau unpleasant, but he is one from whom we have much to learn. Previously, nature had been regarded with a certain distaste, now nature was fashionable. We have arrived at the period of the "natural man," of emotion, and of delight in landscapes which are not classical but rugged. When Dr. Johnson described a mountain as a "monstrous protuberance" he was talking in terms of the Age of Reason, when MacPherson wrote his forgeries of *Ossian* (a totally imaginary Gaelic poet), replete with mists, mountains, and heroes, we had already reached the Age of Romance.

Romanticism in English Literature: Byron, Keats, Wordsworth, Shelley, Blake.

This was a return to nature, and to the period belong some of our greatest poets: Thomson, Gray, Burns, Blake, Wordsworth, Keats, Shelley, and Byron. James Thomson (d. 1748) was a Scotsman whose *The Seasons* is perhaps little read now, but the poetry of his fellow-countryman Robert Burns (d. 1796) is on the whole under-estimated by the English—possibly because of the dialect—although honoured in Germany and the Soviet Union; for Burns was, with Heine, one of the greatest lyric poets of all time. *My Love is like a Red, Red Rose* is as lovely an account of young love as *John Anderson* is the tenderest picture of old. Thomas Gray's *Elegy Written in a Country Churchyard* is one of the best-known poems in our language, but his equally admirable *Ode on a Distant Prospect of Eton College* along with his other works is often neglected. Gray, born in London, died in 1771.

The poet most characteristic of the age was George Gordon, Lord Byron (1788–1824), who went through the whole rigmarole of romanticism —a cripple, a young man fascinated with evil, an unhappy marriage, leading up to his self-imposed exile abroad and his death at Missolonghi, where he was supporting the Greeks against the Turks. Byron's *Childe Harold* is a long epic poem unlikely to be read in full today, but his shorter poems *She Walks in Beauty Like the Night* and *So We'll Go No More a Roving* can never be forgotten. The same spirit of revolt is found in the works of Percy Bysshe Shelley (1792–1822) together with a love of nature found also in William Wordsworth (1770–1850), one of our greatest poets, whose *The Prelude* is the finest of autobiographical poems. Wordsworth welcomed the French Revolution only to be disillusioned later. John Keats (1795–1821), who died at the age of twenty-five from tuberculosis, took much of his inspiration from classical themes, and his melancholy quite unassociated with any political interests appealed to the school of Pre-Raphaelite painters whom he strongly influenced.

William Blake (1757–1827), poet, mystic, and artist, was a rebel in another way. A deeply religious man, he would have no truck with official art; his subjects, taken from theology,

were dreamlike and fantastic, as, for example, *The Ancient of Days*, a metal-cut with water-colour in the British Museum. His poems range from the mystical and almost incomprehensible (which caused his contemporaries to regard him as mad) to the delightfully simple *Songs of Innocence*. The art of Blake is in many ways reminiscent of that of another rebel of the same day, the great Spanish painter Francisco Goya, who is referred to elsewhere.

We have already mentioned the interest in the past excited by James MacPherson's Ossianic forgeries; but the past that appealed to the Romantic Age was a primitive past (as in *Ossian*) or a mediaeval past. The Waverley novels of Sir Walter Scott (d. 1832) and his long poems *Marmion* and *The Lady of the Lake* had an immense influence on the Romantic movement, particularly in Italy, where Manzoni's historical novel *I Promessi Sposi*, justly famous for its fine prose, was in its manner obviously based on Scott. Manzoni died in 1873, and his short-lived contemporary Leopardi (1798–1837), Italy's greatest romantic poet, was the other representative of a movement which, although popular for a time, did not take hold in a country which was still hankering after classicism. The verse of Carducci (1835–1907), a classicist, brought an end to the brief period of romance in Italy.

Romanticism in Germany.

Broadly speaking—and we are talking for the ordinary man not for the learned—Italian writing shows a great gap between Boccaccio (1313–75) and the writers mentioned above, and the same may be said of German literature. Between Walther von der Vogelweide (fl. 1190–1230) and 1750 there is nothing which need distract our attention. It was the Romantic movement which began to stir that something in the German mind which those who are not German find difficult to appreciate—the cloudy spaces, the nightmare visions, the sentimentality mingled with cruelty, which has already been noted in German painting. The herald of this movement in Germany was the critic and playwright Gotthold Lessing (1729–81), whose *Laokoon* destroyed the vogue for classical plays based on the works of the French dramatists, demanded a German theatre, and asserted that art must be true to nature. Lessing's *Minna von Barnhelm* and *Nathan the Wise* are the first German plays of a genuinely national character.

Lyric Poetry: Goethe, Schiller, and Heine.

But the greatest genius of this period known in Germany as the age of "Sturm und Drang" (storm and stress) was Johann Wolfgang von Goethe (1749–1832) of Frankfurt, who spent much of his later life in the Court of Weimar. Goethe was, like Leonardo, a universal man who studied botany, physics, optics, and mineralology in addition to writing his great lyric poems, and his most important work *Faust*. His play *Götz von Berlichingen* was a typical product of a time when all kings and priests were regarded as wicked and the hero was a friend of the oppressed, but his novel *The Sorrows of Werther* can only be regarded now as a period piece of sentimentality—although it caused an epidemic of suicides throughout Europe on the part of those who felt sympathy for the hero's self-inflicted death. However, later in life Goethe gave up his Romanticism and his play *Iphigenia in Tauris* is in pure classical form. It is extremely difficult to assess Goethe as a writer; his poems and his *Faust*, to those who can read German, are supreme works of genius—but, unfortunately, poetry is the least translatable of the arts and no good translations of *Faust* exist; his novels and plays are dated; yet possibly his greatest work was himself—the last man who was able to encompass the sum of human knowledge.

Johann Friedrich Schiller (d. 1805), the great German dramatist was an army surgeon whose first play *The Robbers* in the romantic style caused him to desert his regiment in order to view a performance. He was saved by Goethe, who obtained him the post of professor of history at the University of Weimar—a post for which he was entirely unfitted since he had little knowledge of the subject. But his later plays *Wallenstein*, *Don Carlos*, *Maria Stuart*, and *The Maid of Orleans*, all based on historical subjects, make up for the deficiency. In his *William Tell* Schiller makes an eloquent appeal for German nationalism in face of the armies of Napoleon then spreading over his country. So, too, did Johann von Herder (d. 1803), also of the Weimar school, whose works of criticism show the romantic obsession with the natural goodness of man, belief in progress, deism, and the study of early literatures such as the Norse sagas and early German poems. The works of Shakespeare, thought "barbaric" during the Age of Reason, were translated at this time by August von Schlegel (d. 1849), whose brother Friedrich wrote a work on Hindu philology which is one of the first studies in comparative languages.

The German literary skill is in lyric poetry. The plays of Schiller meet with little interest outside the land of their origin (although *Maria Stuart* has recently been produced in London and Edinburgh). There is no readable German novel until almost the 20th century, when it comes to maturity with Thomas Mann; for the typical form was the *Novelle* or short story as practised during the early 19th century by E. T. A. Hoffmann and Theodor Storm. But the lyric poets, from Klopstock, Goethe, and Hölderlin in the 18th century to Heine and Mörike in the 19th are supreme. Heinrich Heine (d. 1856), a Jew who spent much of his life in Paris, was one of the great lyric poets of the world and in his prose he graphically prophesied the future actions of Germany and Russia with an accuracy which has proved all too justified.

Philosophy: Fichte, Schopenhauer, and Hegel.

This was also the age of the great German philosophers: Immanuel Kant (d. 1804), Johann Fichte (d. 1814), Schopenhauer (d. 1860), and Georg Wilhelm Hegel (d. 1831). We need say little about these, for they are of little artistic interest and few would find, for example, Kant's *Critique of Pure Reason* either a model of style or even comprehensible. But they are typical of German thought, which, unlike the English empirical and the French rationalist approach that begins with facts, attempts to compress the whole universe into a single scheme. Universal egos, synthesis and antithesis, moral imperatives, and other terms which most people today would regard as almost meaningless, since metaphysics are not now in fashion, are the meat of German philosophy. But Kant is one of the world's great philosophers, and Hegel is important for his influence on Feuerback and Karl Marx, who promptly turned his idealistic philosophy upside-down and used it to defend historical materialism.

Painting: Turner, Goya, Delacroix, Constable, and the Barbizon School.

Romanticism was characterised by pleasure in nature, concern with the ordinary man, nationalism, and a revolt against formalism. The great painters of the time were English and French, and the artists to be described here represent these qualities. John Constable (1776–1837) together with Joseph Turner (1775–1851) are the important English landscapists; Eugène Delacroix (1798–1863), the romántic patriot; Jean Millet (1814–75), the portrayer of common men. In Spain, Francisco Goya (1746–1828) painted portraits of the great, such as that of King Ferdinand VII now at the Prado in Madrid, which can only be described as ruthless in their realism, and his prints in *The Horrors of War* tell of his hatred of the cruelty and reaction in his own country. Constable's landscapes—the famous *Haywain* at the National Gallery in London, his *Salisbury Cathedral from the Meadows*, and his *Study of Trees* at the Victoria and Albert Museum—fitted in with a time when people were reading Wordsworth and the other Lake Poets. But our greatest and most revolutionary painter was Turner, much of whose work was done in water-colour; Constable found his scenes within a few miles of his home, but Turner journeyed tirelessly over the continent from France to Rome with his sketchbook. This

eccentric genius, son of a London barber, and highly irregular in his way of life, was one of the greatest figures in the history of European art. In his old age his colours became stronger as if he were trying to paint light itself. The landscapes of this period (many of which he left to the National Gallery) seem, as Eric Newton says, to be melting away " by the radiance of light and the envelope of air." *The Founding of Carthage, The Fighting Temeraire, Steamer in Snowstorm, Calais Pier*, and *Crossing the Brook* are amongst the works which were championed by Ruskin in his *Modern Painters.*

Delacroix (whose best work is seen at the Louvre), also broke with classical traditions. Influenced by the paintings of Constable and the poems of Byron, he portrayed relatively contemporary scenes of revolution and action such as his *Wounded Cuirassier* and the *Arabic Fantasy* at Montpellier, which depicts a cavalry charge in a highly dramatic and exciting way. His large work *Massacre of Scio* was repainted after he had seen a landscape of Constable's in Paris. The so-called Barbizon school, very different in its inspiration from Delacroix, yet typical of its time, painted poor people, and is best represented by Millet, whose *Angelus, Man with the Hoe*, and *The Gleaners* (at the Louvre) are perhaps all too familiar, and Gustave Courbet, who gave the school its name from the little French village near Fontainebleau where these artists proposed a programme of realism. Other painters of the group are the landscape painters Jean Corot (d. 1875), Charles Daubigny (d. 1878), and that great master of landscape Theodore Rousseau (d. 1867).

English Architecture 1714–1820.

Baroque and Palladianism: Vanbrugh, Gibbs, Kent, Burlington. In this age we are still at the stage of late Renaissance in Britain. The country was prosperous and complacent; the church somnolent; and the universities of Oxford and Cambridge riddled with prejudice and obscurantism. Few churches were built during these years in spite of the good intentions of Queen Anne, the dreadful towns in the North and Midlands were arising towards the end of the 18th century to house factory workers, and fine architecture is mainly to be seen in the small Georgian houses of the middle class or the very large ones, such as Blenheim Palace, the large and ostentatious building presented by the nation to the Duke of Marlborough. Its astonishing architect, Sir John Vanbrugh (d. 1726), was an army officer, wrote a successful play, and so far as one knows learned most of what he knew of architecture from a French edition of Palladio at the age of thirty-five. Vanbrugh was the leading English Baroque architect and specialised in the grand and enormous. Blenheim and Castle Howard in Yorkshire are typical of his work. On the other hand, many of the small houses throughout England are in excellent taste, and, as befits an age of taste, their furnishings, china, wallpapers, and the rest fitted in with the whole design which might be Palladian, Baroque, Rococo, or Greek or Chinese in inspiration. Other great architects were James Gibbs (d. 1754), who built the Senate House in Cambridge and the Radcliffe Library of Oxford; Burlington and Kent, responsible for Chiswick House, the " Palladian Villa " based on Palladio's Villa Capra near Vincenza; " Carr of York " (d. 1807), painter and book-illustrator, architect of Harewood House and the Royal Crescent at Buxton; and the Scotsman Robert Adam (d. 1792), who designed Syon House at Isleworth and Kenwood House at Hampstead.

The Later Romantic Period: the Novel.

Tales have been told from time immemorial, but when the novel proper begins depends upon our definition of the word. The simplest definition is that a novel is (*a*) realistic and (*b*) deals with recognisable individuals often belonging to the period of the writer. Thus the work of Rabelais, Cervantes, and John Bunyan are not novels as understood by the 19th century. In terms of our definition the novel can be traced back to Portugal and Spain, for example, de Rojas' *Celestina* of the 16th century and numerous other works of the same period; to France, where it developed independently; and to Germany, where a century later (1669) von Grimmelhausen portrayed the mind of his age in his *Simplicissimus.* Daniel Defoe (d. 1731), author of *Robinson Crusoe*, Samuel Richardson (d. 1761), regarded as the founder of the modern novel, whose novels *Pamela* and *Clarissa Harlowe* had such wide influence, Henry Fielding (d. 1754), author of *Tom Jones*; Tobias Smollett (d. 1771); and Laurence Sterne (d. 1768), author of *Tristram Shandy*, are the very great 18th-century parents of the English novel. In France, Alain Le Sage (d. 1747) wrote *Gil Blas* and the Abbé Prévost wrote *Manon Lescaut* about the same time.

Most of these novels are " picaresque," a term meaning literally " concerned with rogues," but now used to refer to a type of book which recounts the history of an individual from birth to death, and places him in a large number of improbable situations, which amusing or interesting as they may be, really tell us little about the individual himself. The novelist is writing about his times rather than about a person. Smollet's *Roderick Random*, most of Defoe's novels, and even *Tom Jones* are of this character, although Richardson and Fielding are obviously struggling to break free. The real psychological novel which deals with a small group of ordinary people over a limited period of time and with their mental attitudes towards each other rather than their physical reactions towards environmental circumstances begins with that very great Englishwoman Jane Austen (1775–1817).

Jane Austen, the Brontës, and George Eliot. Jane Austen is one of the world's supreme novelists and it is a mistake to think of her works in such categories as " the novel of manners "—for small as her society may have been, she depicts within that compass how people really behave. The deceptive civility of her books covers an immense insight into human nature, which, as psychologists are discovering today, begins at home and in just such small circles. The Brontë sisters, Charlotte, Anne, and Emily are amongst our other great novelists; here we can only mention Charlotte's *Jane Eyre*, and Emily's *Wuthering Heights* and her poems, which, together with Jane Austen's *Pride and Prejudice* and *Northanger Abbey* belong to our literary heritage. George Eliot, the pen-name of Marian Evans (d. 1880) belongs to a slightly later period than the Brontës, who died about the middle of the century; her *Mill on the Floss, Middlemarch*, and *Silas Marner* are, whatever their merit, probably less read now than the works just mentioned. She is a great novelist whose novels are sometimes sentimental in a way that Jane Austen's are not; Emily's *Wuthering Heights* may be sentimental on analysis but is overwhelming in its impact. These are necessarily personal judgments, but few people would be prepared to deny that in the last fifty years more have read *Wuthering Heights* or *Pride and Prejudice* than have read *The Mill on the Floss.*

Dickens and Thackeray. By the middle of the 19th century the novel had become the most popular literary form in Britain, and its two greatest figures were Charles Dickens (1812–70) and William Makepeace Thackeray (1811–63). It is unnecessary to list the many works of Dickens, who has been taken to the English heart as has the light music of Gilbert and Sullivan; but those who are not English will wonder why those who seldom read at all and have never read Thackeray's *Vanity Fair* will take up *Pickwick Papers* with zest as if it were the latest thriller, and those who would never dream of going to a concert or an opera will know the music of *The Gondoliers* by heart. In spite of the great poets we have produced, the average Englishman tends to regard anyone who reads poetry as eccentric, yet he will solemnly study the somewhat tedious *Bab Ballads* of W. S. Gilbert. These are private secrets of the English—but then one may well wonder why, on the continent, the admired British works are those of Oscar Wilde, Byron, and the totally fictitious Ossian which few regard very highly

here. Dickens was a natural writer; his works are important for the light they throw on the social problems of his time; they are immensely readable; the comic figures are inimitable—but the critic is entitled to say that at his worst Dickens can be grossly sentimental (we know that he was often in tears at the readings he gave of his own works), and that his figures are exaggerated and unrealistic caricatures. There are people who have the traits of Mr. Pickwick, Mr. Micawber, or Scrooge, but, as depicted by Dickens, these characters are not "in the round"—they are almost like the figures in Bunyan or a mediaeval play each depicting a single virtue or vice. Jane Austen deals with real people; Dickens creates pawns for a particular purpose. Yet nobody will remove the affection of the English for Dickens.

Thackeray mostly wrote of the upper classes, and in the technical sense is a greater writer than Dickens. He is not melodramatic, his characters are of their type real, he does not descend to farce or caricature, but, perhaps for these reasons, his books are less read. *Vanity Fair*, *Pendennis*, and *The Newcomes* are amongst the best known. Literary taste is notoriously fickle, but the Barchester series of novels by the fine novelist Anthony Trollope (d. 1891) dealing with life in a small cathedral town clearly became popular during the last war precisely because, in a time of terror, people wanted to look back on the small things of life in a secure society. The Victorians, too, might be surprised to find that the highly estimated novels of Bulwer-Lytton (d. 1873), including *The Last Days of Pompeii* and Charles Reade's *The Cloister and the Hearth*, are little read now, whereas the Christian Socialist parson Charles Kingsley (d. 1875) is known to millions of children through his *Water Babies* and his *Westward Ho!*

The French Romantic Novelists: Hugo, Dumas, Balzac, George Sand. The novelists of France typical of the romantic period are Victor Hugo, Alexandre Dumas, Honoré de Balzac, and George Sand. Hugo (1802–85) was a very fine poet, and his novels—particularly *The Hunchback of Notre Dame*—show the tendency of the time towards historical subjects and concern with humble people. Dumas (1802–70) was the grandson of a negress from the West Indies and his dashing historical novels, such as *The Three Musketeers*, are widely known even to those who are aware of greater French writers only by name. There must be many more Englishmen who have revelled in the works of Dumas than have ever read Flaubert, who produced one of the greatest novels ever written. Balzac (1799–1850), another of France's and the world's finest writers, was a veritable book-factory—a trade carried out on a diet of black coffee with periodic outbursts of over-eating and drinking when he was paid. He wrote an enormous amount of trash anonymously but also more than eighty novels known collectively as *La Comédie Humaine*, which deal with middle-class life and for which he is justly famed. The novel as we have defined it belongs to France, England, and Russia; for few would deny that Flaubert, Balzac, Jane Austen (perhaps Dickens and Fielding), Tolstoy, and Dostoievsky are the supreme novelists. George Sand (d. 1876), the pen-name of Armandine, baronne Dudevant, wrote somewhat melodramatic works in the romantic style but is now best known as the mistress of Alfred de Musset and Chopin; Guy de Maupassant (d. 1893), famed in his lifetime for his short stories, although still regarded as a great writer, might today be criticised as more superficial than deep. There is something contrived about Maupassant's plots; he is witty but unfeeling.

With these writers we come to the period of realism with Flaubert and Zola, who will be discussed later.

Russia: Awakening under Peter the Great.

It was Peter the Great (1689–1725) who brought Russia into the orbit of Western civilisation. In the 10th century Russia had been a small country centred about the city of Kiev, to which Christianity of the Orthodox Church was brought from Constantinople and with it Byzantine forms of art. This art was, as we have seen, almost entirely religious in the form of icons and wall-paintings for churches. Indeed, icon painting dominated the art of Russia for many centuries, but reached its zenith at Novgorod in the 14th and 15th centuries. Architecture, too, was based on Byzantine patterns, though the forms were modified in characteristically Russian ways, such as the familiar onion-shaped dome, designed to throw off the snow. The church of Sta Sophia at Novgorod, belonging to the 11th century, has five such domes. In the 16th century Moscow became the artistic centre of Russia. Peter's reforms, however, brought a break with Byzantine tradition. Foreign painters and architects were imported, and the 17th century produced a style known as "Moscow baroque." St. Petersburg (Leningrad) was planned by Italian and French architects and became the centre of cultural activity under Catherine the Great. Baroque gave way to a severe and simple classical style, and the 19th century saw the beginnings of the romantic movement.

Russian musical tradition had been confined mainly to the church, although no country is richer in folk-music than Russia. Peter I introduced Italian opera, but a reaction came with the Napoleonic wars and the literary revival initiated by Pushkin, the great poet of Russian romanticism. The movement began with Glinka (1804–57), who after studying in Italy for three years decided to come home and write Russian music. Unlike the composers of Germany, France, and Italy, the great Russian composers of this age were amateurs. Alexander Borodin (d. 1887), the composer of the unfinished opera *Prince Igor*, symphonies, string quartets, and songs, was a professor of chemistry and the founder of a school of medicine for women. Rimsky-Korsakov (d. 1908) is known for his *Scheherazade*, and Moussorgsky (d. 1881) for his opera *Boris Godounov*. Perhaps the greatest Russian composer was Peter Tchaikovsky (1840–93), who wrote ballets and symphonies too well known in this country to require mention here.

Curiously enough, some of the greatest Russian literary figures are relatively unknown outside the country except by name. We know of Ivan Turgenev, Tolstoy, and Dostoievsky, of the short stories and plays of Anton Chekhov because we have read their works or seen them in the theatre. But few know of the poet Pushkin (1799–1837), who is regarded by Russians as the greatest figure in their literature; of Mikhail Lermontov, lyric poet and novelist; of Ivan Krylov, teller of fables or even Nikolai Gogol, whose *Dead Souls* is a masterpiece of humour. The reasons are perhaps that Pushkin wrote verse which is, on the whole, untranslatable (*Eugene Onegin*, like Goethe's *Faust*, is only fully appreciated in the original) and that in Western Europe Russian literature really begins with Turgenev (1818–83), who was the first of her great novelists to win recognition there. In his novels—for example *Fathers and Sons*—Turgenev shows how western revolutionary ideas were beginning to influence Russian thought. He was the most western-minded of Russian writers. But the greatest of all Russia's novelists were Dostoievsky (1821–81), author of *Crime and Punishment*, *Brothers Karamazov*, *The Idiot*, and *The Possessed*, and Tolstoy (1828–1910), whose *War and Peace*, *Anna Karenina*, and *Resurrection* are amongst the most important European novels.

Most of the writers we have described were revolutionary in the sense of being against the existing government. Their views ranged from liberalism to anarchism, and, like most revolutionaries, they belonged to the middle or upper classes. Maxim Gorky (pen-name of Alexei Pieshkov, d. 1936) is one of the few Russian writers who could be described as of working-class origin.

Early American Art and Literature.

By "early American" we mean the European art which developed from 1781 when America became a nation. That this art was primarily

European was inevitable, and a glance at any book of "American" folk-songs will show that the majority are English, some of the later ones German, and a smaller number indigenous—these are the songs of the colonisation of the West, the work-songs, and the songs of the negro. They form a picture of the history of this great country, which, curiously enough, the Americans in their dislike of "colonialism" do not consider to have been colonised by themselves.

In Europe William Cullen Bryant (d. 1878) is little known; he was a poet who, like most of the literary men of this period, lived in Massachusetts (the others were centred around New York), but we do know Washington Irving's (d. 1859) *Rip Van Winkle* and the adventure novels of James Fenimore Cooper (d. 1851), whose books were asked for by Franz Schubert on his death-bed. But even if Van Winkle is a widely known legend and Cooper's *Last of the Mohicans* appears on television, nobody could suppose that these were great writers. Harriet Beecher Stowe (d. 1896) produced a tremendous effect with her novel *Uncle Tom's Cabin*, which preached against slavery, but again nobody would today regard it as literature—it is simply excellent journalism. Nathaniel Hawthorne (d. 1864) is of more considerable stature; his *Scarlet Letter*, with a characteristically puritan flavour, is a fine novel, and many of us must have got our first taste of Greek mythology from *Tanglewood Tales*. Henry David Thoreau (d. 1862) was not a novelist but a philosopher, whose *Walden* describes his life and thoughts in the woods where he had retreated as a protest against a society which, he felt, interfered too much in the individual's affairs. He was not, of course, a philosopher in the formal sense; basically he was a pacifist, an anarchist in his disapproval of authority, and an advocate of a return to nature. He, like Tolstoy, strongly influenced Ghandi. But the greatest American writers in terms of world influence were undoubtedly Herman Melville, whose *Moby Dick* (1851) is one of the very great novels; Mark Twain (pen-name of Samuel Clemens, d. 1910) and author of the beloved *Huckleberry Finn* and *Tom Sawyer*; Henry James (d. 1916), who spent most of his life in Britain, where he received the Order of Merit; and Edgar Allan Poe, whose short life (he died at the age of 40 in 1849) nevertheless encompassed the writing of some excellent poems, the invention of the detective-story form—although, of course, the very wise will find earlier origins—and the influence upon French writers and poets which was specially important to Baudelaire and Mallarmé. Henry James wrote novels mostly with a European setting (*The American*, *Portrait of a Lady*, *Daisy Miller*); he is regarded as a great novelist—and certainly his works have lasted better than those of most others in this century—but non-addicts will find his tortuous style irritating and prefer his two long short-stories *The Turn of the Screw* and *The Aspern Papers*. Ralph Waldo Emerson (d. 1882) wrote essays which, with the works of Marcus Aurelius, were amongst the "improving" books to be found on most Edwardian or late Victorian bookshelves, but today they appear somewhat platitudinous. His views were associated with those of Thomas Carlyle.

American Poetry. The New England group of poets produced such men as Bryant, already mentioned, James Russell Lowell, and Longfellow. Apart from Henry Wadsworth Longfellow (d. 1882), who was a darling of the Victorians but is probably less highly thought of now (for who today reads *Hiawatha*), we can ignore the others, who excite little interest here.

Undoubtedly America's most important poet is Walt Whitman (1819–1892), who was born in New York. His verse, in a sense, heralds the beginning of modern poetry with its free style based on none of the rules which had been used before. Whitman in his emphasis on democracy and his new manner of writing verse is the first truly American poet; he is as typical of the America of his time as the Statue of Liberty and the rebellious Huck Finn, who avoided his Aunt Sally because she was going to "adopt me an' sivilise me." *Leaves of Grass* is his best-known collection.

THE LATE 19th CENTURY IN EUROPE.

Great Figures of the Age.

The crowded events and the great men of these years cannot possibly be described in any detail here. It was the age of great political thinkers, of the rise of the working class, the age of Karl Marx and Engels, of Saint-Simon, Fourier, and (earlier) Robert Owen. In science it was the age of Darwin, Pasteur, and Mendel; in poetry of Tennyson and Browning; in music of Wagner and Verdi. The political views and writings of Thomas Carlyle (d. 1881) are difficult to assess. Fifty years ago they were required reading, but now one wonders whether Carlyle's allegedly democratic beliefs were not tinged with a strong element of authoritarianism obtained from the German philosophers of whom he was so fond. In his *Heroes and Hero-worship* he makes it quite clear that the common man cannot free himself but needs a "hero" to lead him. His *French Revolution* makes the same point: that the working classes are dangerous. Thomas Babington Macaulay (d. 1859) is a great stylist and perhaps our best-known historian, although his *History of England* written from a Whig point of view begins with the year 1685 and ends, unfinished, at 1702. His *Essays* are important, but his poems are now of little significance. Other famous historians of the time are George Grote, with his *History of Greece*; Henry Buckle, who tried in his *History of Civilisation in England* to show that the main motive factor in history is economic; John Motley, who wrote *The Rise of the Dutch Republic*; the American William Prescott, who wrote of the Spanish conquest of the Incas and Aztecs; and one of the greatest historians who ever lived, Jakob Burckhardt, the Swiss author of *The Civilisation of the Renaissance in Italy*.

Of Victorian poets we can only refer to Alfred Tennyson (d. 1892), who composed such poems as 'Sweet and Low,' 'Tears, Idle Tears,' and 'The Splendour Falls on Castle Walls'; his *Idylls of the King* and *In Memoriam* are amongst his finest works. Robert Browning (d. 1889), who is possibly a greater poet although certainly less popular. Browning's wife Elizabeth Barrett Browning—and here again we see the fickleness of public taste—although a comparatively minor poet was more read than her husband in their lifetime. And Matthew Arnold (d. 1888) critic and poet, whose *Culture and Anarchy* expresses the view that culture can regenerate the world; we must "know the best which has been thought and said in the world." As a poet Arnold is probably more highly esteemed today than ever, and his 'Dover Beach' is one of the great English poems.

Movements in art are often initiated by relatively unimportant men—for example, Byron, who is by no means our best poet, was the inspirer of Pushkin in Russian and other continental writers too numerous to mention, and Walter Scott, not one of our best novelists, had an equally strong impact in Western Europe. Similarly John Ruskin (d. 1900) played no small part in the Gothic revival which influenced building in Britain, France, and other countries including America. In Britain Augustus Pugin (d. 1852) and in France Viollet-le-Duc (d. 1879) were the architects who enthusiastically rediscovered mediaevalism. The days of the earlier styles already described ended with John Nash, architect to George IV and designer of the "Royal Pavilion" at Brighton (in exotic Oriental style), as well as the great town-planning scheme which lies between St. James's Park and St. John's Wood in London; Regent Street, Waterloo Place, the whole of Regent's Park, Carlton House Terrace, Trafalgar Square, Buckingham Palace, and the Marble Arch (originally designed as an entrance gateway to the palace) are all among the works of the architect who considered himself a "Greek Revivalist." There were other buildings in the classical style of a later period; St. Pancras Church, the National Gallery, University College, by various architects, but the style petered out with Smirke's British Museum. Sir George Gilbert Scott (d. 1878) was a leading protagonist of the Gothic revival, very famous in his time, and guilty of the Albert Memorial in Kensington

Gardens. Ruskin disliked the age in which he lived. Yet in his mediaevalism, his moralising, his concern to educate the poorer classes, he is wholly of his age, as is William Morris (d. 1896), who also hated the products of industrialism and, like Tennyson, wrote imitation mediaeval verse. He was, with Dante Gabriel Rossetti, Holman Hunt, John Millais, and Ford Madox Brown a leader of the Pre-Raphaelite school of painting which believed that sincerity in art had ended before Raphael. Morris, a socialist, is unlikely now to be considered as a poet, he produced no important paintings, but he did a great deal to influence and improve interior decoration. The sentimental mediaevalism of the Pre-Raphaelites is, whatever its merits, not on the whole acceptable to modern taste.

THE ROMANTIC AGE IN MUSIC.

The 19th century was the period of the romantic composers whose music expressed emotion in a direct and powerful manner. Previously the emotion aroused by a musical composition had been delight in the formal perfection of the work itself—that is, in the music for its own sake. Now specific emotions were expressed—emotions of joy, sorrow, anger, or love. Sometimes in so-called "programme music" the composer tried to tell a story or produce sound effects imitating events. Tchaikovsky's "1812" overture has the roar of cannon; Schubert's song *The Erl King* has a piano accompaniment which imitates the beat of horses' hooves; and Beethoven's Pastoral symphony has headings for various movements, such as "by the brook," "nightingale," "cuckoo," "peasants merrymaking," "tempest and storm." This would have seemed very strange to composers of the earlier classical school. Beethoven and Schubert were the last of the great classical composers and the first of the romantic composers.

Beethoven, Weber, and Schubert.

Ludwig van Beethoven (1770–1826) was born at Bonn. The "van" was an indication of his Flemish ancestry, not a sign of aristocratic origin as is the "von" of Weber. We have seen how in the other arts it was a long time before the artist came to be recognised as a special kind of person rather than a mere craftsman, and in music the delay was even more prolonged. Mozart, Haydn, and their predecessors had been told by their patrons what to compose, and when visiting a great house to give a recital they had to eat with the servants. Beethoven put an end to this. He composed what he pleased and insisted on dining with his hosts. He refused to accept the belief that music was a social grace; it must, he said, "strike fire from a man's heart." In a sense Beethoven was the first composer to be accepted, not as beneath or even equal to his listeners or patrons, but as a supreme genius towering above them. When he died 20,000 people attended the funeral and all the schools were closed. Beethoven's many works include nine symphonies, of which the more familiar are the Third or Eroica, the Fifth with its "V sign" opening bars, the Sixth or Pastoral, the Seventh, and the Ninth or Choral symphony in which the last movement is sung by a choir. The piano sonatas, piano concertos, and quartets are among his finest compositions. His one opera *Fidelio* was not popular in his lifetime and is seldom performed even today, but the two overtures *Leonore No. 2* and *No. 3*, based on the original overture to the opera, are well known.

Carl Maria von Weber (1786–1826) is looked upon as the founder of the German romantic opera and is best known for his *Der Freischütz* and *Oberon* (commissioned by Covent Garden). All have typically romantic plots: mediaeval gloom, pacts with the devil, and dark woods. The overtures to all three are favourite concert pieces, and popular too is his *Invitation to the Dance*. Much of Weber's music is showy and over-dramatic and is now seldom heard. As Schubert said: "If Weber snares a scrap of melody he is sure to crush it to death like a mouse in a trap by his overwhelming orchestration." He died and was buried in London during the run of *Oberon* at Covent Garden. His body was later removed to Dresden.

The lyrical songs and orchestral music of Franz Schubert (1797–1828), greatest of all song-makers, are known even to those who ordinarily have little interest in music. When he began to compose there were, broadly speaking, two types of song: the operatic *aria* based on Italian pattern and technique, and the simple folksong. Schubert's great achievement was the creation of the *Lied* (plural *Lieder*), a song which was less artificial than the first and more sophisticated than the second. He wrote over 600 songs, including the two great song-cycles *Die Schöne Müllerin* and *Die Winterreise*, set to poems by Wilhelm Müller, Goethe, Schiller, Heine, and others. He also composed, like Beethoven, symphonies, string quartets, and sonatas. Born in Vienna, Schubert died thirty-one years later, hardly recognised, sick with typhus, and in dire poverty; his sole remaining possessions were his clothes and what his brother described as "some old music." The "old music" included the Unfinished Symphony and the C major, discovered by Schumann some time after his death.

Schumann, Mendelssohn, Chopin, and Liszt.

Robert Schumann (1810–56), Felix Mendelssohn (1809–47), and Frédéric Chopin (1810–49), all born within a few months of each other, represent romanticism at its purest. They worked in smaller forms, especially in solo music for the piano. Schumann is probably best known now for his songs and piano pieces. As a critic he exercised great influence and always supported the young composer experimenting in new forms. As he said, "It is characteristic of anything unusual that it cannot be easily understood; the majority is always tuned to the superficial." When we reflect on how few really great artists, composers, or writers have received the Nobel Prize, the Order of Merit, or burial in Westminster Abbey (or their equivalents), how few great poets have become Poet Laureate, we can see the justice of Schumann's aphorism. He was the first to see the genius of the young Brahms. Schumann's wife Clara was also a brilliant pianist and herself a composer. Mendelssohn composed many works, but best known are his overtures *A Midsummer Night's Dream*, *Fingal's Cave*, his songs, and the two oratorios *St. Paul* and *Elijah*. He frequently visited England, and Queen Victoria thought highly of his work. It is difficult to judge the works of Chopin, just as it is difficult to judge the poems of Robert Burns, and for the same reason. Both are national artists who appeal to people ranging from the highly intelligent and knowledgeable to the lunatic fringe who are more concerned with nationalism than with art. Suffice it to say that Chopin was undoubtedly the greatest composer for the piano who ever lived and is best known for his preludes, mazurkas, impromptus, and nocturnes (a form modelled on those of the Irish composer John Field (d. 1837)). In Poland he remains the great composer of his country. The compositions of Franz Liszt (1811–86), the greatest pianist of the age, are highly romantic and he had a great influence on younger composers. His daughter Cosima became the wife of Wagner.

This was also the age of great virtuosos in musical performance. Previously the movements of the virtuoso had been restricted by the difficulties of travel, but by the beginning of the 19th century there were stage-coach routes over most of Western Europe which made it possible to get fairly quickly from one city to another throughout the continent. Liszt, the pianist, Paganini, the violinist, whose favourite trick was to cut three strings of his instrument and announce, "now you will hear Paganini on *one* string!", Jenny Lind, the Swedish singer—were they as good as their enthusiastic audiences believed? We do not know, although it is obvious that Paganini was highly melodramatic whatever his ability as a violinist. Music at this time was the art without a knowledge of which nobody could enter cultured society.

Romantic Opera: Wagner, Gounod, Bizet, Berlioz, Verdi, Puccini.

Richard Wagner (1813–83) was both the greatest composer of operas and one of the most unpleasant men of his time. He was, in a sense, with his one-time friend Friedrich Nietzsche (whose "superman" philosophy is expressed in *Thus Spake Zarathustra*) one of those who supplied the emotional background on which the Third Reich of Hitler was founded (he was, with Lehar, Hitler's favourite composer). Wagner was violently anti-semitic; he abused, lied about, and persecuted most of the people he met—especially when they were Jews. Those who do not care for Nordic mythology may find Wagner's operas tiresome; but his importance in the history of opera is that he changed it from a formal affair with set pieces, solos, or choruses, to a dramatic unity which went right through from beginning to end like a play. Ludwig II, the mad king of Bavaria, fortunately for Wagner and for us, financed his operas, notably the series *Ring des Nibelungen* and *Parsifal* (both based on early works already mentioned), which were and still are performed at their best in the centre of Wagnerian opera, Bayreuth.

French opera is represented by the sentimental Charles Gounod (d. 1893), whose *Faust* and *Romeo and Juliet*, popular in Victorian times, are still performed today, and the much more important composer Georges Bizet (d. 1875), whose *Carmen* was beloved by Nietzsche after he had inevitably quarrelled with Wagner. Hector Berlioz (d. 1869), another romantic composer, wrote the dramatic cantata *The Damnation of Faust*. But the greatest composer of operas, after or together with Wagner, was Giuseppe Verdi (d. 1901), whose *Rigoletto*, *Il Trovatore*, *Aïda*, and *La Traviata* are famous. An eminent musician once said that the Italians, reputedly a musical nation, are not really infatuated with music in general but with Italian opera, which is to them as football is to the English or bullfighting to the Spanish. This is a controversial point on which the reader must form his own opinion, but it is undoubtedly true that the old gulf between Italy and Northern Europe which was noted earlier in relation to architecture and painting exists also in the field of music. The Germans (Goethe, Thomas Mann) have always had a romantic eye turned towards Italy, but culturally the glance has not been reciprocated by the Italians. The Wagnerian technique in which orchestra and singers are tightly welded together as a unity and the action runs on smoothly without set pieces was used by Verdi in his old age in the Shakespearean operas *Falstaff* and *Otello*. The only other Italian composer of operas we can mention here is Giacomo Puccini (d. 1924), whose *Madame Butterfly* and *La Bohème* are known—at least in part—to everyone. Puccini was a brilliant composer who, by his sentimentality, just missed being a genius. On the whole, the other composers of Italian opera, however popular, are negligible. Verdi and Puccini are giants amongst pygmies.

The Beginnings of Realism.

The periods into which we have artificially divided our short account cannot be dove-tailed smoothly together. Nevertheless, there are attitudes typical of an age, and tastes in art have changed roughly as we have described them. By the end of the 19th century romanticism was dying and realism was taking its place; yet realism in French painting may be said to have started with Courbet during the mid-nineteenth century, in his revolt against Delacroix; realism in English literature with Thomas Hardy (d. 1928). But, although Robert Louis Stevenson, a great romantic if ever there was one, died in 1894, another, Rudyard Kipling, died in 1936. Of French novelists Balzac was surely a realist, as was Stendhal (pen-name of Henri Beyle), author of *La Chartreuse de Parme*, yet both died in the middle of the 19th century. Gustave Flaubert (1821–80) wrote one of the world's great novels in *Madame Bovary*, which coldly dissects the personal relationships of village life; but his other novels such as *Salambo* were romantic in trend. *Madame Bovary* is one of the many works regarded as scandalous or obscene in their time which are now unquestioningly accepted. The works of Emile Zola (d. 1902), designed to relate the history of a Second Empire family (*i.e.*, the period between 1852 and 1870), were also regarded as scandalous but widely read. *Les Rougon-Macquart* is a series of 20 novels describing the decay of a family as a result of heredity and environment and include *L'Assommoir*, on alcoholism and slum conditions, and *Germinal*, on coal-mining in northern France. Anatole France (d. 1924) was the complete sceptic, and his *Penguin Island* and *The Revolt of the Angels* satirise religion and politics.

But the harsh materialism of the time did not appeal to everyone, and a group of French poets who described themselves as "Symbolists" began to write verse which, instead of making literal statements, attempted to create moods by a kind of word-music. This was not entirely a new idea, since John Donne in the 17th century had written:

> "Go, and catch a falling star,
> Get with child a mandrake root,
> Tell me, where all past years are,
> Or who cleft the Devil's foot."

A lovely verse which has no clear-cut meaning.

Stéphane Mallarmé (d. 1896) was at the head of this movement, but the greatest symbolists were Paul Verlaine (d. 1896), his friend Jean Rimbaud, all of whose verse was written before the age of nineteen, Charles Baudelaire (d. 1867), whose *Les Fleurs du Mal* was regarded as obscene, and in England Algernon Swinburne (d. 1900). Baudelaire and Rimbaud are two of the finest French poets. In music, Claude Debussy (d. 1918) introduced musical impressionism, and his original ideas found exquisite expression in works such as *L'Après-midi d'un Faune* and *La Mer* where the structure of the music seems to dissolve into atmosphere. Oscar Wilde (d. 1900) was influenced by the impressionist movement, but his poetry is of less account than his witty plays: *The Importance of Being Earnest*, *Lady Windermere's Fan*, and others.

THE APPROACH OF THE 20TH CENTURY.

The Social Background.

The immediate influences leading up to the arts of our own time can be traced back to two main sources: The French Revolution and the beginnings of the Industrial Revolution in England. In the long run, at first slowly and then with ever-increasing speed, these events brought about the decay of the old order of landowning aristocracy and its traditions, the rise of a commercial middle-class, and an improvement in communications between one country and another. People became more mobile, both geographically and socially, and the new momentum of technical development put an end for ever to the old static type of society, which had changed little over hundreds of years. These developments had their necessary repercussions upon the artist: (1) his patron—in mediaeval times the Church and later the aristocracy—was gone; (2) his style, which had formerly been set for a whole period of history, became fluid, and there were many conflicting styles, depending only upon the judgment of the artist himself; (3) his subjects had to appeal to a larger social group which had little interest in aristocratic portraits or even in the classics. How he responded depended upon his own attitude towards the changes. He might defiantly look back towards the past, seek refuge in romantic fantasy, or realistically depict what he saw, and all these trends are to be seen in that most sensitive barometer of the arts since the Italian Renaissance—the French schools of painting.

We have already mentioned (G53–54) the neo-classicists represented by David and Ingres in the early part of the 19th century, the romantics represented by Delacroix, whose emotionalism and use of colour so shocked the conservatives, and the realists headed by Millet, who painted ordinary people, although in a way most of us today would regard as sentimental. Two other trends became apparent, particularly in England—a new interest in landscapes for their own sake and not, as in earlier times, merely as a background, and a taste for the appallingly sentimental and vulgar. Pseudo-classical subjects became

the excuse for thinly disguised eroticism; every picture had to "tell a story," and children, dogs, and horses were made to take the viewer's heart by storm with sickly emotionalism. Photographs replaced portraits, coloured reproductions original paintings, and architecture was orientated towards the past. Small wonder that the artist, unless he was prepared to pander to popular demand, felt neglected, and towards the end of the century began to raise the cry of "art for art's sake."

The Modern Reaction. As the 20th century dawned other factors had an ever-increasing influence: the rise of nationalism among the economically backward nations; the rise of the working classes; the increase in scientific knowledge, which introduced new materials and processes and a new understanding of the nature of colour-vision; Freud's insights into the workings of the depths of the mind; and the possibility of cheap literature. The general movement towards one world brought about by modern methods of travel had led the more advanced nations to become internationally minded at the very time when the breaking-up of empires led to a vociferous nationalism among the technically backward ones. From the end of the 19th century an interest in folk-tales and folk-music became almost a badge of patriotism in the revolt of the Irish against England, and the Czechs, Hungarians, and Poles against the Austro-Hungarian monarchy. Dying languages, such as Irish and Hebrew, were brought into everyday use, and others, such as Norwegian and Finnish, were refurbished to rid them of foreign elements. In music and literature Europe was becoming more, rather than less, polyglot. Moreover, these nationalist uprisings received support from the international socialist movement, and after the Russian Revolution of 1917 the Communist Government tended to encourage regional nationalism in culture, with the result that its official attitude towards art became essentially the Tolstoyean one that art should be judged: (*a*) by its moral effects in promoting the "correct" political and social attitudes among the masses, and (*b*) by its ability to transmit understanding to the masses. Art, it was held, wells up from the people, and the message it conveys must be both readily comprehensible and morally edifying; when it looks to the past, is difficult to understand, is abstract, or instils values contrary to Marxist thought, it becomes "bourgeois" and "decadent." True art begins as folk-art.

In Western Europe events took a different course; for although interest in folk-art was not lacking, it could have little patriotic or political appeal to long-established and basically democratic nations, like Britain and France. It remained one strand among many, and by the beginning of the century had been largely exhausted by the paintings of the Barbizon school (**G54** (1)) and the literary works of Zola. Naturalism and literal realism were abandoned, not for any sinister or reactionary political reasons, but because it came to be felt that they were essentially dull and set unnecessary limitations upon the artist. The new movements wanted to experiment, and the history of modern art, excluding music, is very largely the history of French painting, which, as it were, formed the backbone of the revolt. Not that French music was unimportant, but on the whole the trends in modern music have been set in Eastern and Northern Europe. Literature in Britain, France, and Germany experimented along much the same lines as painting, showing tendencies which might be realist, surrealist, impressionist, symbolist, or near-abstract.

The Impressionists.

Impressionism was a movement away from the realism of Courbet which had caused a sensation at his privately organised "Pavillon du Realism" during the World's Fair Exhibition at Paris in 1855. Dark colours were replaced by light; solid modelling by an appearance of flatness; near views which emphasised form, by distant out-of-doors ones emphasising the interplay of sunlight and atmosphere. The large canvases of the classicists, which had often taken years to complete and emphasised detail, were replaced by smaller ones, which selected from nature and appeared to be sketchy improvisations rather than literal transcriptions. The artist had noted a particular aspect of his subject and repeated it until he had arrived at the desired effect, the total impression being one of movement and sunlight caught as in a snapshot seen through half-closed eyes—hence the name of the school, which was taken from Claude Monet's picture *Impression: soleil levant*. Patches of light and shade with few and simple outlines were characteristics deriving from the Japanese wood-block prints of Hokusai (d. 1849) and Utamaro (d. 1806).

In the broadest sense, impressionist techniques are to be found in the works of Whistler, Sargent, Turner, Constable, and even Rembrandt, but the French movement, which specialised in the use of bright unmixed colours, and was influenced by the theories of the physicist Helmholtz relating to the nature of colour vision, was led by Monet, Sisley (a French painter of English origin), and Pisarro. Other artists who, without subscribing to the principles, made use of the technique were Renoir, Degas, Manet, and the early post-impressionists Cézanne, van Gogh, and Gauguin.

Monet, Manet, Renoir, Degas. Claude Monet (1840–1926), a landscape painter, found greater interest in the quality of light than in the objects reflecting it, and frequently painted series of pictures of the same object under different lighting conditions, as in his twenty studies of Rouen Cathedral. His *Madame Monet under the Willows* is a blurred figure surrounded by green meadow, dappled sunlight and shade, created by the direct application of paint from the tube and brush strokes. Edouard Manet (1837–87) aroused a storm of criticism with his *Déjeuner sur l'herbe*, which was a modern version of *The Concert*, by Giorgione, the painter of the High Renaissance (d. 1510). His many subjects included portraits, horse-racing, boating scenes, landscapes and interiors, and still-lifes, but all had the quality of snapshots without any single focus of attention, taken as it were by surprise in a split second of time. The nude on a couch being presented with flowers by a Negro maid in his *Olympia* (Louvre) was attacked on the grounds that her expression was stupid and she was too naked. He was defended by Zola.

August Renoir (1841–1919) was at first a decorator of porcelain, and his light and airy canvases, the pinks, ivory, and pale blues of his nudes recall this early interest. His view of life is uncomplicated and charming. Well known to Londoners are *Les Parapluies* (National Gallery) and *La Première Sortie* (Tate Gallery). Edgar Degas (1834–1917), an admirable draughtsman and painter, gave up his brushes to work in pastel. His interest lay in scenes of everyday life, especially the ballet, theatre, and race-course. The close connection between impressionist painting and the other arts is seen in the sculpture of Rodin and the music of Debussy.

The Post-impressionists: Cézanne, van Gogh, Seurat. Paul Cézanne (1829–1906) exhibited with the impressionists but came to feel that their pictures lacked form and solidity. He admired the grandeur, harmony, and three-dimensional quality of Poussin and the old masters, but wanted, on the other hand, to start painting all over again in a style that would owe nothing to others. His claim that all forms in nature could be seen as cylinders, spheres, and cones was later to influence the cubists, but his real wish was to make of impressionism "something lasting like the art of the museums." A stubborn and eccentric man, Cézanne retired to Aix on a small allowance from his father and concentrated on developing a style with a frustrated intensity that ignored such material considerations as finishing, exhibiting, or even selling his canvases. Yet, like Giotto six centuries earlier, it was he more than any other artist who determined the future course of European painting.

Vincent van Gogh (1853–1890), son of a Dutch pastor, worked as a lay preacher with the miners of Belgium and spent some time in England. He

never grew up emotionally and remained all his life tied to his brother Theo; he became insane and shot himself after leaving a mental hospital. His works, unappreciated in his lifetime, show an intense emotionalism revealed in brilliant colours and a forceful but simple technique; they retain the freshness of the impressionists without their rather fragile delicacy. Paul Gauguin (1848–1903) lived with van Gogh at Arles until he was attacked during one of the latter's periods of insanity, when he went to Paris and, two years later, to Tahiti, where he died of ill-health and poverty. A successful stockbroker, without artistic training, he left his family in middle-age to become a "barbarian" painting the pictures of natives in the South Seas by which he is best known.

PAINTING IN THE 20TH CENTURY.

"Post-impressionism" was a term orginated by Roger Fry to describe the paintings in his London exhibitions of 1910–12; they included works by Manet, Cézanne, van Gogh, Seurat, Matisse, and Picasso. However, most authorities today would assert that this revolt in favour of colour, form, and solidity was primarily the work of Cézanne, van Gogh, and their contemporaries Seurat, Gauguin, the later Renoir; that it was followed by fauvism and cubism. The best collections of impressionist and post-impressionist paintings in Britain are at the Tate Gallery and the Courtauld Institute in London.

Another movement away from impressionism which is best regarded as an aspect of post-impressionism was the neo-impressionism of the painters Georges Seurat (1859–1891) and Signac, who in the 1880s devised the method of painting known as *pointillism*. Small spots of pure colour were arranged in a mosiac on the theory that complementary colours seen at a distance fuse within the eye of the observer to produce a purer and more luminous result than would be the case if they were mixed (*e.g.*, spots of blue and yellow will appear as green). One of the best-known examples of this technique is Seurat's *Sunday Afternoon on the Grand Jatte*, familiar from reproductions, although the original is in Chicago. The movement was short-lived, and its excellent results were due more to the fact that Seurat was a fine artist than to his method.

The Fauves: Matisse, Vlaminck, Rouault, Braque, Dufy, Derain. The *fauves*, or "wild beasts," was a name contemptuously given to a group of painters who exhibited at the Salon d'Automne in Paris in 1905 because of their violent use of colour and apparent neglect of drawing. Like the post-impressionists, they were in revolt against the delicacy of the impressionists and had, in fact, learned much from the former, notably from van Gogh and Gauguin. There was a kind of hysteria in the air far removed from the old academic standards and exemplified by such remarks as van Gogh's "I am trying to exaggerate the essential," Gauguin's "A kilo of blue is bluer than a half-kilo," Cézanne's worry lest his still-life of green apples should look too "horribly resemblant to life," and Toulouse-Lautrec's relief that "at last I have forgotten how to draw." Like all the French schools of this time, the fauves were influenced by Helmholtz' theory of primary and complementary colours, which implied that whereas yellow and blue, red and yellow, spots will fuse on the retina of the eye to make green and orange respectively, masses of blue will look bluer next to orange and red redder next to green. The fauves omitted shadows and often used heavy black outlines to show form; their works were flat and sometimes distorted; all nature was seen in brilliant colours but without sentiment. Leader of this movement was Henri Matisse (1869–1954), whose *Woman with the Hat* shocked everyone and led to the appearance of posters announcing "Matisse rend fou"—Matisse drives people mad. Matisse experimented in various styles for a while, and when he died in 1954 he was the greatest and most admired painter of contemporary France, an acknowledged genius in his own lifetime. His work, relaxed and decorative, was inspired not only by Gauguin and van Gogh but also by Byzantine mosaics, Persian and Oriental art generally, the Negro sculpture which was exciting interest at that time, and Turner's paintings, which he visited London to see. Among his paintings are *Odalisque with Raised Arms*, *Egyptian Curtain*, and *Odalisque with a Tambourine*; the decorations in the little chapel at Vence in the south of France are well known to visitors. Other members of the movement were Maurice de Vlaminck (d. 1958), Georges Rouault, Georges Braque, Raoul Dufy, and André Derain. Both Braque and Rouault, like Matisse, have decorated chapels, the former at St. Dominique near Dieppe, the latter at Assy; all were commissioned by Père Couturier a modern-minded Dominican friar.

Toulouse-Lautrec (1864–1901), like Gauguin and van Gogh, is familiar to many through popular biography and films. Belonging to no particular school, he is the illustrator of the *fin-de-siècle* night-life of Paris in his pastels and paintings, and creator of the modern poster.

Cubism: Matisse, Braque, Picasso. Modern art as we know it today derives from three artists who were painting in Paris between 1905 and 1908: Matisse, Braque, and Picasso. Braque and Picasso were the originators of cubism, a geometric-abstract style deriving from Cézanne's concern with solidity and form which led to a reduction of natural shapes to their fundamental geometric ones. Picasso's *Young Ladies of Avignon*, the first cubist painting, shows the influence of African Negro sculpture as does his *Head* of 1909, the first piece of cubist sculpture. Cubism passed through various phases from the early "analytical cubism," through the development known as "simultaneity," in which different views of an object were shown in the same composition (*e.g.*, full-face and profile) and colour and the third dimension were eliminated, to the "synthetic" or "college" phase of 1913, in which pieces of paper and other materials were used in addition to paint. Other painters in this movement were Gris, Duchamp, Gleizes, and Jeanneret (Le Corbusier the architect), and among sculptors Brancusi, Archipenko, Belling, and Lipchitz. Georges Braque, born near Paris in 1882, is still one of the greatest living painters, best known perhaps for his still-life studies Pablo Picasso, son of a professor at the Barcelona Academy of Fine Arts, was born in 1881 in Malaga, but has lived in France since 1903. His work is universally known, as is his early friendship with the American writer Gertrude Stein, his left-wing views, and the dove, guitar, and bull motifs of many of his paintings. Perhaps the best-known single work is his mural *Guernica* (1937), but the paintings in many styles, his etchings, sculpture, and ballet decor also make up his enormous output. His influence upon modern art has been somewhat analogous to that of Cézanne fifty years earlier.

Abstract and Non-objective Painting: Mondrian, Kandinsky, Klee. Painting from the time of Cézanne showed two fundamentally different approaches: his own severely intellectual and geometric one, which led to cubism and the various forms of abstractionism, and the free and emotional approach of van Gogh and Gauguin, which led, by way of the fauves, to expressionism (an essentially German movement) and surréalism. The Dutchman Piet Mondrian (d. 1944) was one of the most intellectually extreme cubists, but neither Picasso nor Braque totally eliminated all resemblance to reality. Abstract art in so far as it insists on the importance of form and colour and ignores content is, of course, the very oldest type of art and, in Moslem countries, the universal one; but its modern expression derives from the rejection of naturalism with the advent of photography, which freed the artist to attempt something other than mere reproduction. A further justification was found in Plato's dictum that "straight lines and curves and the surfaces of solid forms" are not beautiful relatively like other things but "always and naturally and absolutely."

The most extreme abstractionists were the Dutch neo-plasticists of De Stijl movement

founded in 1920 by Mondrian; the Russian constructivists led by Pevsner and Gabo, who gave up painting in favour of complex figures built from paper, cardboard, wood, and metal; the French abstraction-creation movement; the British painters Ben Nicholson (b. 1894) and Wadsworth; and the German abstractionists, represented by the Russian-born Wassily Kandinsky, whose work from 1923 became completely abstract and latterly even dispensed with titles. Most of these are represented at the Tate.

Wassily Kandinsky (1866–1944) was born in Moscow but trained in Munich. His first purely abstract painting dates from 1911, so he was one of the founders of this movement. Between 1914 and 1921 he returned to Russia, but subsequently taught at the Bauhaus in Weimar, and in 1933, following its closure by Hitler, went to France. The *Blaue Reiter* circle, founded in 1911 by Kandinsky, Klee, and Franz Marc, had the aim of bringing art to the people. Paul Klee (1879–1940) was a Swiss whose water-colours and drawings are reminiscent of those of children, but their simplicity is only apparent, covering considerable sophistication. In this country his works are perhaps better known to art-lovers than those of Kandinsky.

Expressionism: Munch, Kokoschka. Expressionism, with its roots in French post-impressionism and particularly in the works of Gauguin, van Gogh, Rouault, and Matisse, was in its later developments essentially a German movement. As noted above, it was the emotional rather than the intellectual reaction to the naturalism of the impressionists. As the name implies, its approach was subjective and imaginative, and among its practitioners were members of *Der Blaue Reiter* group and the group known as *Die Brücke* founded in Dresden in 1905 by Edward Munch (d. 1944), who first used the title *Expressionismus*. Primitive art was another source, but later the most obvious inspiration was the suffering of the German proletariat as seen in the lithographs, etchings, and woodcuts of Käthe Kollwitz, wife of a physician in post (first)-war Berlin, and the savage cartoons of George Grosz (d. 1959). Oskar Kokoschka (b. 1886), an Austrian, taught at Dresden, and was influenced by the Brücke group. He came to England, where he remained from 1935 to 1953. A widely travelled man, his landscapes, city views, and portraits have a wider appeal than some of the other artists mentioned; his style is vivid, imaginative, and highly personal.

Futurism: Balla, Severini, Boccioni. An Italian contribution to modern art, futurism is a term sometimes wrongly used to apply to modern art in general, although it was in fact a movement originated in 1909 in Paris by the writer Marinetti (d. 1944), whose futurist manifestos glorified war and the machine. This mountebank and subsequent friend of Mussolini proclaimed that "a roaring motor car, which runs like a machine-gun, is more beautiful than the *Winged Victory of Samothrace* . . . we wish to glorify war." Although a number of Italian painters and sculptors held exhibitions in Paris, London, Berlin, and elsewhere, causing thereby considerable outcry and scandal, the movement for all practical purposes died during the First World War. The distinctive feature of the work of such artists as Balla and Severini and the sculptor Boccioni was an attempt to express motion by the principle of "simultaneity," in which a figure was shown in a series of successive positions as in the *Nude Descending a Staircase*, by Marcel Duchamp.

Dada and Surrealism: Duchamp, Arp, Dali, Max Ernst, Chirico, Chagall. Dada began in a cabaret in Zurich as a product of the hysteria and nihilism accompanying the First World War; it was by intention anti-art and anti-intellect, setting out to scandalise and shock. Hence Duchamp's reproduction of the Mona Lisa with a moustache and an obscene caption, and the genuine bottle-drier and bicycle-wheel bearing his signature. At an exhibition in Cologne in 1920, held in an annexe to a café lavatory, the spectators were provided with a chopper to smash the exhibits, and the collages of Hans Arp (b. 1888) consisted of bits of coloured paper cut out at random and shuffled. By 1922 the movement had given rise to surrealism, which combined its nihilism and Freudian insights with the collage and constructivist aspects of cubism.

Its Freudian aspect is best seen in the work of Salvador Dali and André Breton, a French dadaist poet who had derived the title of the movement from another poet, Guillaume Apollinaire, who attempted to bring the movement into association with Communism—an attempt which the Communist Party rejected. Dali (b. 1904), in Spain, combined an academic technique with such fantastic subject-matter as open drawers projecting from female figures and flabby watches drooping over branches which had a Freudian significance. More recently, considering surrealism Marxist in implication, Dali rejoined the Catholic Church. His works have been immensely popular; but serious critics have not always been so impressed as the general public.

Max Ernst (b. 1891) a German artist, took his subjects from natural materials as the pattern of the grain in wood or of veins in leaves. In some of his works the pages of technical and scientific catalogues with illustrations of machinery or apparatus are provided with backgrounds so that machines appear standing in a desert. Similar effects are found in the lonely, sunlit landscapes of Giorgio di Chirico, an Italian born in Greece in 1888, which sometimes have unexpected objects displayed in the foreground. The deliberate search for the unexpected, seen also in Klee, whose abstracts were often given irrelevant titles (*e.g.*, *The Twittering Machine*), and the later Picasso, is typical of surrealism which aimed to be "beautiful as the chance encounter of a sewing-machine and an umbrella on an operating table" in the simile of Lautréamont.

Marc Chagall (b. 1887), not himself a surrealist, had a considerable influence upon the movement, with his poetic fantasies, unusual juxtapositions, and highly imaginative style. Born in Vitebsk, trained in St. Petersburg, where he came under the influence of Bakst and the Russian Ballet, Chagall was made Commissar of Fine Arts in his home area after a brief stay in Paris when he was interested in the cubists. After political disagreements he resigned and came to Paris once more in 1923, and from 1941 to 1946 lived in the United States. His dreamy and evocative fantasies of Russian village life in rich colours have latterly given place to religious subjects in which the Byzantine influence is strong.

Tanguy, Miro, Le Douanier Rousseau, Modigliani. Other noted painters in the surrealist tradition are Yves Tanguy, whose landscapes filled with unreal creatures bear titles such as *Four O'clock in Summer* and *Mamma, Papa is Wounded*, and Joan Miro (b. 1893), whose playful and childlike *Circus* and other works link him with the primitives. The latter term has been used, as explained elsewhere, to denote: (1) the art of technically primitive cultures; (2) the art of Netherlandish and Italian painters before 1500; (3) the "art" of amateur and technically incompetent French and American painters whose lack of sophistication has been accounted a virtue by some. In this third sense the main exponents have been the genuine primitives of the early 19th century, the Douanier Rousseau, and the modern American "grandma" Moses, but their many imitators beguile only the pseudo-sophisticated. Henri Rousseau (1844–1910), called "Douanier" because of his position in the Customs service, was an amateur "Sunday" painter and had allegedly served as regimental bandsman in Mexico, where he is said to have obtained his exotic settings. His tropical forests with wild beasts, tapestry-like foliage, and sleeping figures are universally popular, both with those who have little culture and those who have too much.

Surrealism has had an immense influence, not only in painting but also in literature, the theatre, the cinema, photography, and even shop-window dressing and advertising, where its juxtapositions of apparently unrelated objects has been widely

used. If its original force has been largely spent, it is more because the movement has become respectable and almost academic than because it has been neglected; surrealist techniques have been generally accepted and no longer shock. Although essentially of the 20th century, its long and reputable ancestry can be traced into the past from Bosch, Fuseli, and Goya, together with many others who depicted the fantastic and dream-like.

Amedeo Modigliani (1884–1920), of Italian-Jewish family, was born in Leghorn, and although his work shows the influence of cubism and Negro art, his unique style came most of all from his Italian heritage, its purity of form reminiscent of the Florentine Renaissance. The greatest Italian artist of the century, his work is as truly of his country as Chagall's is of Russia, in spite of the fact that most of his working life was spent in Paris. The elongated figures and light tints of orange, black, blue, and green contribute to his distinctive style.

British Painting in the 20th Century: Whistler, Steer, Sickert, Augustus John, Sutherland, Nash, Spencer. James McNeill Whistler (d. 1903), although an American, spent most of his life in England, and was strongly influenced by the impressionism of Manet, whose pupil he had been. The famous portrait of his mother is now in the Louvre, and the almost equally well-known *Nocturne in Blue and Silver: Old Battersea Bridge*, along with other pictures is in the Tate. The most important British impressionists were Wilson Steer (d. 1942) and Walter Sickert (d. 1942). Steer's landscapes have been described as Constable revivified by impressionist technique, but Sickert's paintings of the shabbier parts of London and music-hall scenes possess a sombre tone which is unlike most impressionist art. The so-called Camden Town group, which later became absorbed in the London group, was founded by Sickert. Both these painters are well represented both in the Tate and in many provincial galleries. Augustus John's rather self-conscious Bohemianism has not prevented his acceptance as a brilliant portrait painter in a traditional style modified by post-impressionism. The American John Sargent (d. 1925), who was born in Florence, was a fashionable portrait painter, perhaps less heard of today, when the more revolutionary techniques of Graham Sutherland, seen in his portraits of Somerset Maugham, Beaverbrook, and Churchill, attract general interest. Sutherland (b. 1903), one of the finest living British abstract painters, used a semi-abstract technique in his paintings of war-torn landscapes; his religious works include the *Crucifixion* commissioned for St. Matthew's, Northampton. Paul Nash (d. 1946) exhibited with the surrealists in Paris and, like Sutherland, was an official war artist in the last war. He is probably best known for his landscapes and book-illustrations, but perhaps one of the most original and English of our artists was Stanley Spencer, who died in 1959. His religious paintings, in modern dress and often located in his own village of Cookham (*e.g.*, *Resurrection, Cookham*, a huge work now in the Tate), caused some offence, and the apparent distortion of the figures aroused perplexity, but in fact his style derives from the naïve religious feeling of the Gothic artists and William Blake. Before his death Spencer was knighted and received back into the Royal Academy. Some of his finest works are the mural decorations in Burghclere Chapel, Berks.

SCULPTURE IN THE 20TH CENTURY.

Sculpture in the past two centuries has had to face much the same problems as painting: the loss of the aristocratic patron and his replacement by wealthy but untutored individuals, who either had no interest in art at all or a rather conventional and sentimentalised one. But the sculptor was in a worse position than the artist, in that his materials were more costly and his work more exclusive. Few people can do without pictures, but most expect to see their sculpture on public buildings rather than in the home. Yet the trend in architecture, compared with earlier periods, was towards austerity and against decoration, and bureaucrats tend to play safe in sculptural design when the need arises. However, the movements in painting had an influence upon the sculptor, and many painters, such as Picasso and Modigliani, were also sculptors.

In the 19th century neo-classicism, which had produced David and Ingres, produced the neo-classic sculptors Bertel Thorwaldsen (d. 1844), the only Danish artist with an international reputation; Antonio Canova (d. 1822), an Italian and perhaps the greatest in this style; and the two Englishmen John Gibson (d. 1866) and John Flaxman (d. 1826). Gibson's bequest to the Royal Academy paid for the building of the Diploma Gallery, where some of his work can be seen. He re-introduced the tinting of statues in the Greek classical tradition. Flaxman's works, which at one time had an enormous reputation, are scattered all over the world, and may be seen in Edinburgh, Glasgow, Westminster Abbey, and St. Pauls. Canova's are mostly in Italy, but also in the Louvre, Munich, Berlin, and Vienna; Thornwaldsen's in Copenhagen in the Museum named after him and in St. Peter's Rome (tomb of Pius VII).

Barye, Carpeaux, Rodin, Maillol, Meunier, Mestrovic. Romanticism found its Delacroix in Antoine Louis Barye (d. 1875), whose dynamic studies of animals are still highly prized. Jean Baptiste Carpeaux (d. 1875), a favourite of the Second Empire, whose work is full of life and movement, is best known for his *Ugolino* in the Tuileries gardens, and *The Dance* on the façade of the Paris opera house. But the greatest modern sculptor was undoubtedly Auguste Rodin (1840–1917). Influenced by Donatello and Michelangelo, Rodin devised the method of leaving part of the rough stone unfinished, from which his figures seem to be emerging. His fame survived a certain amount of public opposition, and his statues are known from photographs or replicas almost everywhere. Among the best known are *The Thinker*, *The Burghers of Calais*, and the statues of Hugo and Balzac. A large collection presented by Rodin himself is in the Victoria and Albert Museum. Aristide Maillol (d. 1944) was influenced by Gauguin's wood-carvings and by his studies of early Greek sculpture. The Belgian sculptor Constantin Meunier (d. 1905) and the Yugoslav Ivan Mestrovic (b. (1883) both have a vigorous style and a sense of the monumental, the former being famous for his great *Monument to Labour* in Brussels.

Brancusi, Archipenko, Hepworth, Moore, Epstein. Constantin Brancusi (1876–1957) was a Rumanian and one of the most abstract of modern sculptors, many of his works consisting of a single polished shape; his abstract tendencies have been followed by Alexander Archipenko (b. 1887), a Russian, now an American, and Barbara Hepworth (b. 1903) of Britain, among many others. Henry Moore (b. 1898), perhaps the greatest living sculptor in semi-abstract style, is British, as was Sir Jacob Epstein (1880–1959), born in New York, but British by adoption, having lived in this country from 1905. Epstein, however, for all the uproar caused by the large statues, was in the classic tradition of Rodin; his bronze portraits are highly regarded, and his later works (*e.g.*, at Llandarf Cathedral and at the Convent of the Holy Child, Cavendish Square, London) aroused admiration rather than the early hostile comment. Moore's sculpture has yet to be widely accepted by the general public, but his *Madonna and Child* in St. Matthew's, Northampton, the Memorial to the Airborne Force at Arnhem, and the statue for the new Unesco building in Paris have been acclaimed by critics.

ARCHITECTURE IN THE 20TH CENTURY.

About the beginning of the century there began a revolution in architecture parallel with that in the other arts. Partly this was due to the desire to escape from the eternal imitations in Gothic and Classical or Renaissance styles, partly to the discovery of new methods and materials which made columns (for example) seem rather absurd

when the reinforced-concrete structure of a building made them functionally unnecessary.

The first reaction against traditional architecture was violent. No ornamentation of any kind was used, and the beauty of the building depended wholly upon the elegance of its proportions; there was a great deal of plate-glass and steel, and the structure was completely functional, eschewing any unnecessary graces. It was not until later that the value of the older materials of brick, stone, and wood, within a concrete setting, came to be understood, first of all by the German Walter Gropius of the Bauhaus school. In 1910 Gropius put forward the idea that there should be no separation between the fine arts, the applied arts, and architecture. In his school at Weimar the staff consisted not only of architects and engineers but also of such artists as Klee and Kandinsky.

Le Corbusier, Lloyd Wright. One of the great architects of this century is the Swiss Le Corbusier, whom we have earlier seen as an artist; he designed the great blocks of flats in Marseilles and many other buildings. But it is to America that we must look for the most powerful influence on world architecture, and there the modern skyscraper of steel construction created by Louis Sullivan was at first bedevilled with past ideas, as in the (1911) Gothic Woolworth building in New York. The most important apostle of modernism was Frank Lloyd Wright (d. 1959), who with others brought into fashion the present-day horizontal strip and all-glass design. Attacked at first for the "eccentricity" of his early designs (the Larkin Building in New York, the Imperial Hotel in Tokio, 1916), Wright, who was at first more appreciated in Europe than in America, gradually converted others by his imaginative solution of each building in an original way (*e.g.*, Kaufmann House), which is projected on cantilevers across a waterfall with holes left in porch roofs for trees to grow through). The design for his last building, the Guggenheim Museum in New York, is based on a spiral.

Modern architecture has led to a kind of universal style, based on Wright and others, which is the same or similar all over the world.

MUSIC IN THE 20TH CENTURY.

In the opening years of the present century Vienna, home of so much great music, was passing through a kind of decadence similar to that of Paris and London. The *fin-de-siècle* mood arose in part from the artist's disillusion, which had led him to preach a gospel of "art for art's sake" (with the implication that it need be for nobody else's), in part from the feeling that a new century should have new means of expressing itself. But in Austria there was a further reason for disillusionment in that the rising nationalist movements within the Austro-Hungarian Empire were already presaging its end. The nationalist fervour among Czechs, Hungarians, and Poles had since the mid-19th century provided a stimulus to music and literature, and the stirrings of revolution in Russia at the turn of the century had a similar effect. There was no disillusionment among these peoples, but rather the reverse, which expressed itself in a revival of folk-themes and a desire to experiment, a movement which led to modern music.

Two men who made it impossible for music ever to return to the techniques of the past were Igor Stravinsky and Arnold Schönberg. The great composers towards the end of the 19th century had been Brahms, Mahler, and Bruckner in Vienna, the Czech nationalist composers Smetana and Dvorak, Dohnanyi the Hungarian, and the French composer Debussy, whose dreamy, and, as it appeared, structureless tone-poems *Prélude à l'Après midi d'un Faune* and *La Mer* and the opera *Pélleas et Mélisande* expressed the new "impressionism." Mahler wrote enormous symphonies, some scored for multitudes of voices. Dvorak's (d. 1904) Slavonic Dances and the *New World Symphony*, which he wrote in New York, are well known, as is Smetana's opera *The Bartered Bride*. Johannes Brahms (1833–97) was a classic-romantic composer in the Beethoven tradition. He composed in all forms except opera, and his four symphonies rank among the greatest ever written.

Although in art nothing is as simple as historians sometimes make it out to be, we can perhaps discern four trends as the century opened: the Brahmsian tradition followed by Bruckner, Mahler, Elgar, and Sibelius (so far as his style is concerned); impressionism as a reaction against traditional harmony, led by Debussy; the experimentalism of Stravinsky; and the revolutionary atonal (absence of key) and largely abstract approach of Schönberg. Among the composers of national music based on folk-themes, some made use of the traditional style, while others (notably Bartok) brought into existence new harmonies. Later in the century Stravinsky was to introduce a neo-classicism which looked to Bach and his predecessors rather than to Beethoven and the romantics.

Schönberg, Alban Berg, Stravinsky. Arnold Schönberg (1874–1951), born in Vienna of Jewish parents, was devoted to the music of Wagner, and his early work, like that of Mahler, emphasised the huge and complex; his *Gurre-Lieder* was scored for vocal soloists, three separate choirs, and an orchestra of 155. The score paper required 65 staves (the five horizontal lines on which music is written; two sets are required in piano music). His symphonic poem *Pelleas und Melisande*, completed a year after Debussy's famous opera, brought a storm of abuse from the critics, one of whom described him as "a man either entirely devoid of sense or one who takes his listeners for fools. . . . Schönberg's opus is not only filled with wrong notes, as Strauss's *Don Quixote* is, but it is a fifty-minute-long wrong note." At this time Schönberg was not aware of having based his music upon any theory which could account for its marked difference from what had gone before, and it was only when he studied both his own works and those of his pupil Alban Berg that he could see its tendencies clearly. It was continuously dissonant, any sort of harmony being deliberately avoided; there was no continuous melody but only a series of fragmented motifs; it was chromatic (*i.e.*, making use of all the twelve notes, white and black, in the scale); its harmony was so contrapuntal that he compared it to that of Bach. To those who regarded tonal music as natural, it appeared intellectualised, mathematical, unemotional, and chaotic.

Although there are still many people to whom Schönberg's music is merely a weird dissonant scraping, sawing, banging, and wailing, his "composition in twelve tones" is increasingly used by composers. In essence it is a rejection of all the traditional Western rules. *Pierrot Lunaire*, his most famous work for song-speech and five instruments, is well known in Britain. In 1933 Schönberg was dismissed from his post as head of the Prussian Academy of Fine Arts in Berlin because of his Jewish ancestry. He went to the United States, teaching first at Boston and then in Los Angeles, where he died. Some later compositions making use of the old tonal system brought about criticism as violent as his most revolutionary atonal ones had done. Schönberg completed only fifty works, and although in twelve years at Hollywood he was a near neighbour of Stravinsky, the two men rarely met.

Alban Berg (1885–1935) is best-known for his opera *Wozzeck* about the degradation and downfall of a soldier, and in this work the twelve-tone scale is used along with traditional forms, such as the lullaby, march, passacaglia, and so on. Now very highly regarded, most people would agree that Berg's music is exactly fitted to the subject and characters of the opera. His emotional links with the past are evident in his two other important works: the *Lyric Suite* for string quartet and his violin concerto. Another of Schönberg's pupils, Anton Webern (d. 1945), was essentially a miniaturist, and one of his works lasts no longer than 19 seconds; he was shot by accident in Vienna at the end of the War.

Igor Stravinsky (b. 1882), son of a singer in the Imperial Opera, St. Petersburg, was a pupil of Rimsky-Korsakov. His first opus, a symphony, was influenced by Brahms, and the second, a song-cycle, by Debussy. In his middle twenties Stravinsky met Serge Diaghilev, the Russian expatriate, then starting the famous Ballets Russes in Paris, who commissioned *The Firebird*. Although clearly in the style of Rimsky-Korsakov, this work already showed the primitivism and savagery of his later works. The second ballet, *Petrushka*, was produced the following year (1911) in Rome, and in this his "polytonalty"—the bringing of foreign chords into a composition—became more apparent. Unlike Schönberg, Stravinsky was using dissonances for the sake of colour and effect in a basically conventional work only different in degree from many of the works of his own teacher and Moussorgsky. The third ballet, *Le Sacre du Printemps*, was presented in Paris in 1913, but this aroused a storm of protest, to the great distress of the composer. Stravinsky rightly described it as a "romantic" work, but for the critics it was an outrage, the "destruction of music," barbarism, and its composer "the apostle of noise." This now popular work strikes the listener as Russian in tradition, Byzantine in colour, barbaric in rhythm as its composer intended, and undoubtedly noisy; we do not disagree with the original critics—it is simply that these qualities are accepted today, whereas then they were not. After the First World War Stravinsky turned his mind to new problems and began to develop a neo-classical style which is characterised by the use of few instruments, thin and intellectual music in an impersonal manner, precision, and conciseness. Among his best-known works in this style are the opera-oratorio *Oedipus Rex*, the octet for wind instruments, and the concerto for piano and wind orchestra. Latterly Stravinsky accepted commissions from jazz bands and the circus (*Ebony Concerto*), and his opera *The Rake's Progress* has been criticised as imitative of Mozart and Tchaikovsky.

Diaghilev died in 1929, and Stravinsky's wife and daughter in the same year. A French citizen since the end of the First World War, Stravinsky left Europe for America just before the Second and, as noted above, lived in California near Schönberg. Among French composers influenced by his first style were Darius Milhaud and Arthur Honneger (of German-Swiss ancestry)—the latter the composer of the notorious *Pacific 231*, which depicts in an ever-accelerating rhythm the journey of an express train.

The Hungarians: Dohnanyi, Bartok, Kodaly. The three great Hungarian composers of the period were Dohnanyi, Bartok, and Kodaly, and their history is in effect the history of 20th-century Hungary. Bartok was a refugee from the Nazis and died in America of leukaemia on the eve of his return to his native land; Kodaly has emerged as the recognised leader of his country's music today and President of the Hungarian Academy.

Ernst von (latterly changed to Ernö) Dohnanyi (1877–1960), in many respects like Rachmaninov, was first noted as an outstanding pianist and as one whose orientation was always primarily towards Western Europe. He received many honours and achieved great worldly success, but his music, which took advantage of the growing interest in folk-themes, was never truly nationalistic as was that of Bartok. Thus, his opera *The Tower of Voivod* (1922), while Hungarian in content, being based on an old folk-ballad, was not in the actual style of his country's music. His works include many solo piano pieces, the *Variations on a Nursery Song* for piano and orchestra, sonatas for violin or cello and piano, and chamber music.

Bela Bartok (1881–1945), like Dohnanyi, was a pianist, and under the latter's influence chose to study at the Hungarian Royal Academy of Music in Budapest rather than at the Vienna conservatoire. Later, however, the two fell out, primarily on political grounds, Dohnanyi, the conservative, obtaining all the important official posts in a reactionary Hungary, Bartok, the radical and nationalist, gaining little official recognition until late in life, when he was permitted as a state-paid official to devote himself to the publication of his collection of folk-music. This was his burning interest, and Bartok visited not only the villages of his native land to collect material but even travelled to Biskra in 1913 to study Arab music; his first book was on Rumanian folk-music. Bartok left for America in 1940, where he lived precariously and apparently unhappily until the end of the War made a return possible—regrettably too late. Bartok's main works are the ballets *The Wooden Prince*, *Duke Bluebeard's Castle*, and *The Miraculous Mandarin*, his violin sonatas and string quartets, his arrangements of Hungarian folk-songs, the violin and viola concertos, and the sonata for solo violin commissioned by Yehudi Menuhin. The apparent modernity and strangeness of Bartok's music arise rather from the asymmetrical qualities of Balkan folk-music than from the imitation of any other composer. His earliest works were influenced by Strauss.

Zoltan Kodaly (b. 1882), a close associate of Bartok, shared an interest in folk-music which he was able to satisfy during a nomadic early life as the son of a state railway official. As a composer he may have been overshadowed by his more successful colleagues. Among his recent offices in present-day Hungary are those of Director of the Academy of Music, Chairman of the Hungarian musicians' trade union, President of the Hungarian Academy, and President of the Anglo-Hungarian Society. Apart from his foundations in the folk-music of his country, Kodaly's music has been said to have been influenced by the two widely different composers, Debussy and J. S. Bach. Among the more important works are the *Psalmus Hungaricus* for tenor solo, chorus, and orchestra; large and small religious or folk-song choral works; numerous piano pieces and songs; a musical play; the opera *Hary Janos*. Kodaly himself directed performances of the *Budavari Te Deum*, the motet *Jesus and the Traders*, and the *Galanta* dances at Gloucester in 1937.

The Russians: Rachmaninov, Prokofiev, Khachaturian, Shostakovich, Shaporin. The Russian situation after the Revolution of 1917 had much the same effect upon composers as the more complex situation in Hungary. There were those who left Russia never to return, like Glazunov, who died in Paris in 1936, Grechaninov (d. 1956), and Rachmaninov (d. 1943), who sought refuge in America. Serge Prokofiev (1891–1953) had a foot in both worlds, but died full of honours in the new Russia in 1953. The leading Soviet composers, Shaporin, Shostakovich, and Khachaturian, had never left their country, and had no difficulty in fitting in with the prevailing mood.

Sergei Rachmaninov (1873–1943) composed music in the traditional manner which aroused few conflicts and was always highly praised. He was also, of course, a conductor and pianist of note, and frequently complained that, like Rubenstein, his fame as a pianist overshadowed his just dues as a composer. In spite of this, his symphonies and piano concertos (not to mention the *Prelude in C. sharp minor*) have remained favourites with musical amateurs. But the tuneful and superficial music of Glazunov, Grechaninov, and Rubenstein has little appeal today. Serge Prokofiev (d. 1953) is remembered for his *Classical Symphony*, *Peter and the Wolf*, and the music to Eisenstein's film *Alexander Nevsky*, although these are by no means his most important works.

Aram Khachaturian (b. 1904), a Russified Armenian, has made use of the melodies of his native land sweeping aside "the scrap-heap of tinsel acquired from Western European sources." He has composed among other works a three-movement symphony, a piano concerto, violin concerto, Armenian soldiers' songs, the ballet *A Song of Happiness*, and an orchestral and choral *Ode to Stalin*.

Dmitri Shostakovich, born in St. Petersburg in 1906, is possibly the most noted Soviet composer, and has composed many works, symphonic,

chamber music, ballets, and operas, including *Lady Macbeth of Mtsensk*, which *Pravda* found to be "all wrong" and lacking in "socialist realism." His Fifth Symphony, autobiographical and essentially programme music, is described by Shostakovich as "The Reply of a Soviet Artist to Merited Criticism"; the Seventh Symphony written during the siege of Leningrad is usually considered to be inferior to his First. The decree of Andrei Zhdanov (1948) attacking "formalism" and commending "socialist realism" seems to result in a type of music which, like Russian paintings and books, differs only in content from 19th-century Victorian art. It is, in effect, the result of accepting Tolstoy's views on the function of the artist. Yuri Shaporin (b. 1889) is unlikely to get into trouble on this account; for his music is for the most part blatantly patriotic and for "the people," taking the form of incidental music for the theatre and cinema and the cantatas *On the Field of Kulikovo* and *A Saga of the Defence of the Fatherland*, which indicate its general tone.

Polish and Scandinavian Composers: Szymanowski, Sibelius, Nielsen. Two outstanding composers highly regarded, both by their own nation and by the world at large, are the Polish composer Carol Szymanowski and the Finn Jean Sibelius. Szymanowski (1883–1937) is regarded in Poland as a worthy successor to Chopin, and his music, which tends to the exotic, has been influenced by folk-music, Debussy's impressionism, and the Arab music which so appealed to Bartok. After a long struggle against tuberculosis Szymanowski died in Lausanne and was buried in the vault for distinguished Poles in the Stalka Church, Cracow.

Jean Sibelius (1865–1957) first studied law at Helsinki University, but his natural musical gifts took him to Berlin and Vienna to study music. He was, like Elgar, a fine violinist. It is doubtful whether it is useful to think of him as a nationalist composer, for although he had strong national feelings and much of his early work was inspired by folk-music and the ballads of the Finnish epic *Kalevala*, he is a composer in the Beethoven–Brahms tradition, his true greatness lying in his originality, and intense imaginative and creative powers. Some regard him as the greatest composer of the 20th century. Songs, tone-poems, together with the symphonies, form the most familiar part of his work; *Tapiola*, the tone-poem, and the *Seventh Symphony* perhaps ranking as the finest. Known to all are *The Swan of Tuenela*, *Finlandia*, and *Valse Triste*. Carl Nielsen (d. 1931) of Denmark, although not so well known in Britain, occupies a place in Scandinavian music second only to that of Sibelius.

French Composers: Milhaud, Poulenx, Dukas, Ravel. French composers have obtained little universal recognition since Debussy, although many of the composers mentioned above have sought refuge in Paris. Of the post (first)-war group known as *Les Six*, whose literary spokesman was Jean Cocteau, only two—Darius Milhaud (b. 1892) and Francis Poulenx (b. 1899) —are at all well known, the former for his opera *Christophe Colomb*, the latter for the ballet-music first commissioned by Diaghilev. Paul Dukas (1865–1933), born of a Parisian-Jewish family and a fellow-student of Debussy, is familiar from his *Sorcerer's Apprentice*, and Maurice Ravel (1875–1937) from his *Daphnis and Chloe* ballet and, of course, the *Bolero*. Ravel, who also worked with Diaghilev and was a friend of Stravinsky, was a Swiss-Basque—the second half of his parentage supplying the Spanish element in his music.

The Spanish composers Manuel de Falla (1876–1946) and Pantaleon Granados (1867–1916) both received training in Paris, but their style is purely Spanish, and both were admirers of the older composer Albeniz, who died in the first decade of the century. The ballets of de Falla *The Three Cornered Hat* and *Love the Magician* are as popular as his piece for piano and orchestra, *Nights in the Gardens of Spain*. The *Goyescas* and *Spanish Dances* of Granados reflect his own ability as a concert pianist. He was drowned on board the *Sussex* when she was sunk by a German submarine.

British Composers: Elgar, Britten, Holst, Delius, Vaughan Williams, Walton. Sir Edward Elgar (1857–1934) composed in the traditional style; his *Enigma Variations*, the two symphonies, the tone poem *Falstaff*, and the oratorio *The Dream of Gerontius* are familiar works. Benjamin Britten (b. 1913) has created a world-wide reputation by his operas *Peter Grimes*, *Billy Budd*, *The Turn of the Screw*, *The Young Person's Guide to the Orchestra*, and the *Sinfonia da Requiem*. He can undoubtedly be regarded as the reviver of the British musical tradition. Gustav Holst (1874–1934), of Swedish descent, was the composer of *The Planets* suite and the opera *The Perfect Fool*, while Frederick Delius (1862–1934), of German descent, is best known by his orchestral pieces *On Hearing the First Cuckoo in Spring*, *Brigg Fair*, *Summer Night on the River*, and the operas *Koanga* and *A Village Romeo and Juliet*. Most English of composers, Ralph Vaughan Williams (1872–1958) was influenced by the French impressionists and by English folk-music. wrote nine symphonies, operas, religious music, the overture *The Wasps*, and set to music many songs, arranged folk-songs and hymns. William Walton (b. 1902), friend of the Sitwells, became first known through his music for *Façade* played to poems composed by Edith Sitwell. His Viola Concerto, played at the Leeds Festival in 1928, resulted in a commission to write an oratorio —the dramatic *Belshazzar's Feast*. Walton has also written chamber music, music for the ballet and for films.

LITERATURE IN THE 20TH CENTURY.

Although it would be an impossible task to list all the important writers of the present century, there would be fairly general agreement as to the most *significant* ones (which, of course, does not necessarily mean the most readable or popular). Of the earlier generation we must include Joyce, Proust, Mann, Kafka, and D. H. Lawrence; of the second, Graham Greene, Silone, Camus, Faulkner, Malraux, and Moravia.

English Novelists: Hardy, Meredith, Kipling, Conrad. In Britain, Thomas Hardy (d. 1928) and George Meredith (d. 1909) are the two novelists of the early period whose works are still read, but both are essentially Victorians. Hardy's reputation may have slightly decreased, but among the sophisticated Meredith's position, after suffering a decline in the inter-war years, is probably more secure than ever. Rudyard Kipling (d. 1936), never popular with the intellectuals, also declined in popularity, but there are signs that he too is being reassessed as a writer of genius rather than as a mere story-teller.

The fact is that Hardy's novels *Tess of the D'Urbervilles*, *The Return of the Native*, *Jude the Obscure*, and many others strike the modern mind as melodramatic in their pessimism, and his epic poem *The Dynasts* is little read, not because it is not a good poem, but because few people today read long poems. Yet his shorter verses are probably more popular than in his lifetime. Meredith, on the other hand, although dealing in his novels *Diana of the Crossways* and *The Ordeal of Richard Feverel* with essentially upper-class and sophisticated people, did so by dissecting their characters in a way which appeals to a more psychologically-oriented generation. Meredith's poetry also makes frequent appearance in modern anthologies.

During the 1930s, when war and imperialism were at a low ebb in Britain except as subjects for satire or bitter denunciation, Kipling came to be regarded as the very incarnation of the "Empire-builder," and only his books for children, *The Jungle Book*, *Puck of Pooks' Hill*, and *Rewards and Fairies*, received attention. Today, when we can look back more dispassionately and even with a certain nostalgia, it is possible to see him as writing with real brilliance

of a bygone era. Even his poems, which had aroused little interest among serious students, have been reprinted in a selection with an introduction by T. S. Eliot. Because literature, whatever other qualifications are necessary, must be produced by people who can write well, irrespective of subject-matter, Joseph Conrad (d. 1924) must remain one of our great writers. His novels of the sea and foreign parts (*Almayer's Folly*, *The Arrow of Gold*, and many others) are unlikely to be forgotten. This extraordinary man, a Pole by birth, joined the British merchant service and, changing his name, spent the rest of his life in England.

Wells, Bennett, Galsworthy. H. G. Wells (d. 1946) was too multifarious as a writer to discuss briefly. His early novels *Mr. Polly* and *Kipps* or *Tono-Bungay*, have a Dickensian flavour, and are obviously autobiographical. The scientific fiction of *The First Men in the Moon*, *The Invisible Man*, and others has presumably been outpaced by their modern competitors. But his great attempt at educating the man in the street (*A Short History of Mankind*, *The Science of Life*, and *The Work, Wealth, and Happiness of Mankind*) was a worthy one, and proved so successful that his imitators have been legion. Wells was a phenomenon of his age, a man born with a faith in progress through science who felt his hopes were gradually being shattered as time went on.

Arnold Bennett (d. 1931) was a very good novelist who brought to his early works (*The Old Wives' Tale*, *Tales of the Five Towns*, *Clayhanger*) the skill of a Maupassant dissecting the life of the Pottery Towns. Unfortunately he also wrote a good many pot-boilers, but hardly deserves the neglect that has fallen upon him. John Galsworthy (d. 1933) wrote plays and novels about the rich English upper middle-class society of his day, most of his novels dealing with the Forsyte family (three trilogies: *The Forsyte Saga*, *A Modern Comedy*, *End of the Chapter*). He received the 1932 Nobel Prize for Literature.

Huxley, Lawrence, Joyce. Aldous Huxley (b. 1894), author of *Chrome Yellow*, *Brave New World*, *Point Counter Point*, *Jesting Pilate*, and many other books, was highly regarded by the intellectuals of the thirties; justly so, since besides being a brilliant writer, his knowledge in every sphere is unexcelled. However, as Wells had moved into cynicism, Huxley moved towards mysticism (*Ends and Means*, *The Perennial Philosophy*), which whilst popular in the perplexed pre-war period cuts—for better or worse—little ice now, when increasingly people seek salvation in technology. In *Brave New World Revisited* Huxley sees his fears justified.

David Herbert Lawrence (d. 1930), a miner's son from the coalfields near Nottingham, wrote novels, poems, and essays (he also translated Verga's novel *Maestro-don Gesualdo*) which are beyond doubt the most important of the half-century. He is acknowledged to be one of the greatest of English novelists since the novel began. Among his many works are *Sons and Lovers*, *Women in Love*, *The White Peacock*, *The Plumed Serpent* (all largely autobiographical), the banned *Lady Chatterley's Lover*, *Aaron's Rod*, the short stories in *The Prussian Officer*, and a considerable body of poems. His apparent obsession with sex and the unconscious elements in man's nature aroused protests, and his rather sensitive nature brought him both passionate friends and enemies. He died of the tuberculosis which had for much of his life sent him travelling from England to Mexico, Italy, Switzerland, and Australia.

James Joyce (d. 1941) also aroused passionate resentments (notably in his birthplace Ireland, which, as in the case of the playwright Sean O'Casey, was torn between native pride and native bigotry). His *Portrait of the Artist as a Young Man* described in more or less conventional prose the conflicts of a youth brought up in a Jesuit seminary, but the banned *Ulysses* shocked many outside Ireland with its peculiar style, its form, based upon the adventures of Ulysses in Homer's *Odyssey*, and its content which described in minute detail 18 hours in the lives of a group of Dubliners, being extremely frank about matters usually confined to the lavatory or the bedroom. His last book *Finnegan's Wake* is written in a totally allusive and surrealist style incomprehensible to the general reader, and even those with a wide knowledge of languages and mythology would find it hard to read more than a few pages a day. Whatever may be the fate of *Finnegan's Wake*, there can be little doubt that *Ulysses* is one of the great novels, but there can be equally little doubt that Joyce went as far in this particular direction as it is possible to go, and the type of word-music found in the former is a literary dead-end. Joyce spent most of his later life in Paris and Zurich.

Virginia Woolf and Lytton Strachey. Virginia Woolf (d. 1941), a member of the "Bloomsbury Set," which also included Clive Bell, the art critic, and Lytton Strachey, was one of the most original writers, whose impressionist technique was employed in understanding human relations and the inner life with little reference to the objective world (*Mrs. Dalloway*, *Orlando*, *The Waves*, *To the Lighthouse*). Lytton Strachey's essay in history, *Elizabeth and Essex*, *Eminent Victorians*, had a considerable vogue and started a long train of historical works "debunking" the great of past times which is still in progress.

Chesterton and Belloc. G. K. Chesterton (d. 1936) and Hilaire Belloc (d. 1953) were the two Catholic writers of the period; Chesterton a convert from Anglicanism, Belloc, his friend, a Catholic by birth. Chesterton was essentially a brilliant journalist who irritates by his eternal use of paradox. His vast output includes novels (*The Napoleon of Notting Hill*, *The Man Who Was Thursday*), essays and poems, biographies of Aquinas, Dickens, and Browning, and the detective stories of Father Brown. Belloc, like Chesterton, wrote poetry, novels, books such as *The Path to Rome*, and what ordinary English Protestants must regard as extremely contentious historical works on Napoleon, Danton, Robespierre, and Cromwell, all of which reveal his religious sympathies and his half-French parentage.

Among the important living novelists are E. M. Forster (b. 1879), whose novels (*A Room with a View*, *Howards End*, *A Passage to India*) have given him great authority in the world of literature; Evelyn Waugh (b. 1903), author of the satirical novels *Vile Bodies*, *The Loved One*, *Brideshead Revisited*, *The Ordeal of Gilbert Pinfold*; Graham Greene (b. 1904), whose novels (*The Heart of the Matter*, *Brighton Rock*), like his plays (*The Complaisant Lover*) and film scripts, deal with moral problems in a modern setting from a Catholic standpoint.

American Prose Writers.

American fiction took a new turn with the novels of Theodore Dreiser, who died in 1945. He discarded Europe, and particularly Britain, and used a native American style. His realist novels (*Sister Carrie*, *An American Tragedy*) portray the seamy-side of life in big industrial cities. He is little read now in Europe, nor perhaps is Upton Sinclair (b. 1878), whose documentary novel *The Jungle* about the Chicago slaughter-yards caused a furore in 1906. Sinclair Lewis (d. 1951) was awarded a Nobel Prize in 1930 for his novels *Babbitt* and *Main Street*, but whatever their historical importance, it is doubtful whether they are still regarded as literature. Other important American writers of the 20th century are Thomas Wolfe (d. 1938), who wrote *Of Time and the River* and *Look Homeward Angel*, J. R. Dos Passos (b. 1896), author of the trilogy *U.S.A.* (1930–36), J. E. Steinbeck (*Tortilla Flat*, *Of Mice and Men*, *The Grapes of Wrath*). Three writers whose reputations have risen since the 1930s are F. Scott Fitzgerald (d. 1940), whose *The Great Gatsby* won him great popularity and is considered his best novel; William Faulkner (b. 1897), author of *As I Lay Dying* and *Sanctuary*

(which brought a Nobel Prize), and now recognised as one of the great writers of the century; and Ernest Hemingway (b. 1898), another Nobel Prizewinner, who has brought into literature a new style and a new type of hero in his novels *Farewell to Arms*, *For Whom the Bell Tolls*, and *The Old Man and the Sea*.

English Verse.

It is impossible to guess which poets of our time will be remembered fifty years hence. But one of the safest guesses would be William Butler Yeats (d. 1939), the great Irish poet and playwright. Rupert Brooke, who died tragically in 1916, may still be the poet of youth, but James Elroy Flecker (d. 1915), whose verse play *Hassan* was performed in the 1920s with music by Delius and ballet by Fokine, is almost forgotten. The verse of Brooke, Rudyard Kipling, and A. E. Housman (d. 1936) will haunt the minds of those born about the time of the First World War, but today we no longer regard war as an adventure as Brooke did, we no longer own, as in Kipling's time, the road to Mandalay. The First World War brought to an end the romantic tradition in poetry. To the "war poets," Siegfried Sassoon (b. 1886), Isaac Rosenberg (killed in action 1918), Edward Thomas (killed in action 1917), and Julian Grenfell (killed in action 1915), war was brutal, futile, and degrading, and in powerful realistic verse these poets expressed their hatred of war. Walter de la Mare (d. 1957) saw the world through the eyes of a child, and in many ways resembles Blake. His lovely verses are likely to retain a place in English literature. A. E. Housman was a professor of Latin at Cambridge and an eminent classical scholar, but is best known as a poet (*A Shropshire Lad*, *Last Poems*).

The poets who aroused interest in the 1930s were experimentalists and realists, many of whom held strong political views in relation to the threatening international situation. Stephen Spender (b. 1909) wrote *Poems*, *The Still Centre*, *Ruins and Visions*, besides fiction and literary and social criticism. Wystan Hugh Auden (b. 1907), who has succeeded C. Day Lewis as Professor of Poetry at Oxford, wrote *The Orators*, *Look Stranger*, and, in collaboration, the verse-plays *The Dog Beneath the Skin*, *The Ascent of F.6*, *On the Frontier*. His *The Age of Anxiety* won him the 1948 Pulitzer prize for poetry. C. Day Lewis (b. 1904) is the author of several volumes of poetry, and has translated Virgil's *Georgics*, while Louis MacNeice (b. 1907), also a classical scholar, in addition to poems, and his translation of the *Agamemnon* of Aeschylus, wrote *Letters from Iceland* in collaboration with Auden. Roy Campbell (1920–1959), born in South Africa, lived much of his life in France and Spain. He fought for Franco in the Spanish Civil War, and his colourful poetry in the volumes *The Flaming Terrapin*, *Mithraic Emblems*, *The Georgiad* reflects his general obsession with blood, bulls, and wild animals. Edith Sitwell (b. 1887), the sister of Osbert and Sacheverell, revolted against the traditional forms (*see* **M2**), and Thomas Stearns Eliot (b. 1888), born in America but a naturalised British citizen since 1927, has graduated all the way from a rebel whose early poems were alleged to be incomprehensible to a highly respected and almost conventional poet with the O.M. His works include *Prufrock and other Observations* (1917), *Poems* (1919), *The Waste Land* (1922), *The Hollow Men* (1925), *Ash Wednesday* (1931), *Four Quartets* (1935–42), and the verse-plays *Murder in the Cathedral*, *The Cocktail Party*, and *The Confidential Clerk*. He won the Nobel Prize for Literature in 1948.

Another important modern poet, read mostly by intellectuals, is Robert Graves (b. 1895), whose *Collected Poems* appeared in 1938 and *Poems, 1938–45* in 1946. Undoubtedly the two most popular modern poets are John Betjeman, who has aroused a new interest in Victorian architecture and achieved the not inconsiderable status of being a best-seller with his poems, and Dylan Thomas, who died in 1953. This fine Welsh poet, since his tragic end in New York, is now more read than in his lifetime; his verse play *Under Milk Wood*, his shorter verses (*Fern Hill*, *Do not Go Gentle into that Good Night*), and his autobiographical sketches in *Portrait of the Artist as a Young Dog* at this short distance of time seem important.

American Verse.

In American poetry we have to retrace our steps to Emily Dickinson, who died in 1886. This extraordinary recluse produced some very great short poems and is now becoming recognised at her true worth. Ezra Pound (b. 1885), a scholar, who has an immense knowledge of world literature has made, in addition to original verse, translations from Provençal, Chinese, Latin, Italian, and other languages. One of the most popular American poets now living is Robert Frost (b. 1875), who writes in a simple manner of country life; among his poems are *Birches*, and *Stopping by Woods on a Snowy Evening*. Other well-known poets are Carl Sandburg (b. 1878), Edwin Arlington Robinson (d. 1935), and E. E. Cummings.

EUROPEAN WRITING.

German Literature. We have seen how Germany produced no great novelist up to the end of the 19th century, and specialised in lyric poetry and the short-story form. Yet in the 20th century she can claim perhaps more great novelists and poets than any other nation. Thomas Mann (d. 1957) was driven out of his country by the Nazis and became an American citizen; his *Buddenbrooks* (a German Forsyte Saga) and *The Magic Mountain* won him a Nobel Prize. He is likely to be regarded as one of the greatest novelists of our time. Hermann Hesse of Switzerland, although little known here, also won a Nobel Prize. Franz Kafka (d. 1924), a Jewish-Czech writer, wrote the powerful symbolist novels, *The Castle* and *The Trial*, which depict the life of man as solitary and surrounded by baleful influences in a nightmare form. His works have had a potent influence upon the modern generation, and notably upon the Existentialists. The great poets in the German language, who, influenced by the French symbolists, moved away from the simple lyric form, were Stefan George (d. 1933), a German; Hugo von Hofmannsthal (d. 1929), a Viennese Jew; and Rainer Maria Rilke (d. 1926), an Austrian. George, in addition to his original poems, translated Shakespeare's sonnets and, refusing Nazi honours, retired to Switzerland, where he died; his philosophy is expressed in his own words: "A poem is not the reproduction of a thought, but of a mood." Von Hofmannsthal, in addition to writing modern morality plays, composed the librettos of the operas of Richard Strauss. But the poetry of Rilke, particularly his *Sonnette an Orpheus* is among the most significant of the age. Among other works which, whatever their importance, have had some influence are Erich Remarque's war novel *All Quiet on the Western Front*, Arnold Zweig's *The Case of Sergeant Grischa*, the comic *Good Soldier Schweik* of the Czech Jaroslav Hasek (d. 1923), and the Proustian novels of the Austrian Robert Musil (d. 1942).

Spanish Literature. Spanish literature, almost since the time of Cervantes, has never been adequately recognised in Britain. The ordinarily educated individual, if asked the names of Spanish writers of this century, would probably be able to give only two: the novelist Vicente Blasco-Ibáñez (d. 1928) and the poet Federigo García Lorca (d. 1936). Blasco-Ibáñez is known for his novels *The Four Horsemen of the Apocalypse*, (made into a film), and *Blood and Sand*, which campaigned against bull-fighting. But few read these works now. García Lorca, however, is one of Spain's great poets, who nevertheless may owe some of his European reputation to the fact that he was brutally murdered by Franco sympathisers. Amongst his works are *Llanto por Ignacio Sanchez Mejías*, his unforgettable lament on the death of a bull-fighter, and his *Cancion de Jinete* with its haunting refrain, "Córdoba, far away and alone." Benito Pérez Galdós (d. 1920) is the Spanish Balzac who wrote a cycle of novels on contemporary life in Madrid. His *La de Bringas* ("The Spend-

thrifts ") has been translated into English. Other important Spanish writers are José Ortega y Gasset (b. 1883), who wrote one of the most important books of our time, *The Revolt of the Masses*; Miguel de Unamuno (d. 1936) poet and author of *Del Sentimiento Tragico de la Vida* (The Tragic Sense of Life); and Juan Jiménez (b. 1881), the symbolist poet. The most important living novelists of Spain are Arturo Barea, author of *The Forge, Struggle for the Spanish Soul, The Clash, The Broken Root*, and Ramon Sender, whose novels include *Seven Red Sundays, A Man's Place*, and *Dark Wedding*.

Italian Literature. In Italy, Gabriele d'Annunzio (d. 1938) was a romantic poet who considered himself a realist because, as a Fascist, he was obsessed with death, blood, and brutality. He was, in fact, a decadent. A much greater poet is Salvatore Quasimodo (b. 1901), whose humanism broke the spell of Fascist blood and thunder. He received the Nobel Prize for Literature in 1959. Of novelists we can only mention Ignazio Silone, the humanistic author of *Bread and Wine* and *The Seed beneath the Snow*; Alberto Moravia, the widely-read author of many short novels and stories (*The Conformist, The Fancy Dress Party, The Woman of Rome*), which deal with emotional and sexual problems in a highly imaginative and dramatic way; Riccardo Bacchelli, the greatest living Italian novelist, whose trilogy *The Mill on the Po* is reminiscent of Manzoni; and Carlo Levi (*Christ stopped at Eboli*). Giovanni Verga (d. 1922) is recognised as one of the great modern novelists of Europe. His Sicialian novel *Maestro-don Gesualdo* was translated, as we have seen, by D. H. Lawrence.

Russian Literature. Russian literature has, at any rate in Western eyes, suffered a sad decline since the Revolution, as have the rest of her arts. There has been no considerable Russian novelist since Gorky, unless we take into account the novel *Doctor Zhivago*, by Boris Pasternak (b. 1890), which leaves the "socialist realism" of Ilya Ehrenburg and Mikhail Sholokhov to return to the older tradition of Tolstoy and Dostoievsky basically concerned with moral rather than political problems. Pasternak is also one of Russia's great poets, but his writing was too much in the humanist European tradition for his countrymen, and latterly he took to translating Shakespeare's plays and Goethe's poems. As everyone knows, Pasternak was offered a Nobel Prize for his novel, but was compelled to refuse it by his government. Mayakovsky (d. 1930) was another poet of the early revolution which he supported, but, disillusioned, he took his own life, as did S. A. Yesenin (d. 1925). The romantic poetess Anna Akhmatova (b. 1888) has, with other writers who looked towards Europe, written nothing for many years; her husband was executed as a counter-revolutionary. Alexander Blok (d. 1921) also had faith in the revolution, and his famous poem *The Twelve* portrays Christ as leading the Bolsheviks; driven to despair, he drank himself to death. Two other authors, the Dostoyevskian Leonid Leonov (b. 1899), who wrote *Death of a Little Man*, and Mikhail Zoshchenko (b. 1895), the satirist, have been condemned to silence; Dostoyevsky is now regarded as a reactionary, and satire has little place in modern Russia, though Zoschenko's satirical short stories were very popular in Russia in the 1920's.

French Literature. France has been as prolific in the literary field as at any time in her past. The great poets of the 20th century are Paul Valéry (d. 1945), who was translated by Rilke; the specifically Catholic writers Charles Péguy (d. 1914, killed in the first world war) and Paul Claudel (d. 1955); Guillaume Apollinaire (d. 1918); and Jean Cocteau (b. 1889). Important novelists are Romain Rolland (d. 1944), whose *Jean Christophe* was based in the life of Beethoven; Marcel Proust (d. 1922), whose *A la Recherche du Temps Perdu* is one of the most important novels of the century; and Jules Romains (b. 1885), writer of *Men of Goodwill*. All these writers shared the French propensity for novels running into many volumes. André Gide (d. 1951), on the other hand, produced many short novels in which he unsuccessfully attempts to escape from his Protestant upbringing (*Strait is the Gate, The Coiners*). The Existentialist writers Jean-Paul Sartre (b. 1905), author of *La Nausée* and *Les Mouches*, Albert Camus (tragically killed in a motor accident in 1960), and André Malraux (b. 1895) are the most important writers of their generation. Camus, a Nobel Prizewinner, was the author of *The Plague*, a powerful allegorical novel of the Occupation. Malraux's great novel *La Condition humaine* was published in 1933 and won him the Goncourt prize. He has been side-tracked into politics and art-criticism and this has limited his scope as a writer of novels.

THE MODERN THEATRE.

Two writers who exercised a tremendous influence upon later dramatists were Anton Chekhov (d. 1904) and Henrik Ibsen (d. 1906). Chekhov, unlike Ibsen, never indulged in social criticism. His plays have no social message but are concerned with the relationships of small groups of people. Yet his characters are realistic, slightly ridiculous, and lovable, and express the dullness and frustration of Russian life in his day. Ibsen was a poet as well as a dramatist, and was nearly 50 when he began to write the series of realistic social dramas for which he is famous: *The Pillars of Society, A Doll's House, An Enemy of the People, The Wild Duck, Rosmersholm, The Lady from the Sea, Hedda Gabler, The Master Builder, John Gabriel Borkman*. Chekhov's plays include *The Three Sisters, The Cherry Orchard, The Seagull, Uncle Vanya*. Ibsen's disciple George Bernard Shaw (d. 1950), the brilliant Irish dramatist, brought new life and thought to the theatre, and by the use of great wit and irony made social criticism highly entertaining. His plays include *Back to Methuselah, Arms and the Man, Pygmalion, St. Joan, Caesar and Cleopatra, Heartbreak House*.

Johan Strindberg (d. 1912), a Swede, wrote *The Father* and *Miss Julie*, the former showing a wife deliberately driving her husband insane. Today it seems melodramatic, and his autobiography *Son of a Servant* reveals his tremendous personal conflicts in a manner reminiscent of Rousseau. The German Gerhart Hauptmann (d. 1946) was the author of plays of working-class life, such as *The Weavers*, for which he won a Nobel Prize in 1912, but they are seldom performed outside his own country. Another Nobel prizewinner (in 1934) was the Italian Luigi Pirandello (d. 1936), whose plays (*Enrico IV* is best known) are based on the psychological theme that individuals are not unified personalities but groups of varied personalities which change according to the situations they face. He was strongly influenced by the Sicilian novelist Giovanni Verga (d. 1922). Bertold Brecht (d. 1959), a German Communist dramatist who died in East Germany but who had also lived in the Soviet Union and the United States, wrote satirical plays directed against capitalism and war (*Die Dreigroschenoper*). Other important dramatists in Germany were Ernst Toller (d. 1939), Franz Werfel (d. 1945), who was also a novelist (*The Song of Bernadette*), and Carl Zuckmayer (*The Captain of Köpenick*).

Important names in the British theatre today are the verse-dramatists T. S. Eliot (*Sweeney Agonistes, Murder in the Cathedral, Family Reunion, The Cocktail Party*) and Christopher Fry (*A Phoenix Too Frequent, The Lady's Not For Burning, Venus Observed*), J. B. Priestley, who has experimented in various forms (*Time and the Conways, Johnson Over Jordan, Eden End*), the late James Bridie, another great and versatile dramatist, by some called the "Scottish Shaw," and, of course, Noel Coward and Somerset Maugham, both writers of glittering comedy.

In France the Existentialist dramatists Gabriel Marcel (b. 1889) and Jean-Paul Sartre (b. 1905) are important, the latter for his *Huis-Clos, La Putain respectueuse, Crime passionnel*. The Greek plays in modern dress of Jean Giraudoux (d. 1944) and the delicately ironical plays of Jean Anouilh (b. 1910) are among the most familiar French works performed in Britain.

Gazetteer of the World

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This edition of the gazetteer has been revised from standard and authoritative sources. For the population figures the latest censuses have been used, where available, and where not available, the latest official estimates.

An endeavour has been made to include all the more important places throughout the world. The small scale of the maps included in the Cyclopaedia does not enable all places included in the gazetteer to be named on the maps.

In regard to the spelling of place names, the general principle followed has been to adopt national spellings. For those countries where the Latin Alphabet is not used, the principles for transliteration laid down by the "Permanent Committee on Geographical Names" of the Royal Geographical Society have been followed. There may be a few instances where the spelling shown on the map does not conform to that used in the gazetteer.

ABBREVIATIONS USED IN THE GAZETTEER

Geographical Names

Ala. = Alabama.
Ark. = Arkansas.
A.S.S.R. = Autonomous Soviet Socialist Republic.
Atl. Oc. = Atlantic Ocean.
B.C. = British Columbia.
Brit. = British.
Cal. = California.
Col. = Colorado.
Conn. = Connecticut.
Del. = Delaware.
Eng. = England.
E.R. = East Riding.
Fla. = Florida.
Fr. = French.
Ga. = Georgia.
Ill. = Illinois.
Ind. = Indiana.
Kan. = Kansas.
Ky. = Kentucky.
La. = Louisiana.
Manch. = Manchuria.
Mass. = Massachusetts.
Md. = Maryland.
Me. = Maine.
Mich. = Michigan.
Minn. = Minnesota.
Miss. = Mississippi.
Mo. = Missouri.
Mont. = Montana.
N.B. = New Brunswick.
N.C. = North Carolina.
N.D. = North Dakota.
Neth. = Netherlands.
N.H. = New Hampshire.
N.J. = New Jersey.
N.M. = New Mexico.
N.R. = North Riding.
N.Y. = New York.
N.Z. = New Zealand.
O.F.S. = Orange Free State.
Okla. = Oklahoma.
Ore. = Oregon.
Pac. Oc. = Pacific Ocean.
Pa. = Pasadena.
Penns. = Pennsylvania.
R.I. = Rhode Island.
R.o.I. = Republic of Ireland.
R.S.F.S.R. = Russian Soviet Federal Socialist Republic.
S.C. = South Carolina.
Scot. = Scotland.
S.D. = South Dakota.
S.S.R. = Soviet Socialist Republic.
T.W.I. = The West Indies.
Tenn. = Tennessee.
U.S.S.R. = Union of Soviet Socialist Republics.
Va. = Virginia.
Vt. = Vermont.
Wash. = Washington.
W.I. = West Indies.
Wis. = Wisconsin.
W.R. = West Riding.
Wyo. = Wyoming.

Abbreviations of names of Counties in Gt. Britain and Rep. of Ireland are those recognised by the General Post Office.

Other Abbreviations

a. = area.
agr. = agriculture.
alt. = altitude.
approx. = approximate.
arch. = archaeological.
aut. rep. = autonomous republic.
ass. = associated.
bdy. = boundary.
bldg. = building.
bor. = borough.
C. = cape.
c. = city.
can. = canton.
cap. = capital.
cas. = castle.
cath. = cathedral.
ch. = chief.
co. = county.
co. bor. = county borough.
col. = colony.
colly. = colliery.
comm. = commercial.
cst. = coast.
ctr. = centre.
cty. = country.
dep. = department.
dist. = district.
div. = division.
E. = east or easterly.
elec. = electrical.
engin. = engineering.
estd. = estimated.
exp. = exports.
F. = firth.
fed. = federal.
fish. pt. = fishing port.
fortfd. = fortified.
ft. = feet.
G. = gulf.
gd. = good.
gen. = general.
gr. = great, group.
I. = island.
impt. = important.
inc. = including.
indep. = independent.
inds. = industries.
industl. = industrial.
Is. = islands.
L. = lake.
lge. = large.
lgst. = largest.
m. = miles.
machin. = machinery.
mftg. = manufacturing.
mkg. = making.
mkt. = market.
mnfs. = manufactures.
mng. = mining.
mt. = mount.
mtn. = mountain.
mun. = municipality.
mun. bor. = municipal borough.
N. = north or northerly.
nat. = national.
nr. = near.
p. = population.
par. = parish.
parlt. = parliament.
parly. = parliamentary.
prod. = products.
prot. = protectorate.
prov. = province.
pt. = port.
R. = river.
rep. = republic.
residtl. = residential.
rly. = railway.
rural dist. = rural district.
S. = south or southerly.
shipbldg. = shipbuilding.
sm. = small.
spt. = seaport.
sq. m. = square miles.
St. = Saint.
st. = state.
sta. = station.
sub. = suburb.
t. = town.
terr. = territory.
tr. = trade.
trib. = tributary.
univ. = university.
urb. dist. = urban district.
vil. = village.
W. = west or westerly.
wat. pl. = watering place.
wks. = works.
wkshps. = workshops.

Land = administrative division of W. Germany approx. corresponding to "province".

A

Aabenraa, *spt.*, S.E. Jutland, Denmark; at head of Aabenraa fjord; dairy prod.; mnfs. machin., organs; p. (1950) *13,017*.
Aachen, *t.*, N. Rhine-Westphalia, Germany; formerly Aix-la-Chapelle; one of the oldest cities in Germany, cath., famous baths; suffered badly from bombing in Second World War and was first large German town to be taken by the Allied Forces in 1944; cars, elec. motors, machin., textiles, aniline dyes; p. (estd. 1954) *143,200*.
Aalborg, *c., spt.* Jutland, Denmark; shipbldg., fishing, cement, textiles, machin.; airport; p. (1955) *83,210*.
Aalen, *t.*, Baden-Würtemberg, Germany; on R. Kocher; iron and textiles; p. (estd. 1954) *26,100*.
Aalst, *see* **Alost.**
Aar, *R.*, Switzerland, flows through Brienz and Thun lakes, and thence into the Rhine, 181 m.; famous Aar gorges above Meiringen.
Aarau, *t.*, cap. Aargau can., Switzerland; precision tools and instruments, shoes, textiles; hydro-elec. plant; p. (1950) *14,295*.
Aargau, *can.*, N. Switzerland; a. 542 sq. m.; extensive vineyards, cereals, orchards, metal prod., textiles, salt mining; p. (1950) *300,782*.
Aarhus, *c.*, principal spt. on E. coast of Jutland, Denmark; famous Gothic cath., Univ.; coal, iron, grain, engin., textile inds., p. (1955) *118,943*.
Abaco, Gt., Bahama Is., W. Indies; p. (1953) *3,407*.
Abadan, *t.*, Persia, oil refineries; exp. petroleum; p. (1956) *226,103*.
Abancay, *t.*, Apurimac, Peru; sugar; p. (1947) *5,789*.
Abano, *t.*, N. Italy; sulphur water and mud baths.
Abbazia, *see* **Opatija.**
Abbeville, *mftg. c.*, on the R. Somme (N. France); connected with Paris and Belgium by canals; sugar-milling, carpets, biscuits, beer; p. (1954) *19,502*.
Abbeyleix, *t.*, Laoighis, Ireland; quarries; p. (1951) *633*.
Abbiategrasso, *t.*, Milano, N. Italy; mkt. and industl. centre; dairy produce, glassware, soaps, fertilisers; p. *13,704*.
Abbotsbury, *par.*, Dorset, Eng.; world-famous swannery.
Abbots-Langley, *vil.*, Herts, Eng., birthplace of Nicholas Breakspeare (Adrian IV); the only Englishman ever raised to the Papacy; p *4,200*.
Abeokuta, *t.*, Nigeria; palm oil, hardwoods; p. (1953) *84,000*.
Aberavon, *t.*, Glamorgan, Wales; on R. Avon, 8 m. E. of Swansea; harbour Port Talbot; lge. coal and iron inds., metals, tinplate, cables; p. *1,273*.
Abercarn, *urb. dist.*, Monmouth, Eng.; coal and iron, tin-plate, knitting pins; p. (1951) *18,757*.
Abercnirder, *burgh*, Banff, Scot.; p. (1951) *800*.
Abercorn, *par.*, W. Lothian, Scot.; on the Forth; Roman wall built by Antoninus began here, and extended to Kirkpatrick on the Clyde; p. (1951) *806*.
Abercorn, *t.* Northern Rhodesia; trading sta.; airfield; p. *1,420*.
Aberdare, *urb. dist.*, Glamorgan, Wales, on the R. Cynon; wire cables; p. (1951) *40,916*.
Aberdeen, *co.*, Scot.; mountainous; agr., oats, barley, turnips, cattle; fisheries; granite, brewing, distilling, paper; a. 1,970 sq. m.; p. (1951) *308,055*.
Aberdeen, *c., burgh*, Aberdeenshire, Scot.; at mouth of R. Dee, 100 m. N.E. of Edinburgh; sm. shipbldg., fishing, oats, whisky, paper mkg., granite, tourism; p. (1951) *182,714*.
Aberdeen, *t.*, S.D., U.S.A.; chemicals, foundry; p. (1950) *21,051*.
Aberdeen, *spt.*, Wash., U.S.A.; lumbering, salmon canning; p. (1950) *19,653*.
Aberdour, *par.*, Fife, Scot.; sea-bathing noted; p. (1951) *1,939*.
Aberdovey, *wat. pl.*, Merioneth, Wales, on estuary of R. Dovey.
Aberfeldy, *burgh*, Perth, Scot., in Strath Tay, 4 m. below Loch Tay; mkt.; tourist centre; p. (1951), *1,523*.
Aberfoyle, *par.*, Perth, Scot.; tourist resort; p. (1951) *1,133*.
Abergavenny, *mun. bor., t.*, Monmouth., Eng. on R. Usk; light engin., concrete prods.; p. (1951) *8,844*.
Abergele, *urb. dist.*, Denbigh, Wales; small wat. pl.; p. (1951) *7,539*.
Aberlour, Charlestown of, *burgh*, Banff, Scot.; on R. Spey, 12 m. S. of Elgin; p. (1951) *1,153*.
Abernethy, *burgh*, Perth, Scot.; on R. Tay, once the cap. of the Pictish Kings; p. (1951) *675*.
Abersychan, *par.*, Monmouth, Eng.; coal, iron, and steel; p. *25,748*.
Abertillery, *urb. dist.*, Monmouth.; coal, engin., leather goods; p. (1951) *27,617*.
Aberystwyth, *mun. bor., wat. pl.*, on Cardigan Bay at the mouth of the R. Ystwyth, Cardigan, Wales; univ. college; Nat. Library of Wales; p. (1951) *9,323*.
Abidjan, *cap.*, Ivory Coast, W. Africa; palm oil, cocoa, copra, hardwood, rubber; p. (1948) *45,735*.
Abilene, *t.*, Texas, U.S.A.; univ.; food prod., oilseeds, oil-refining, cotton; p. (1950) *45,570*.
Abingdon, *mun. bor.*, Berks, Eng., on R. Thames; cars, leather goods; p. (1951) *10,176*.
Abingdon, *t.*, Va., U.S.A.; lumbering, flour milling; mnfs. condensed milk, chemicals, tobacco; tourist resort; p. (1950) *4,709*.
Abington, *t.*, Mass., U.S.A.; shoes, textile machin.; p. (1950) *7,152*.
Abitibi, *R.* and *L.*, R. flows into James Bay, Ontario, Canada; gold dist.
Abo, *see* **Turku, Finland.**
Abomey, *old cap.*, Dahomey, W. Africa; former slave mkt.; cotton; p. *16,900*.
Aboyne and Glentanner, *par.*, Aberdeen, Scot.; holiday resort on R. Dee nr. Ballater; p. (1951) *1,651*.
Abraham, Plains of, nr. Quebec; Wolfe's victory over French under Montcalm, 1759.
Abram, *urb. dist.*, Lancs, Eng.; coal, engin., cotton mnfs.; p. (1951) *6,286*.
Abrantes, *t.*, Portugal, on the Tagus R.; French won battle here in Napoleonic Wars, 1807; p. (1940) *11,339*.
Abrud, *t.*, Transylvania, Romania; p. (1948) *2,656*.
Abruzzi and Molise, *region* of Italy on the Adriatic, inc. provs. of Aquila, Chieti, and Campobasso, Teramo, a. 5,883 sq. m.; p. (1951) *1,682,808*.
Abu, *mtn.*, N. Bombay, India, 5,653 ft.; Jain temples.
Abukir or **Aboukir,** *vil.* on Abukir Bay, Egypt; site of ancient Canopus; Battle of the Nile fought in the Bay, 1798; p. *7,086*.
Abu Simbil, Egypt; famous ancient temples cut out of solid rock by Rameses II.
Abydos, *ruined c.*, Upper Egypt, celebrated for its temple of Osiris.
Abydos, *ruined castled t.*, Anatolia on the Dardanelles, which desperately resisted Philip of Macedon, and famous for the love story of Leander and Hero.
Abyssinia, *see* **Ethiopia.**
Acadia or **Acadie,** French name applied to previous possessions S. of St. Lawrence R., inc. Nova Scotia and New Brunswick and part of Maine.
Acajutla, *spt.*, Salvador, Central America; coffee.
Acambaro, *t.*, Mexico; rly. junction; p. *17,643*.
Acapulco, *spt.*, Pacific coast Mexico; exp. hides, cedar, fruit; p. *9,993*.
Acatlán de Osorio, *t.*, Puebla st., central Mexico; p. *5,591*.
Acayucán, *t.*, Veracruz st., Mexico; p. *5,143*.
Accra, *spt., cap.* Ghana, W. Africa; gold, cocoa; insecticide, cigar, soap mftg.; p. (1948) *135,456*.
Accrington, *mun. bor., mftg. t.*, Lancs, Eng.; 20 m. N. of Manchester; cotton ctr., coal, textile machin., engin., bricks; p. (1951) *40,671*.
Acerra, *t.*, S. Italy; destroyed by Hannibal 216 B.C.; restored 210 B.C.; olive oil, wine, hemp; p. *16,460*.
Achaia, *prov.*, Greece; a. 2,000 sq. m.; with Elis prov. chief currant-producing dist.; spt., Patras; p. (1951) *228,274*.
Achill, *I.*, off the W. coast of Mayo, Ireland; agric., fishing.
Achill Head, *cape*, Mayo.
Acireale, *spt.*, Sicily; sulphur baths; p. *36,871*.
Acklin, *island*, Bahamas, W. Indies; timber, sponges; p. (1953) *1,273*.
Acomita, *vil.*, N.M., U.S.A.; on Acoma Indian Reservation; pottery mkg.; p. (1948) *1,482*.

Aconcagua, *mtn.*, Andes, Argentine, S. America, highest peak of New World, alt. 22,835 ft.
Aconcagua, *prov.*, Chile; a. 3,939 sq. m.; cap. San Felipe; alfalfa and Mediterranean fruits; p. (1957) *154,075*.
Aconquija, Sierra de, *mtn. range*, N. Argentina, S. America; rises steeply from Chaco lowland to 18,000 ft.
Acqui, *ancient walled t.*, N. Italy, prov. Alessandria; famous cath., sulphur springs; p. *18,975*.
Acre (Akka), *c.*, *spt.*, Israel, famous for its sieges during Crusades and in 1799 withstanding Napoleon for 61 days; p. *14,000*.
Acre, *terr.*, Brazil; a. 59,139 sq. m., cap. Rio Branco; rubber; p. (1950) *116,124*.
Acton, *mun. bor.*, Middlesex, Eng.; residtl. and mftg. suburb of London; p. (1951) *67,424*.
Acushnet, *t.* Mass., U.S.A., 3 m. N. of New Bedford; p. (1950) *4,401*.
Ada, *t.*, Oklahoma, U.S.A.; p. (1950) *15,995*.
Adamawa, *prov.*, W. Africa, divided between Nigeria and the Cameroons; a. 70,000 sq. m.; ivory, groundnuts.
Adams, *mftg. t.*, Mass., U.S.A.; paper, cottons, woollens, calcium quarrying; p. (1950) *12,034*.
Adam's Bridge, ridge of sand and coral reef, 30 m., between India and Ceylon. Proposed inter-dominion rly.
Adam's Peak, *sacred mtn.*, S. Ceylon, alt. 7,352 ft.
Adana, *t.*, Turkey; on R. Seihan; wool, cotton, grain, tobacco; p. (1955) *172,465*.
Adapazari, *t.*, Turkey; rly. junction; agr. and tr. ctr., silk, linen; p. (1950) *36,210*.
Adda, *R.*, N. Italy, flows through L. Como to R. Po.
Addis Ababa, *cap.* Ethiopia; terminus of Jibuti rly.; p. (estd. 1953) *340,000*.
Adelaide, *c.*, *spt.*, *cap.*, S. Australia; on R. Torrens, which flows into G. of St. Vincent; trans-continental rly. connections and inds. using wool, leather, iron; imports fuels, fertilisers; exports wheat, wool, wine, ores; Univ.; p. (with suburbs) (1958) *544,000*.
Adelboden, *t.* Bern can., Switzerland; 19 m. S.W. of Interlaken; health resort, mineral springs.
Adélie Land, Antarctica; French terr. and dependency of Réunion.
Adelsburg, *t.*, Jugoslavia; 20 m. N.E. of Trieste; extensive grotto and stalactite cavern.
Aden, *spt.*, *terr.*, *Crown Col.*, S. Arabia; t. stands on peninsula of Aden, is refuelling pt. and entrepôt for cotton, clothing, coffee, tobacco; salt mftg., oil refinery; Aden Terr. inc. Perim I. and Kuria Muria Is., also administers Kamaran I.; a. 75 sq. m., p. (1955) *138,441*.
Aden Protectorate, S. Arabia; comprises section of mainland stretching along G. of Aden and inland for about 100 m., also Sokotra I; a. 112,080 sq. m.; p. (estd. 1959) *650,000*.
Aden, Gulf of, Arabian Sea; length 480 m., breadth 180 m.
Aderno, *t.*, Sicily, Italy; at base of Mt. Etna, ancient ruins; p. *24,307*.
Adige, *R.* in N. Italy; enters Adriatic N. of Po, length 240 m.
Adigrat, *t.*, Ethiopia; near Eritrean border; p. *5,000*.
Adirondacks, *mtns.*, N.Y., U.S.A.; highest peak, Mt. Marcy, 5,345 ft.
Adlington, *urb. dist.*, Lancs, Eng.; nr. Chorley; cotton, coal-mining; p. (1951) *3,998*.
Admiralty G., N.W. of Western Australia.
Admiralty I., off Alaska mainland; belongs to U.S.A.; fishing, timber.
Admiralty Is., S.W. Pacific Ocean, N. of New Guinea, comprise some 40 small islands; Australian mandate; coconuts, copra; a. 663 sq. m.; p. *13,134*.
Adonara, *I.*, one of Lesser Sunda Is., Indonesia; p. (estd.) *25,000*.
Adoni, *t.*, Madras, India; cotton market; p. (1951) *35,431*.
Adour, *R.*, S.W. France; rises in Pyrenees, enters Bay of Biscay below Bayonne; length 207 m.
Adowa, *t.*, *cap.*, Tigre prov., N. Ethiopia; alt. over 6000 ft., tr. and mkt. centre; p. (1945) *11,500*.
Adra, *spt.*, *t.*, Almeria, S. Spain; nr. Guardia Viejas salt beds and Berja lead-mines; sugar-cane.
Adramyti, *t.*, Turkey; on trade route to Bandirma; wine, olive oil.
Adrano, *t.*, Sicily, Italy; at S.W. foot of Etna; agr. mkt.; p. (1936) *24,307*.
Adrar, *oasis*, Sahara Desert, Rep. Mauritania; salt, dates, grain.
Adria, *mkt. t.*, prov. Rovigo, Italy; formerly on coast, now 14 m. inland, old Etruscan c.; p. *31,025*.
Adrian, *c.*, Michigan, U.S.A.; 73 m. W. of Detroit; p. (1950) *18,393*.
Adrianople, *see* **Edirne**.
Adriatic Sea, branch of the Mediterranean, between Italy and Balkan Peninsula; forms G. of Venice on the N.; chief trading pts., Venice, Trieste, and Ancona on the N., Brindisi and Dürres on the S.; a. 52,000 sq. m., length 450 m.
Adullam or **Aidelma**, *former dist.*, Palestine; S.E. Jerusalem. Site of Canaanite city; cave, David's hiding-place from King Saul.
Adwick le Street, *urb. dist.*, W.R. Yorks, Eng.; coal; p. (1951) *18,808*.
Adzhar, *rep.*, U.S.S.R.; tea, citrus fruits, camphor oil, rubber, bamboo; chief town Batumi; p. *169,946*.
Aegades, group of rocky Is. off W. coast of Sicily; ch. t. Favignana on I. of that name.
Aegean Is., between Greece and Turkey; called the Grecian Archipelago, inc. Crete, Cyclades, Sporades, and Dodecanese; a. 1,506 sq. m.; p. (1951) *280,827*.
Aegean Sea, branch of the Mediterranean; studded with Is., between Greece and Turkey; connected through the Dardanelles with Sea of Marmara and thence through the Bosphorus Strait with the Black Sea. [fisheries.
Aegina, *I.*, Greece; in G. of same name, sponge
Aerö, *I.* in the Baltic off Denmark; p. (1950) *10,723*.
Aetolia and Acarnania, *prov.*, N. Greece; cap. Missolonghi; p. (1951) *220,208*.
Affric, Glen, Inverness, Scot.; 30 m. S.W. of Inverness; hydro-elec. scheme, opened 1952.
Afghanistan, *mountainous cty.*, Asia; monarchy; ch. ts., Kabul, Herat, Kandahar; ch. rs., Kabul and Helm; climate, intense summer heat, severe winter cold, scanty rainfall; races, Afghans, aboriginal hill-tribes; languages, official Persian, spoken Pushtu; religion, Islam; cereals, fruit, sheep, horses, camels; inds. carpets, woollens, silks; rich copper, lead, iron resources undeveloped; a. 245,000 sq. m.; p. (estd.) 11–12 million (inc. 2 million nomadic tribes).
Africa, second largest *continent*; bounded on N. by Mediterranean, by Red Sea and Indian Ocean on E., by Atlantic Ocean on W.; adjoins Asia at Isthmus of Suez. Deserts in N., forests in centre, and lofty plateaux and veldts in S. Highest mtn., Kilimanjaro, 19,324 ft.; chief rivers, Nile, Congo, Niger, Zambesi; largest L., Victoria. Climate; hottest continent, rainfall heavy near Equator, almost rainless in Sahara and Kalahari, elsewhere moderate. All kinds of big game except tiger found. Races include Negro, Bantu, Arabs, Berbers, Hottentots, Bushmen. Agriculture: wine, olives, wheat, esparto grass in N.; cocoa, oil palm, groundnuts, coffee, cotton in centre; wheat, maize, wool in S. Minerals: gold, diamonds, copper. Politically, largely British, French, Belgian, Portuguese, Spanish; among ind. states, Egypt, Sudan, Libya, Tunisia, Morocco, Cameroon, Ghana, Guinea, Liberia, Ethiopia, Union of S. Africa and Nigeria (ind. 1 Oct., 1960); a. (approx.) 11,500,000 sq. m.; p. (estd.) *225,000,000*. [*29,881*.
Afyon Karahisar, *t.*, Turkey; opium; p. (1950)
Agadès, *t.*, Niger, Fr. W. Africa; salt, natron.
Agadir, *spt.*, S. coast of Morocco; wrecked by earthquake, 1960; p. (1946) *15,155*.
Agawam, *t.*, Mass., U.S.A.; engin.; p. (1950) *10,166*.
Agder, E. and W., *two dists.*, Norway; (E.) a. 3,607 sq. m.; p. (1950) *75,788*; (W.) a. 2,794 sq. m.; p. (1950) *96,930*.
Agematsu, *t.*, Japan; timber; p. (1947) *8,919*.
Agen, *t.*, *cap.* Lot-et-Garonne, France; 85 m. from Bordeaux; cath.; p. (1954) *32,593*.
Agincourt, *vil.*, Pas-de-Calais, France; famed for battle in 1415 between English, led by Henry V, and French under d'Albert.
Agira, *t.*, Sicily, Italy; marble, cement, sulphur; p. *15,172*.
Agordat, *t.*, Western Province, Eritrea; rly. terminus; p. *2,050*.
Agra, *prov.*, *see* **United Provinces**.
Agra, *c.*, Uttar Pradesh, India; on Jumna R., 115 m. S.S.E. of Delhi; formerly cap. of Mogul Empire; famous Taj Mahal mausoleum; p. (1951) *375,665*.

Agrigento, *t.*, S. cst. Sicily, Italy; grain, sulphur, salt; p. (1951) *40,353*. Agrigento (lately Girgenti, and formerly Agrigentum, Akragas), is also famous for its Greek temples.
Agrinion, *t.*, Greece; tobacco; p. (1951) *21,752*.
Aguadilla, *spt.*, Puerto Rico, Central America; exp. coffee and sugar; p. *13,468*.
Aguascalientes, *st.*, Mexico; cap. Aguascalientes; a. 2,499 sq. m.; p. (1950) *188,104*.
Aguascalientes, *t.*, *cap.*, Aguascalientes, Mexico; alt. over 6000 ft.; 360 m. N.W. of Mexico City; wide range of local inds.; hot springs; p. (1950) *117,409*.
Aguilar de la Frontera, *t.*, S. Spain; wine, olives; Moorish castle, p. (1947) *15,000*.
Aguilas, *t. spt.*, Murcia, on E. cst. of Spain; exp. esparto, iron ore; p. *246,462*.
Agulhas, *C.*, 100 m. E. of C. of Good Hope, most southerly point of Africa.
Ahlen, *t.*, N. Rhine–Westphalia, Germany; on R. Werse; coal mining, metal and engin. wks.; p. (estd. 1954) *33,700*.
Ahmadabad, *c.*, *dist.*, Bombay, India; Jain temple, splendid mosques, pottery, silk, gold, cotton; p. (of c.) (1951) *788,333*.
Ahmadnagar, *c.*, Bombay, India; lge. trade in cotton and silk goods; p. (1951) *80,873*.
Ahoskie, *t.*, N.C., U.S.A.; agr., timber; p. (1950) *3,579*.
Ahuachapán, *dep.*, Salvador; cap. Ahuachapán; trade in coffee, sugar, tobacco, cereals; p. (1950) *94,646*.
Ahvenanmaa (**Åland**), *dep.*, Finland, a. 572 sq. m.; p. (estd. 1949) *23,056*.
Ahwaz, *t.*, Persia; on R. Karun; oil pipe-line passes through to Abadan; p. (1956) *119,828*.
Aigion, *t.*, Greece; currants exported; p. *11,011*.
Aigues-Mortes, *t.*, Gard, France; on R. Rhône delta; canal centre, once spt. now 3 m. from Mediterranean; salt-works; p. (1954) *3,746*.
Aigun, *former treaty pt.*, Manchuria, China; on bank of Amur R.; flour and saw milling, bricks, ship-repairing; p. (1940) *c. 20,000*.
Ailsa Craig, *rocky I.*, off Ayrshire cst., Scot., alt. 1,114 ft.
Ain, *dep.*, France; mainly agr., vines, grains, sheep, tobacco, silk; a. 2,248 sq. m.; p. (1954) *311,941*.
Ain Sefra, *terr.*, S. Algeria; p. *193,347*.
Aintab, *t.*, Syria, military centre in the Middle Ages; hides, morocco leather; p. (1950) *72,743*.
Air or **Asben**, *oasis* in Sudan, cap. Agades; dates, indigo, senna.
Air, *mtns.*, Niger col., Fr. W. Africa; ch. t. Agades.
Airdrie, *lge burgh. mftg. t.*, N.E. Lanark, Scot.; 12 m. E. of Glasgow; coal-mng., iron inds., brick and concrete wks.; p. *30,645*.
Aire, *R.*, W.R. Yorks, Eng.; trib. Ouse; l. 70 m.
Airlie, *par.*, Angus, Scot.; seat of the Earls of Airlie; p. (1951) *630*.
Airolo, *vil.*, Switzerland; at S. end of St. Gotthard tunnel.
Aisne, *dep.*, France; agr., timber, sugar, brewing, textiles; cap. Laon; a. 2,866 sq. m.; p. (1954) *487,068*.
Aisne, *R.*, N.E. France; trib. R. Oise; l. 150 m.
Aivali, *spt.*, Turkey; olives, olive-oil, soaps; p. (1945) *13,650*.
Aix, *t.*, Bouches-du-Rhône, France; 18 m. N. of Marseilles; old cap. of Provence; thermal springs; p. (1954) *54,217*.
Aix-la-Chapelle, *see* Aachen.
Aix-les-Bains, *health resort*, Savoy, France; p. (1954) *15,680*.
Ajaccio, *spt.*, *cap.* Corsica; timber, flour, olive oil, tobacco; p. (1954) *32,997*.
Ajmer, *t.*, Rajasthan, India; cotton, salt, opium; p. (1951) *196,633*.
Ak-Su, *t.*, Sinkiang, China; walled town, impt. trading ctr. on caravan route; copper, iron, leather; p. *30,000*.
Akaba, *pt.*, Jordan; loading of phosphates and discharging of oil.
Akaroa, *t.*, S. I. New Zealand; on Akaroa Harbour; scenic and historic interest; p. *556*.
Akassa, *t.*, Nigeria; groundnuts, palm oil.
Akershus, *dist.*, Norway; a. 1,895 sq. m.; p. (1950) *183,011*.
Akhisar, *t.*, Turkey; ancient Thyatira; manganese, tobacco, olives, cotton, grain; p. (1950) *23,579*.
Akhmim, *t.*, Upper Egypt; linen and cotton goods; limestone quarries; p. *28,000*.
Akhtyika, *t.*, Ukrainian S.S.R.; metal wks.
Akimiski I., *I.*, James Bay, Canada.
Akita, *t.*, Japan; silk, metals, rice, oil-refining; p. (1950) *126,074*.
Aklavik, *t.*, N.W. Territories, Canada; on Mackenzie R.
Akmolinsk, *t.*, Kazakhstan S.S.R.; nr. Karaganda coalfield, engin.; p. (1959) *101,000*.
Akola, *t.*, Madhya Pradesh, India; cotton; p. *62,564*.
Akpatok I., *I.* in Ungava Bay, Labrador.
Akron, *mftg. c.*, Ohio, U.S.A.; largest rubber mftg. ctr. in the world; maize mills, woollens, machin., chemicals; p. (1950) *274,605*.
Aktyubinsk, *t.*, N.W. Kazakhstan S.S.R.; at S. end of Ural Mtns.; ferro-alloys, engin., lignite, elec. power; p. (1959) *97,000*.
Akureyri, *t.*, N. Iceland; herring fishery; p. (1950) *7,439*.
Akyab, *spt.*, Burma; at mouth of Kaladan R.; exp. rice; p. *38,094*.
Alabama, *st.*, U.S.A.; cap. Montgomery, ch. pt. Mobile; minerals, cotton, cereals, sugar, and mnfs.; a. 51,609 sq. m.; p. (1950) *3,061,743*.
Alagôas, *maritime st.*, Brazil; cap. Maceio; sugar, cotton, tobacco, rubber, rice, textiles; a. 11,016 sq. m.; p. (1950) *1,106,454*.
Alajuela, *prov.*, Costa Rica, Central America; cap. Alajuela; coffee, sugar; p. (1950) *148,850*.
Alameda, *spt.*, Cal., U.S.A.; airport; light mnfs., shipbldg., fish-canning, holiday resort; p. (1950) *64,430*.
Alamosa, *t.*, Col., U.S.A.; flour-milling, meat-packing, stockyards; p. (1950) *5,354*.
Åland Is. (**Ahvenanmaa**), group belonging to Finland at entrance of G. of Bothnia; a. 572 sq. m.; p. (1940) *27,676*.
Alasehir, *t.*, Turkey; ancient Philadelphia; mineral springs, wheat, tobacco, raisins; p. (1950) *10,738*.
Alaska, *st.*, U.S.A.; in Arctic N. America; mtnous.; furs, timber, salmon fishing, mng., natural gas, oil; a. 586,400 sq. m.; p. (estd. 1956) *161,000*.
Alatau, *mtns.*, bdy. of W. Turkestan and Sinkiang, China; group of 5 ranges, outliers of Tien-Shan; alt. up to 15,000 ft.; highest peak Khan Tengri, 22,800 ft.
Alatri, *t.*, Italy, 45 m. S.E. of Rome; cotton, wool, wax.
Alatyr, *t.*, Chuvash, U.S.S.R.; on R. Sura; milling, brewing.
Alava, Basque *prov.*, N. Spain; ch. t. Vitoria; viticulture; a. 1,175 sq. m.; p. (1950) *118,012*.
Alba, *t.*, N. Italy; in Tanaro valley; mkt. for silk, cattle, grain, wine; p. (1936) *11,072*.
Albacete, *prov.*, S.E. Spain; cereals, fruit, sheep; a. 5,739 sq. m.; p. (1950) *397,100*.
Albacete, *t.*, *cap.*, Albacete, Spain; on plains of Alta Mancha; agr. mkt., wheat, sheep; p. (1951) *71,822*.
Alba-Iulia, *t.*, Romania; on R. Mures, formerly Carlsburgh; union of Transylvania with Romania proclaimed here 1918; p. *15,216*.
Alban Hills, *volcanic group*, 10 m. S.E. of Rome, Italy; circumference 35 m.; greatest alt. Monte Faete, 3,137 ft.; viticulture.
Albania, *rep.*, S. Europe; lying along Adriatic, adjacent Jugoslavia and Greece; rugged mtnous. cty., fertile Adriatic littoral and Koritsa Basin; maize, wheat, olive oil, cheese, tobacco, wool, hides, horses, bitumen; cap. Tiranë; a. 10,629 sq. m.; p. (1955) *1,394,310*.
Albano Laziale, *t.*, Italy; S. of Rome; saline springs, mud baths; p. (1936) *9,414*.
Albany, *st.*, *cap.*, New York, U.S.A.; on R. Hudson; iron, brass, chemicals, textiles, paper; p. (1950) *134,995*.
Albany, *spt.*, *t.*, W. Australia; on King George Sound; agr. and pastoral; p. (1957) *8,906*.
Albay, *t.*, Luzon I., Philippines; hemp, sugar, copra.
Albemarle I., largest of the Galapagos in Pacific Ocean; alt. summit, 5,020 ft. above sea-level.
Albemarle Sound, *inlet*, N. Carolina cst. U.S.A. 60m.
Albert, *t.*, Somme, France; on R. Ancre; almost destroyed First World War and damaged again Second World War; aircraft, machin., hardware; p. (1954) *8,991*.
Albert L., Africa; great reservoir of White Nile, extreme length 100 m., general breadth 20 m., alt. 2,100 ft.; greater part in Uganda Protectorate.
Alberta, *prov.*, W. Canada; Rockies, in W.; pre-eminently agr.; wheat, other grains, alfalfa, dairying, livestock; coal, gas, and oil; cap.

Edmonton; a. 255,285 sq. m.; p. (1956) *1,123,116*.

Albertville, *t.*, Belgian Congo; on W. shore of L. Tanganyika; rly. to Kongola on L. Lualaba, trib. of R. Congo.

Albi, *cap.*, Tarn, France; cath.; industl. and comm. ctr. in coal mining district; p. (1954) *34,693*.

Albigeois, *sub-region*, Basin of Aquitaine, France; centred on Albi; rich farming, cereals and vines; sm. coalfield and associated industries.

Albion, *t.*, Mich., U.S.A.; mnfs. iron goods; p. (1950) *10,406*.

Albunol, *t.*, S. Spain; 40 m. S.E. of Granada.

Albuquerque, *t.*, Spain; 25 m. N. of Badajoz.

Albuquerque, *t.*, N. Mex., U.S.A.; on Rio Grande; wool, hides, timber, metals, cement; univ.; p. (1940) *35,449*.

Albury, *t.*, N.S.W., Australia; on Murray R.; sheep farming, currants; p. (1958) *18,400*.

Alcalá de Henares, *t.*, Spain; 20 m. E. of Madrid; birthplace of Cervantes; p. *13,001*.

Alcalá la Real, *t.*, Andalusia, Spain; p. *21,377*.

Alcamo, *t.*, Sicily, Italy; 24 m. S.W. of Palermo; olives, oranges, lemons, wines; Saracen cas.; p. *51,200*.

Alcantara, *fortfd. t.*, W. Spain; on Tagus R.

Alcázar de San Juan, *t.*, nr. Ciudad Real, Spain; soap, gunpowder, wine.

Alcázar Quivir (Al Kazral Kebir), *c.*, Morocco, N. Africa; 80 m. N.W. of Fez; p. (1945) *35,786*.

Alcester, *t.*, Warwick, Eng., needles and fish-hooks; agr. and mkt. gardening; p. *13,110*.

Alcoy, *t.*, Spain; 25 m. N. of Alicante; farm implements, textiles, mach., electrical engin.

Alcudia, *Roman walled t.*, Majorca I., Spain; 31 m. from Palma; site of Roman t. of Pollentia.

Aldan, *navigable R.*, Siberia, U.S.S.R.; length 300 m.

Aldeburgh, *mun. bor.*, *spt.*, E. Suffolk, Eng.; 30 m. from Ipswich; fisheries; headquarters of group of English writers and musicians; p. (1951) *2,684*.

Alderley Edge, *urb. dist.*, Cheshire, Eng.; p. (1951) *3,689*.

Aldermaston, Berkshire, Eng.; Atomic Weapons Research Establishment.

Alderney, most N. of the Channel Is.; agr. and hort. prods., dairying, meat-canning, silencers; t. St. Anne; sm. airpt.; a. 1,962 acres; p. (1956) *1,350*.

Aldershot, *mun. bor.*, Hants, Eng.; bricks; lge. military camp; p. (1951) *36,184*.

Aldridge, *urb. dist.*, Staffs, Eng.; plastics, packing-cases.

Aleksandrovsk, *spt.*, Sakhalin, U.S.S.R.; trading ctr. for coal and petroleum; p. *18,000*.

Alentejo Alto and Baixo, *provs.*, S. Portugal; caps. Evora and Beja; cereals, stock raising, copper, and iron; a. 9,219 sq. m.; p. (1940) *713,218*.

Alençon, *t.*, *cap.*, Orne, France; textiles, lace; p. (1954) *21,893*.

Aleppo, *c.*, ch. tr. centre N. Syria; grain, textiles, carpets, dairying; p. (estd. 1950) *362,541*.

Alès, *t.*, Gard, France; trades in raw silk produced in region; coal mining, chemicals, iron-ore, pyrite, zinc; p. (1954) *36,893*.

Alessandria, *c.*, N. Italy; cap. prov. of same name, 46 m. E. of Turin; linen, hats, macaroni; p. (1951) *82,178*.

Ålesund (Aalesund), *spt.*, W. coast Norway; fishing; p. *18,012*.

Aletsch, *glacier*, Bernese Alps, Valais can., Switzerland; lgst. in Europe; length exceeds 15 m.

Aletschhorn, *mtn.*, Bernese Alps, Valais canton, Switzerland; alt. 13,763 ft.

Aleutian Is. (U.S.A.), N. Pac. Oc., chain of Is. stretching out 1,200 m. from the most S.W. point of Alaska towards Kamchatka.

Alexander City, *t.*, Ala., U.S.A.; formerly Youngville; textiles; p. (1950) *6,430*.

Alexandretta, *spt.*, *see* **Iskenderun.**

Alexandria, *ch. port* Egypt, N.E. Africa; founded by Alexander the Great, 332 B.C.; floating dock; exp. cotton, wheat, rice, gum; p. (1947) *925,081*.

Alexandria, *t.*, Dunbartonshire, Scot.; on W. side of vale of Leven; has developed with increased communications; cotton printing, bleaching, dyeing, torpedo wks.

Alexandria, *t.*, Louisiana, U.S.A.; rice, foundries; p. (1950) *34,913*.

Alexandria, *c.*, *spt.*, N.E. Virginia, U.S.A.; on Chesapeake Bay; mnfs. foodstuffs, thread, cotton, leather goods; p. (1950) *61,738*.

Alexandrina L., inlet, S. Australia; nr. Encounter Bay.

Alexandroupolis, *spt.*, Thrace, Greece; oak timber tr., many antiquities; p. (1951) *18,453*.

Alford, *urb. dist.*, Lindsey, Lincoln, Eng.; agr. mkt., brewing, food-preserving; p. (1915) *2,218*.

Alfortville, *t.*, Seine, France; S.E. suburb of Paris. rubber, paper, glass, hosiery, metal wks.; p. (1954) *30,195*.

Alfreton, *urb. dist.*, Derby, Eng.; coal, iron, stone, chemicals, textile, engin. inds.; p. (1951) *23,388*.

Algarve, *prov.*, Portugal, cap. Faro; fruit, fishing, wines, salt; a. 2,028 sq. m.; p. (1940) *317,628*.

Algeciras, *spt.*, Spain; fishing, cork, oranges; winter health resort.

Algeria, N. African Gov. Gen. of France; comprises N. Algeria (divided into 12 deps.) and S. Territories or Sahara; fertile valleys, rugged mtns., barren plateaux; warm, moist winters, hot, dry summers; Berbers, Kabyles, Arabs, Tauregs; cap. Algiers; products: wine, fruit, olive oil, timber, tobacco, minerals; a. 851,077 sq. m.; p. (1954) *9,368,665*.

Alghero, *spt.* on western coast of Sardinia; cath.; coral fisheries, fruit, wine.

Algiers, *dep.*, Algeria, Fr. N. Africa; cap. Algiers; p. (1948) *2,765,898*.

Algiers, *cap.*, *naval port*, Algeria; strongly fortified; coaling sta.; exp. wheat, wine, olives; p. (1958) *360,000*; sub. *340,000*.

Algoa Bay, about 425 m. E. of C. of Good Hope, S. Africa.

Algonia, *t.*, E. Wis., U.S.A.; mnfs. dairy products, plywood; p. (1950) *3,384*.

Algonquin Park, Ontario, Canada; *park*, game reserve, tourist centre.

Alhama, *c.*, Granada, Spain; hot springs.

Alhaurin el Grande, *t.*, S. Spain; rly.; olive oil, marble quarries; p. *10,681*.

Alicante, *prov.*, S.E. Spain; ch. t. Alicante; a. 2,267 sq. m.; p. (1950) *634,065*.

Alicante, *spt.*, *t.*, E. Spain, noted for its wine, fruits, minerals; p. (1950) *104,099*.

Alice, *t.*, C. of Good Hope, Union of S. Africa; health resort.

Alice Springs, *t.*, N. Territory, Australia; between Adelaide and Darwin; ctr. vast pastoral holdings; p. (1957) *3,000*.

Aligarh, *t.*, India; univ.; wheat, cotton, gold and silver work; p. (1951) *141,618*.

Aliwal, *t.*, Cape Province, S. Africa; sulphur springs, health resort; p. *8,754*.

Alkmaar, *t.*, Netherlands; world cheese mkt.; salt; p. (1951) *40,054*.

Allahabad, *t.*, Uttar Pradesh, India; annual fair; Hindu pilgrimage ctr.; p. (1951) *332,295*.

Allegan, *t.*, Mich., U.S.A.; mkt. for dairy and fruit products of the district; mnfs. drugs; p. (1950) *4,801*.

Allegheny Mtns., U.S.A.; bold escarpment in the W. Section of the Appalachian system stretching from Pennsylvania to W. Virginia.

Allegheny, *R.*, U.S.A.; joins the Ohio R., Pittsburgh, Penns.; length 350 m.

Allen, Bog of, *peat morass*, Ireland; a. 372 sq. m.

Allen, Lough, *L.*, Ireland, length 5 m., breadth 3 m.; one source of R. Shannon.

Allenstein, *see* **Olsztyn.**

Allentown, *t.*, Penns., U.S.A.; on Lehigh R., furniture, silk, tobacco; lorries; p. (1950) *106,756*.

Aller, *t.*, N.W. Spain; agr. mkt.; coal-, iron-, lead-mines; p. *23,600*.

Allhallows-on-Sea, Kent, Eng., on the Thames estuary, opposite Southend; proposed "New Town" planned June 1956 by Dolphin Development and Management Co., Ltd., to house 25,000 people and light inds.

Alliance, *t.*, Ohio, U.S.A.; coal; p. (1950) *26,161*.

Allier, *dep.*, France; coal- and iron-mining, mineral springs, wine, wheat; a. 2,848 sq. m.; p. (1954) *372,689*.

Allier, *R.*, Central Massif, France; rises in Cevennes; trib. of R. Loire.

Alloa, *spt.*, *burgh*, Clackmannan, Scot.; on N. bank of R. Forth 5 m. E. of Stirling; engin., brass, bricks, tiles, woollens, glass, distilling; p. (1951) *13,436*.

Alma, *R.*, Crimea, U.S.S.R.; great victory over Russia by Allies, 1854.

Alma-Ata, *cap.*, Kazakh S.S.R.; cattle, engin., textiles, p. (1959) *455,000*.

Almada, *t.*, Portugal; on R. Tagus opposite Lisbon; founded by English Crusaders.

Almaden, *t.*, Sierra Morena, Spain; ancient Sisapon; quicksilver-mines; p. (1940) *12,988*.
Almansa, *t.*, Spain; textiles, leather, soap, brandy; p. (1940) *14,358*.
Almelo, *t.*, Overyssel, Netherlands; 25 m. S.E. of Zwolle; cotton textile mnfs.; p. (1951) *42,369*.
Almendralejo, *t.*, Badajoz, Spain.; wine, brandy.
Almeria, *prov.*, S. Spain; ch. t. Almeria; a. 3,338 sq. m.; p. (1950) *357,401*.
Almeria, *spt.*, *t.*, S.E. Spain; cath.; exp. grapes, esparto grass, lead; p. (1950) *76,497*.
Almondbury, *t.*, W.R. Yorks, Eng.; joined to Huddersfield.
Almunecar, *spt.*, Spain, on Mediterranean.
Aln, *R.*, Northumberland, Eng.
Alnwick, *urb. dist.*, Northumberland, Eng.; cas.; brewing, agr. machin.; p. (1951) *7,366*.
Alor, *I.*, one of Lesser Sunda Is., Indonesia.
Alor Star, *t.*, *cap.*, Kedah st., Fed. of Malaya; on main road and rly., N Airport; p. *32,424*.
Alora, *t.*, Spain, 25 m. N.W. of Malaga; oranges, lemons; p. (1940) *5,614*.
Alost (Aalst), *t.*, Belgium; 14 m. N.W. of Brussels; rly.-junc.; weaving (linen, silk), brewing; p. (estd 1957) *44,179*.
Alpena, *c.*, Thunder Bay, Mich., U.S.A.; cement, paper, tanneries, sawmills; p. (1950) *13,135*.
Alpen on Rhine, *t.*, Netherlands; on Old Rhine, 10 m. S.E. of Leyden; mkt. for dairy produce; p. (1946) *20,715*.
Alpes-Maritimes, *dep.*, S.E. France; ceded by Italy in 1860; ch. t. Nice; olives, wines, fruit; a. 1,443 sq. m.; p. (1954) *515,484*.
Alps, highest mtns. in Europe; 600 m. long from G. of Genoa to near Vienna; 130 m. broad in Tyrol; principal peaks: Mont Blanc (15,784 ft.), Mont Rosa (15,217 ft.), Matterhorn (14,782 ft.).
Alps, Apuan, limestone range near Viareggio, Italy; source of Carrara marble.
Alps, Australian, mtn. range between E. Victoria and N.S.W.; highest peak, Mt. Kosciusko, 7,328 ft.
Alps, Southern, mtn. ridge between Westland and Canterbury, New Zealand, highest peak Mt. Cook 12,349 ft.
Als, *I.*, Denmark, in the Little Belt, a. 130 sq. m.
Alsace-Lorraine, *prov.*, France; industl., agr., wooded, minerals; total a. 5,601 sq. m. Taken from France, in 1871, retroceded 1919; now divided into deps. of Bas-Rhin (1,848 sq. m. and p. (1954) *707,934*); Haut-Rhin (1,354 sq. m. and p. (1954) *509,647*); Moselle (2,403 sq. m. and p. (1954) *769,388*).
Alsager, *urb. dist.*, *mkt. t.*, Cheshire, Eng.; motor vehicles; p. (1951) *5,574*.
Alsdorf, *t.*, N. Rhine-Westphalia, Germany; 10 m. N.E. of Aachen; tar-distillation plant; p. (estd. 1954) *22,800*.
Alston, *t.*, Cumberland, Eng., on S. Tyne R. in N. Pennines; limestone quarrying, hosiery; p. *3,344*.
Altai, *mtns.*, S. boundary of Siberia; extend from sources of Obi to Gobi Desert more than 2,500 m. Bieluka Peak, alt. 12,796 ft.
Altamaha, *R.*, Georgia, U.S.A.; flowing into Atlantic; length 150 m.
Altamira, *caves*, N. Spain; prehistoric shelters, paintings of animals (Magdalenian).
Altamura, *t.*, Apulia, Italy; at foot of the Apennines; wines, wool.
Altdorf, *t.*, *cap.* Uri can., Switzerland; on R. Reuss; rubber goods, wood workings; p. *5692*.
Altea, *spt.*, Spain; on Mediterranean.
Altena, *t.*, N. Rhine-Westphalia, Germany; site of ancient cas. of Counts von der Marck; metals, wine; p. (estd. 1954) *22,600*.
Altenburg, *t.*, Thuringia, Germany; lignite mining, engin., metallurgy, mnfs. playing cards, textiles; p. (estd. 1954) *51,800*.
Alton, *urb. dist.*, Hants, Eng.; breweries, light engin.; p. (1951) *8,636*.
Alton, *t.*, Illinois, U.S.A.; machinery, glass, chemicals, flour; p. (1950) *32,550*.
Altona, *t.*, part of Hamburg, Germany; iron, textiles, breweries, glasswks., soap, leather, tobacco, fish canning; p. (estd. 1954) *250,000*.
Altoona, *c.*, Blair, Penns., U.S.A.; coal, rly. wks.; p. (1950) *71,177*.
Altrincham, *mun. bor.*, Cheshire, Eng.; heavy engin.; p. (1951) *39,787*.
Altus, *t.*, Okla., U.S.A.; cotton, livestock, grain mkt.; p. (1950) *9,735*.
Altyn Tagh, part of Kunlun mtns., Tibet, 14,000 ft.
Alva, *burgh*, Clackmannan, Scot.; at S. foot of Ochil Hills, 3 m. N. of Alloa; woollens, printing, fruit and fish canning; p. (1951) *4,107*.
Alvah, *par.*, Banff, Scot.; near the hill of Alva; p. (1951) *892*.
Alvin, *t.*, Texas, U.S.A.; grain mkt., oil wells; p. (1950) *3,701*.
Älvsborg, *co.*, Sweden; a. 4,919 sq. m.; p. (1950) *359,005*.
Alyth, *mftg. burgh*, Perth., Scot.; in Strathmore 17 m. N.E. of Perth; p. (1951) *2,072*.
Amadeus, *large salt L.*, N. Terr., Australia; 92 m. long.
Amadjuak Lake, Baffin I., Canada.
Amagasaki, *t.*, Japan; sub. of Osaka; chemicals, iron and steel; p. (1950) *279,264*.
Amakusa Bay, *inlet*, Kyushu, Japan; on W. cst., E. of Nagasaki.
Amakusa, *I.*, Japan; kaolin.
Amalfi, *spt.*, Italy; on G. of Salerno; tourist resort; fisheries. p. *12,365*.
Amalias, *t.*, W. Greece; grapes, wine, currants;
Amapa, *Fed. terr.*, Brazil; a. 53,059 sq. m.; cap. Macapá; manganese ore; p. (1950) *37,477*.
Amara, *t.*, R. *pt.*, Iraq; on left bank of R. Tigris 250 m. below Baghdad; Arab t. and agr. mkt. at R. crossing; p. *18,000*.
Amarillo, *t.*, Texas, U.S.A.; oil refining, creameries; p. (1950) *74,246*.
Amasya, *t.*, Turkey; on Yeshil-Irmak; fruit, salt, silk, wine.
Amazon, *R.*, S. America; largest basin and extent of water of any river in the world; rises among the Andes as the Alto Marañon, and flows 4,000 m. to the Atlantic. Ocean steamers penetrate to Iquitos, 1,935 m. from mouth. One of its affluents, the Madeira, has an extreme length of *c.* 2,000 m. Drains nearly 3 million sq. m.
Amazonas, *st.*, Brazil; rubber, timber; a. 616,148 sq. m.; cap. Manaus (*q.v.*); p. (1950) *530,920*.
Amazonas, *dep.*, Peru; a. 13,943 sq. m.; cap. Chachapoyas; p. (1947) *99,060*.
Ambala, *t.*, E. Punjab, India; cotton, flour.
Ambarchik, *spt.*, Yakut rep., U.S.S.R.; air base, gold-mining; p. *10,000*.
Ambato, *c.*, Ecuador, S. America; S. of Quito, on slope of Mt. Chimborazo; alt. 8,859 ft.; p. (1950) *33,908*.
Amberg, *t.*, Bavaria, Germany; on R. Vils; iron, mining, engin., textiles; p. (estd. 1954) *40,100*.
Ambert, *t.*, Puy-de-Dôme, France; paper, cheese.
Amble, *urb. dist.*, Northumberland, Eng.; exp. coal; p. (1951) *4,677*.
Amblecote, *urb. dist.*, Staffs., Eng.; glass, fireclay, iron wks.; p. (1951) *3,165*.
Ambleside, *sm. mkt. t.*, Westmorland, Eng.; in heart of Lake Dist., nr. L. Windermere; tourist centre, slates.
Amboina, *I.*, Moluccas, Indonesia; a. 75,820 sq. m.; spices; p. (1930) *400,642*.
Amboina, *t.*, *cap.*, *residency*, Molucca Is., Indonesia; pt. on S. cst. of Amboina I.; shipyards; p. (estd.) *17,334*.
Amboise, *t.*, Indre-et-Loire, France; 15 m. E. of Tours; famous cas. and prison; p. (estd.) *4,500*.
Ambriz, *spt.*, Angola; sugar-cane, coffee, copper.
Ameland, *I.*, W. Frisian Is., Netherlands; off cst. of Friesland.
America, *continent*; a. 16¾ million sq. m., p. *215,000,000*. The two vast divs. of this continent are joined by the narrow Isthmus of Panama. The most N. point is over 9,000 m. distant from C. Horn, the extreme S. point. *See also* N. and S. America.
Amersfoort, *t.*, Netherlands; on R. Eem; textiles, leather, tobacco; p. (1951) *59,277*.
Amersham, *t.*, Bucks, Eng.; 17th-century mkt. hall; light inds.; Radio-chemical ctr. of Atomic Energy Research Estab.; p. (of rural dist.) (1951) *41,432*.
Ames, *t.*, Iowa, U.S.A.; State College of Agriculture; p. (1950) *22,898*.
Amesbury, *t.*, Mass., U.S.A.; 40 m. N. Boston; cotton; p. (1950) *9,711*.
Amesbury, *t.*, *rural dist.*, Wilts, Eng.; nr. ancient British monuments of Stonehenge; p. (1951) *24,206*.
Amherst, *t.*, Mass., U.S.A.; machin.; Univ. of Mass.; p. (1950) *7,900*.
Amherst, *spt.*, Nova Scotia, Canada; shipbldg.; p. (1956) *10,301*.
Amiens, *c.*, Somme, N. France; on R. Somme; fine cath.; velvet, linen, woollens, silks; p. (1954) *92,506*.

Amirante Is., British group, Indian Ocean; S.W. of Seychelles.
Amityville, *t.*, N.Y., U.S.A.; Long I. sub. of New York; seaside resort; p. (1950) *6,164*.
Amlwch, *urb. dist.*, *wat. pl.*, Wales; N. cst. of Anglesey; p. (1951) *2,700*.
Amman, *cap.*, Jordan; Site of very ancient c.; aerodrome; p. (estd. 1950) *170,000*.
Ammanford, *urb. dist.*, Carmarthen, Wales; anthracite, brick mkg.; p. (1951) *6,578*.
Ammendorf, *t.*, Saxony-Anhalt, Germany; lignite mining, chemicals; p. (estd. 1954) *20,000*.
Ammer, *R.*, Germany; joins Neckar nr. Tübingen.
Ammergau, *see* **Ober-Ammergau**.
Amorgos, *I.*, Grecian Archipelago; p. *3,069*.
Amoy (Hsiamen), *t.*, former treaty-port, Fukien, China; exp. tea, fruit, bricks; p. (estd. 1946) *214,580*.
Amraoti, *t.*, Berar dist. of Madhya Pradesh, India; textiles, timber; p. (1941) *47,309*.
Amritsar, *c.*, Punjab, India; holy city of the Sikhs; founded by Siri Guru Ram Das Sahib; beautiful Golden Temple and Sikh univ.; famous for shawls and carpets; p. (1951) *325,747*.
Amroha, *t.*, Uttar Pradesh, India; pilgrimage ctr.; p. *55,957*.
Amrum, *I.*, one of N. Frisian Is., Germany; off W. cst. of Schleswig.
Amsterdam, *spt.*, *cap*, Netherlands; at junction of R. Amstel and the Ij; built on 96 Is. joined by 300 bridges, harbour can hold 1,000 ships; two universities, Royal Palace, Bourse; extensive trade; exp. dairy products, sugar, tobacco; shipbldg., diamond polishing, aeronautical, marine, elec. machin.; p. (estd. 1955) *864,000*.
Amsterdam, *t.*, N.Y., U.S.A.; woollens; p. (1950) *32,240*.
Amu Darya (Oxus), *R.*, U.S.S.R.; flows from the Pamir Mtns. to Aral Sea, length 1,350 m.
Amur, *R.*, flows from Mongolia between Manchuria and E. Siberia into the Pacific, opposite Sakhalin I.; length 3,000 m.
Ana, *t.*, Iraq; on R. Euphrates; farming, fruit.
Anaconda, *t.*, Montana, U.S.A.; copper, zinc, manganese; p. (1950) *11,254*.
Anadolu (Anatolia), *see* **Turkey**.
Anadyr, *R.*, U.S.S.R.; flows into Bering Sea.
Anahuac, *depression*, Mexican Plateau, Mexico; average alt. approx. 7,000 ft.; surrounded by higher country inc. volcano Popocatapetl (17,887 ft.); contains Mexico City, a. approx. 1,500 sq. m.
Anaiza, *t.*, Nejd, Saudi Arabia; p. *25,000*.
Anatolia (Anadolu) (formerly Asia Minor), the heart of Turkey; *see* **Turkey**.
Ancash, *dep.*, Peru; a. 14,700 sq. m.; ch. t. Huaraz; p. (1947) *512,383*.
Ancholme, *R.* Eng.; rises in Lincolnshire and joins the Humber.
Anchorage, *t.*, Alaska, U.S.A.; timber, salmon fishing and canning; p. (1950) *11,060*.
Ancona, *spt.*, Central Italy; on the Adriatic Sea; founded by Dorians, 1500 B.C.; sugar refineries, shipbldg.; p. (1951) *85,223*.
Andalusia, *old div.*, S. Spain; citrus fruits, sherry, lead, copper.
Andalusian Mtns. (Baetic Mtns.), S. Spain; young Alpine fold mtns. stretching from Atl. Oc. (Cadiz) to Mediterranean (Alicante); inc. Sierra Nevada (highest peak 11,420 ft.); some minerals, esp. lead and silver.
Andaman and Nicobar Is., Bay of Bengal; constituted a Union Territory, India, 1 Nov. 1956; timber; a. 3,215 sq. m.; p. (1956) *30,971*.
Andenne, *t.*, Namur, Belgium; on the Meuse, mining, chalk quarrying, chemicals; p. (1948) *7,882*.
Anderlecht, *sub.* of Brussels, Belgium; spinning, weaving, dyeing; p. *85,168*.
Andermatt, *vil.*, Uri, Switzerland; at foot of Mt. St. Gotthard; tourist ctr., winter health resort.
Andernach, *t.*, Rhineland-Palatinate, Germany; on the Rhine, 70 m. N.W. of Coblenz; R. port; metallurgy; p. (estd. 1954) *16,600*.
Anderson, *t.*, S.C., U.S.A.; cotton, lumber; p. (1950) *19,770*.
Anderson, *t.*, Indiana, U.S.A.; p. (1950) *46,820*.
Anderson, *R.*, N.W. Terr., Canada; flows into Arctic Ocean.
Andes, *great mtn. system*, S. America; 4,500 m. long; from Panama to C. Horn, 40 m. broad; volcanic; several of the peaks are over 20,000 ft. high. Rich in minerals.
Andhra, Pradesh *state*, E. India; cap. Hyderabad; a. 105,963 sq. m., p. (estd. 1957) *31,260,133*.
Andizhan, *t.*, Uzbekistan S.S.R.; formerly residence of Khans of Khokan; cotton, metals, petroleum; p. (1959) *129,000*.
Andorra, *independent rep.*, Pyrenees between France and Spain; livestock, wines, tobacco; a. 191 sq. m.; p. (1954) *5,664*.
Andover, *mun. bor.*, *mkt. t.*, Hants, Eng.; prehistoric earthwks.; p. (1951) *14,661*.
Andover, *t.*, Mass, U.S.A., on R. Merrimac; woollens, rubber; p. (1950) *12,437*.
Andros, *largest I.*, Bahamas; sponges, sisal hemp; p. (1953) *7,136*.
Andros, *sm. spt.*, Andros I., Cyclades, Greek Archipelago; on E. cst.; p. (1940), *3,028*.
Andujar, *t.*, Spain; on Guadalquivir R.; mineral springs, pottery, soap, textiles, tanning; p. (1940) *24,265*.
Angara, *R.*, Siberia, U.S.S.R.; trib. of Yenisei; navigable almost its entire length, rises nr. and flows through L. Baikal; length 1,300 m.
Angarsk, *t.*, E. Siberia; p. (1959) *134,000*.
Angerman, *R.*, Sweden; falls into G. of Bothnia.
Angermanland, *old div.*, Sweden; now mainly in prov. of Vasternoorland.
Angermünde, *t.*, Brandenburg, Germany; 40 m. N.E. Berlin; rly. ctr.; p. (estd. 1954) *11,000*.
Angers, *t.*, *cap.*, Maine-et-Loire, France; on R. Maine between confluences of Rs. Loire and Loir; mkt. t. for local produce, fruit, vegetables, Anjou wines, Cointreau; textiles; cath.; p. (1954) *102,142*.
Anglesey, *I.*, *co.*, N. Wales, separated from Caernarvon by Menai Straits; cattle rearing, farming; a. 276 sq. m.; p. (1951) *50,637*.
Anglet, *t.*, Basses-Pyrénées, France; airport, woodworking, cellulose mftg.; p. (1954) *12,603*.
Anglo-Egyptian Sudan, *see* **Sudan**.
Angol, *t.*, Chile; fruit, grain; p. *12,398*.
Angola (Port. W. Africa), Portuguese possession, W. Africa; cap. Nova Lisboa; ch. prod. palm oil, rubber, coffee, maize, sugar, wax, diamonds; a. 481,351 sq. m.; p. (1950) *4,111,796*.
Angoulême, *mftg. t.*, Charente, France; on R. Charente; cognac, paper; fine cath.; suffered during Huguenot wars; p. (1954) *43,170*.
Angra do Heroismo, *cap.*, Azores Is.; exp. wine, pineapples, flax; p. (1940) *78,109*.
Anguilla I., Leeward Is., T.W.I.; cap. A.; a. 50 sq. m.; p. (1957) *5,109*.
Angus, *co.*, Scot., formerly Forfar; agr. and mftg.; a. 875 sq. m.; p. (1951) *274,870*.
Anhalt, *dist.*, Saxony-Anhalt, Germany; former duchy; agr. and mining.
Anholt, *I.*, Kattegat, Denmark.
Anhwei, *prov.*, China; soya-beans, rice, tea, coal and iron; a. 54,319 sq. m.; cap. Hofei; p. (1953) *30,343,637*.
Anjou, *old div.*, France; on both sides of R Loire within the Paris Basin; ch. t. Angers.
Anju, *t.*, Korea; coal-mining; mkt. for agr. prod.; p. (1944) *21,861*.
Ankara, *cap.*, Turkey; on the Sakarya R.; grain and fruit ctr.; mohair cloth; p. (1955) *453,151*.
Anklam, *t.*, Mecklenburg, Germany; on Peene R.; engin., sugar, and furniture inds.; p. (estd. 1954) *19,500*.
Annaberg, *t.*, Saxony, Germany; in Erz Mtns.; cobalt, tin, uranium mng.; p. (estd. 1954) *30,000*.
Annam, *eastern prov.*, Rep. of Viet-Nam; within the Federation of Indo-China; rice, cotton, cinnamon, silk, tea, lacquer, minerals; a. about 56,973 sq. m.; cap. Hué; p. (1939) *211,228*.
Annan, *burgh*, Dumfries, Scot.; on R. Annan, 2 m. from its mouth in Solway Firth; cotton, ropes, gloves, boiler mkg., fishing; Chapelcross reactor sta.; p. (1951), *4,631*.
Annapolis, *cap.*, Maryland, U.S.A.; seat of Naval Academy; p. (1950) *10,047*.
Ann Arbor, *c.*, Michigan, U.S.A.; on the Huron; University of Michigan; motor lorries, farm implements; p. (1950) *48,251*.
An Nasiriya, *t.*, Iraq.; on Euphrates R.; p. (1950) *48,251*.
Annecy, *industl. t.*, France, dep. of Haute-Savoie; p. (1954) *33,114*.
Annen, *t.*, Germany; coal, steel, chemicals, glass; p. *17,822*.
Annonay, *t.*, Ardèche, France; mnfs. paper, woollens, silk, leather goods; p. (1954) *16,201*.
Ansbach, *t.*, Bavaria, Germany; machin., metal-

lurgy, furniture inds.; rly. ctr.; p. (estd. 1954) *33,800*.

Anshan, *industl. c.*, Liaoning, N. China; at foot of Changpai Shan, 60 m. S.W. of Shenyang (Mukden); centre of chief worked deposits of iron-ore in China; iron and steel ind., heavy engin.; p. (estd. 1953) *400,000*.

Ansonia, *c.*, Conn., U.S.A.; machin., brass goods, cotton-braid inds.; p. (1950) *18,706*.

Antakya (Antioch), *ancient c.*, S. Turkey; on R. Orontes; tobacco, olives, maize, soap, silk; p. (1945) *27,448*.

Antananarivo, *see* **Tananarive,** *c.*, *cap.* Madagascar; inland c.

Antarctica, *plateau continent* within Antarctic Circle; 7,000–10,000 ft. high; volcanoes and several Is.; owned chiefly by Britain, Australia, New Zealand, France, Norway; penguins.

Antarctic Ocean, lies approx. S. of 60° S.; contains Antarctica; whaling.

Antequera, *t.*, Spain; sugar, textiles; trade in olive oil, grain; p. (1940) *37,231*.

Antibes, *spt.*, France; Alpes-Maritimes; health resort; oranges, flowers for perfume mnfs.; p. (1954) *27,064*.

Anticosti, *barren I.*, N. of R. St. Lawrence, Canada; 140 m. by 28 m.; game preserve.

Antigua, *ch. I.*, Leeward group, T.W.I.; sugar, molasses, pineapples; a. 171 sq. m.; ch. t. St. Johns; p. (1957) *55,967*.

Anti-Lebanon, *mtn. range*, Syria; E. of Lebanon; length 60 m.; alt. 6,000–8,000 ft.

Antilles, Greater and Lesser, W. Indies, comprising the Archipelago enclosing the Caribbean Sea and G. of Mexico.

Antioquia, *dep.* Colombia, S. America; cap. Medellin; a. 25,402 sq. m.; maize, coffee, sugar, gold, silver, panama hats; p. (estd. 1947) *1,405,500*.

Antipodes, *Is.*, New Zealand; in S. Pacific, uninhabited.

Antisana, *volcano*, Central Ecuador, S. America.

Antofagasta, *prov.*, Chile; exp. nitrates, copper; a. 47,502 sq. m.; p. (1957) *221,820*.

Antofagasta, *spt.*, Chile; cap. of province; p. (1952) *62,272*.

Antony, *t.*, Seine, France; brick wks., toys; p. (1954) *24,512*.

Antrim, *co.*, extreme N.E. of N. Ireland; co. t. Belfast; famous Giant's Causeway is on the N. coast; p. (1951) *231,099*.

Antrim, *t.*, N. Ireland; on Six-Mile Water; linen; p. (1951) *1,660*.

Antsirabé, *t.*, Madagascar; thermal springs; p. (1957) *18,460*.

Antung, *prov.*, Manchuria; cap. Tunghwa; a. 22,468 sq. m.; p. (estd. 1947) *3,214,000*.

Antung, *c.*, Antung, N. China; on R. Yalu, 15 m. from mouth; Chinese frontier sta. main rly. from China into N. Korea; mkt. for agr. produce; lumbering; p. (estd. 1946) *315,242*.

Antwerp, *spt.*, Belgium; on R. Schelde; famous Gothic cath.; Franz Hals born here in 1580, and Vandyck in 1599; great trading port; shipbldg., textiles, oil, tobacco, distilling, diamond cutting; p. (estd. 1957) *256,126*.

Antwerp, *prov.*, Belgium; grain, flax; a. 1,104 sq. m.; p. (estd. 1957) *1,389,860*.

Anuradhapura, *ch. t.*, N. Central prov., Ceylon.

Anzhero-Sudzhensk, *t.*, W. Siberia, U.S.S.R.; nr. Tomsk; coal-mining; p. (1959) *116,000*.

Anzin, *t.*, Nord, France; chief coal-mining centre of France; p. (1954) *15,658*.

Aomori, *spt.* Honshu, Japan; on bay of same name; salmon; p. (1950) *106,417*.

Aosta, *t.*, *cap.*, Val d'Aosta, N. Italy; in valley of Dora Baltea at node of trans-Alpine routes; iron inds.; p. (1951) *24,181*.

Apalachee Bay, Fla., U.S.A.; receives Apalachee R.

Apapa, *spt.*, sub. of Lagos, Nigeria; on mainland opposite I. on which Lagos is situated; modern pt. equipment, terminus of W. Nigerian rly. system; rly. wkshps.; exp. palm oil and kernels, hides and skins, ground-nuts, cocoa, rubber; imports cotton piece goods, machin.; p. (1946) *176,000* (inc. Lagos).

Apeldoorn, *mftg. t.*, *rly. junction*, Gelderland, Netherlands; p. (estd. 1955) *95,000*.

Apennines, mtn. "backbone" of Italy; length 800 m., width 70–80 m.; highest part is in Gran Sasso, *q.v.*

Apia, *spt.*, Upolu, terr. W. Samoa; p. *c. 10,000*.

Apiskigamish, *L.*, Labrador, Canada.

Apolda, *t.*, Thuringia, Germany; textiles, engin. chemicals; p. (estd. 1954) *35,000*.

Appalachian Mtns., series of parallel ranges between Atlantic and Mississippi, stretching from Maine to Alabama. Highest peak, Mt. Mitchell, 6,711 ft.

Appenzell, *can.*, N.E. Switzerland; divided into the half-cantons, Appenzell Inner-Rhoden, a. 67 sq. m., cap. Appenzell, and Appenzell Ausser-Rhoden, a. 94 sq. m., cap. Herisau; p. (1950) *61,365*.

Appenzell, *t.*, *cap.*, Appenzell, Switzerland; on R. Sitter, 7. m. N.W. of Herisau; linen tr.; p. (1950) *4,983*.

Appleby, *mun. bor.*, *mkt. t.*, Westmorland, Eng.; on R. Eden; cas.; p. (1951) *1,704*.

Appleton, *c.*, Wis., U.S.A.; paper; p. (1950) *34,010*.

Appomattox, *R.*, Virginia, U.S.A.; joins James R.; at the vil. of same name General Lee surrendered to General Grant in 1865.

Apsheron, *peninsula* on W. side of the Caspian; noted for petroleum wells (nr. Baku) and mud volcanoes.

Apulia, *S.E. Region*, Italy; pastoral plain; grain, fruits, livestock; wine, oil; a. 7,470 sq. m.; p. (1951) *3,214,854*.

Apurimac, *dep.*, Peru, S. America; ch. t. Abancay; a. 8,187 sq. m.; sugar; p. (1947) *318,514*.

Apurimac, *R.*, Peru; joins the Ucayali; l. 500 m.

Aqaba (Akaba), *t.*, on border of Jordan, Saudi Arabia and Israel.

Aqaba, *G.*, between Sinai Peninsula and Saudi Arabia. N.E. arm of the Red Sea.

Aquila degli Abruzzi, *t.*, *cap.*, Abruzzi prov., Italy; on R. terrace of R. Aterno; mkt. and sm. inds. associated with local farming; holiday resort; cath.; p. (1951) *54,778*.

Aquileia, *see* **Grado-Aquileia.**

Aquiles Serdán, *t.*, Chihuahua, Mexico; mining settlement; p. *7,368*.

Aquitaine, Basin of, *geographical region*, S.W. France; to W. and S.W. of Central Massif, to N. of Pyrenees, bordered on W. by Atl. Oc.; warm, wet, oceanic climate; rich agric. lowland, maize, wheat, vines, fruit; inc. Landes, reclaimed sandy area planted with pines; ch. ts. Bordeaux, Toulouse.

Arab Amirates of the South, Federation of, formed by the rulers of 7 of 18 sts. in W. Aden Prot.; the amirates of Beihan and Dhala, the sultanates of Audhali, Fadhli, Lower Fadhli, and Lahej, and sheikdom of Upper Aulagi; cap. Ittihad.

Arabia, S.W. peninsula of Asia; mainly desert plateau; nomadic Bedouins; coffee, dates, gums, horses, camels; petroleum; divided between Saudi Arabia (most impt.), Yemen, Oman, Kuwait, Bahrein, Trucial chiefs of the Oman cst. and Aden protectorates; a. about 1,000,000 sq. m.; p. (approx.) *8,000,000*.

Arabian Desert, Egypt, N.E. Africa; between R. Nile and Red Sea; alt. approx. 1,200–6,000 ft.; a. approx. 80,000 sq. m.

Arabian Sea, N.W. part of Indian Ocean, between Horn of Africa and India.

Aracajú, *spt.*, *cap.* Sergipe st., Brazil; sugar, soap, textiles; p. (1950) *68,686*.

Arad, *t.*, Romania; on R. Maros, wine, corn, tobacco, textiles; p. (1956) *106,457*.

Arafura Sea, N. of Australia, S.W. of Papua, and E. of Timor.

Aragon, *old prov.*, Spain; forests, coal, iron.

Araguaia, *R.*, Brazil; trib. of Tocatins; length 1,000 m.

Araish (Laraish, Larache), *spt.*, Morocco, N. Africa; on Atlantic cst., 45 m. S.W. of Tangier; tr. in grain and fruit; p. (1940) *36,132*.

Arak, *t.*, Persia; carpets; p. (1956) *58,929*.

Aral Sea, large salt *L.*, Kazakhstan Rep. (U.S.S.R.); a. 26,166 sq. m.; receiving the Amu and Syr Darya Rs.; no outlet.

Aran, *Is.*, group in Galway Bay, Ireland; fishing.

Aranjuez, *t.*, Spain; on R. Tagus; mkt. gardens.

Ararat, *mtn.*, Turkey; supposed resting-place of Noah's Ark.

Ararat, *t.*, Victoria, Australia; on Hopteins R., 131 m. from Melbourne; p. (1957) *7,810*.

Aras R. (the ancient Araxes), rising in Armenia, flows through Transcaucasia to the Kur. 500 m.

Arauan, *trading t.*, Sahara desert, N. Timbuktu.

Arauco, *prov.*, S. Chile; a. 2,222 sq. m.; cereals, alfalfa, fruit; p. (1957) *86,758*.

Aravalli Mtns., Rajasthan, India; Mt. Abu, 5,650 ft.

Araxes R., rises in Armenia, flows through Transcaucasia to Caspian Sea; bdy. between Persia and U.S.S.R.

Arbroath, *royal burgh*, Angus cst., Scot.; engin., textiles (flax, jute, cotton, woollens), fishing; holiday resort; p. (1951) *19,503*.
Arcachon, *t.*, Gironde, S.W. France; on S. side of Bassin d'Arcachon (Bay of Biscay); fish. pt.; health resort; p. (1954) *14,958*.
Arcadia, *div.* of Peloponnesus, Greece; cap. Tripolis; p. (1951) *154,318*.
Archangel (**Archangelsk**), *t.*, *dist. ctr.*, U.S.S.R.; on E. side of Dvina estuary, White Sea; lge. harbour kept open in winter by ice-breakers; fishery headquarters; exp. and inds. connected with N. Russia's softwood resources; engin., hydro-elec.; p. (1959) *256,000*.
Archbald, *bor.*, Penns., U.S.A., N.E. of Scranton; anthracite, silk mills; p. (1950) *6,304*.
Arcos, *t.*, Cadiz, Spain; on R. Guadalete; famous Gothic church, ancient fortifications; p. (1940) *18,146*.
Arcot, *t.*, India; 65 m. W. of Madras; taken by [Clive 1751.
Arctic Ocean, seas in the N. polar area.
Arcueil, *sub.*, Paris, France; on both sides of Brièvе valley S. of Paris; varied light inds. concerned with chemicals, clothing, foodstuffs; p. (1954) *18,067*.
Ardabil, *t.*, Azerbaijan, Persia; dried fruits, carpets; p. (1956) *65,720*.
Ardèche, *dep.*, S. France; Cévennes Mtns.; olives, wine silk, minerals; cap. Privas; a. 2,144 sq. m.; p. (1954) *249,077*.
Ardennes, *dep.*, N.E. France; farming, woollens, iron; cap. Mézières; a. 2,027 sq. m.; p. (1954) *280,490*.
Ardennes, *hilly wooded dist.*, Belgium, France, Luxembourg.
Ardmore, *t.*, Oklahoma, U.S.A.; coal, cotton, oil refineries; p. (1950) *17,890*.
Ardnacrusha, Clare, Ireland; power sta. on R. Shannon 3 miles N. of Limerick.
Ardnamurchan, most westerly point of mainland of Scotland, Argyll.
Ardres, *t.*, France; Pas de Calais; nr. site of "Field of the Cloth of Gold," where Henry VIII and Francis I met in 1520; p. (1954) *758*.
Ardrishaig, *t.*, *spt.*, Argyll, Scot.; on Loch Fyne; holiday resort.
Ardrossan, *burgh*, Ayr, Scot.; on Firth of Clyde, 25 m. S.W. of Glasgow; shipbldg., oil storage, road bitumen, engin.; p. (1951) *8,799*.
Arecibo, *c.*, *spt.*, N. coast of Puerto Rico; W. Indies; coffee, sugar; p. (1950) *28,659*.
Arendal, *spt.*, Norway; on Skagerrak; wood pulp, aluminium; p. (1946) *11,273*.
Arequipa, *dep.*, Peru; minerals, wool; cap. Arequipa; a. 21,947 sq. m.; p. (1947) *302,161*.
Arezzo, *t.*, *cap.*, Arezzo prov., Tuscany, Central Italy; hill site in a basin within the Apennines at junction of valley routes; mkt. for silk, wine, olives; p. (1951) *66,345*.
Argentan, *t.*, Orne, France; gloves, lace; p. (1954) *8,339*.
Argenteuil, *t.*, Seine-et-Oise, France; industl.; p. (1954) *63,316*.
Argentina, *rep.*, S. America, bounded by Atlantic, Andes, and Parana, Uruguay, Paraguay and Pilcomayo Rs.; inc. Pampas and Patagonia; cap. Buenos Aires; agr. and pastoral; exp. meat, wool, wheat, maize, linseed, cotton; a. 1,079,965 sq. m.; p. (estd. 1958) *20,252,300*.
Argenton, *t.*, Indre, France; gloves, linen, lace; p. (1954) *6,109*.
Argolis and Corinthia, *prov.*, N.E. Morea, Greece; cap. Nauplion; p. (1940) *197,009*.
Argonne, *hill ridge*, S.E. Paris Basin, France; composed of greensand; wooded; alt. 1,000 ft.; a. approx. 250 sq. m.
Argos, *t.*, Greece; leading Dorian city prior to the 7th century B.C.; ancient acropolis, theatre; p. (1940) *13,403*.
Argostolion, *cap.*, Cephalonia I., Greece; shipbldg.; destroyed by earthquake 1953.
Argun, *R.*, forms boundary between Siberia and Manchuria; joins the Shilka to form the Amur; large portion navigable; length 1,000 m.
Argyll, *largest co.* W. Scotland; mountainous, deer forests, pastoral, fishing, distilling; a. 3,165 sq. m.; p. (1951) *63,270*.
Ariano Irpino, *t.*, Italy; pottery; ancient Aequum Tuticum; p. *22,855*.
Arica, *t.*, *free spt.*, N. Chile; exp. sulphur, copper, silver; oil pipe-line connects to Sica-Sica (Bolivia); p. *16,627*.
Arichat, *spt.*, Madame I., off Cape Breton I., Nova Scotia, p. *675*.
Ariège, *dep.*, S. France; livestock, fruit, iron, copper; cap. Foix; a. 1,892 sq. m.; p. (1954) *140,010*.
Arima, *bor.*, Trinidad, T.W.I.; nr. Port of Spain; cacao industry; p. (1946) *8,069*.
Arish, El, *t.*, *cap.*, Sinai, Egypt; on Mediterranean at mouth of Wadi el Arish; p. (1947) *10,791*.
Arizona, *st.*, U.S.A.; bordering on Mexico; agr., stock-rearing, copper, silver, gold, cotton; cap. Phoenix; a. 113,909 sq. m.; p. (1950) *749,587*.
Arjona, *t.*, Colombia, S. America; sugar; p. *10,410*.
Arjona, *t.*, Jaen, Spain; p. *11,112*.
Arkadelphia, *t.*, S.W. Ark., U.S.A.; cotton, lumber, flour mills; p. *5,078*.
Arkansas, *st.*, U.S.A.; cap. Little Rock; agr., bauxite, coal, petroleum, natural gas, timber; a. 53,102 sq. m.; p. (1950) *1,909,511*.
Arkansas, *R.*, U.S.A.; navigable 650 m.; length 1,450 m.
Arkansas City, *t.*, Kan., U.S.A.; oil, flour mills, packing plant; p. (1950) *12,903*.
Arkhangelsk, *see* Archangel.
Arklow, *urb. dist.*, *spt.*, Wicklow, Ireland; fisheries, copper, lead, bog iron; p. (1951) *5,203*.
Arles, *ancient Roman c.*, Bouches-de-Rhône, France; on the Rhône; corn, wine, hats, silk; p. (1954) *37,443*.
Arlington, *t.*, Mass., U.S.A.; residtl. sub. of Boston; p. (1950) *44,353*.
Arlon, *cap.*, Belgian Luxembourg; p. (1948) *11,384*.
Armadale, *burgh*, West Lothian, Scot.; 10 m. S.W. of Linlithgow; coal, iron, limestone, brick and fireclay wks., engin., hosiery; p. (1951) *5,803*.
Armagh, *co.*, Ulster, N. Ireland; a. 512 sq. m.; p. (1951) *114,226*.
Armagh, *urb. dist.*, Armagh, N. Ireland; cath.; linen, whisky; p. (1951) *9,279*.
Armavir, *old ruined cap.* of Armenia, U.S.S.R.; on the slope of the extinct volcano Algaghoz; grain; p. (1959) *111,000*.
Armenia, *const. rep.* U.S.S.R., former area divided between Turkey, Russia, Iran; rich mineral deposits; agr., cattle rearing, forestry; cap. Yerevan; a. 11,900 sq. m.; p. (1959) *1,768,000*.
Armenia, *t.*, Colombia, S. America; coffee; p. *29,673*.
Armentières, *mftg. t.*, Nord, France; base of British operations against Lille in First World War; cloth, linen; p. (1954) *24,940*.
Armidale. *t.* N.S.W., Australia; ctr. of wool industry, gold mining; p. (1958) *9,390*.
Arnhem, *ch. t.*, *cap.* Gelderland, Netherlands; on right bank of Rhine; lge. tin smelter; light inds. using rubber and rayon; p. (estd. 1955) *116,000*.
Arnhem Land, N. part of N. Territory, Australia; with C. Arnhem.
Arno, *R.*, Central Italy; flows past Florence and Pisa into Mediterranean; Val d'Arno is the fruitful valley of the R.,; length 75 m.
Arnold, *urb. dist.*, Sherwood Forest, Nottingham, Eng.; hosiery, brick mkg.; p. (1951) *21,474*.
Arnsberg, *t.*, N. Rhine-Westphalia, Germany; on R. Ruhr; metal and wood mftg.; spa; p. (estd. 1954) *19,300*.
Arnstadt, *t.*, Thuringia, Germany; on R. Gera, 10 m. S. of Erfurt; artificial silk, leather goods, engin.; p. (estd. 1954) *28,000*.
Arosa, *t.*, Grisons, Switzerland; health and holiday resort.
Arpino, *t.*, Italy; textiles, paper, marble quarries; p. *10,564*.
Arrah, *t.*, Bihar, India; famous in the Mutiny; p. *55,142*.
Arran, *I.*, Bute, Scot.; in Firth of Clyde; contains many summer resorts; a. 165 sq. m.; p. *4,650*.
Arras, *t.*, *cap.*, Pas-de-Calais, France; famous for tapestry; grain; dyeing, brewing; battle, First World War (1917); p. (1954) *36,242*.
Arroux, *R.*, France; trib. of the Loire; flows past Autun; length 75 m.
Arrow Lakes, expansions of Columbia R., Brit. Columbia.
Arta, *prov.*, Epirus, Greece; on R. Arta; p. (1951) *72,738*.
Arta, *t.*, *cap.*, Arta, S. Epirus, Greece; on left bank of R. Arta, 10 m. N. of G. of Arta; purely agr. interests; p. (1951) *14,329*.

Arta, *G.*, between Albania and Greece; near which the Battle of Acutim was fought, 29 B.C.
Artemovsk, *t.*, Ukrainian S.S.R.; salt, coal, iron, mercury; p. (1959) *61,000*.
Arth, *t.*, Schwyz, Switzerland; starting point of rly. up the Rigi; p. *5,146*.
Arthabaskaville, *t.*, S. Quebec, Canada; flour milling.
Arthur's Pass, pass running through the Southern Alps, S. Island, New Zealand, alt. 3,109 ft.
Arthur's Seat, famous hill, Edinburgh, Scot.; 822 ft.
Artois, *old div.*, France; now dept. Pas de Calais.
Aru, *Is.*, group, Indonesia, off coast New Guinea; pearl, tortoise-shell; a. 3,244 sq. m.; p. *18,139*.
Aruba, *I.*, Leeward Is., Neth. Antilles; oil refining, shipping; a. 73 sq. m.; p. (1957) *57,213*.
Arun, *R.*, Sussex, Eng.; flows into English Channel at Littlehampton; length 40 m.
Arundel, *mun. bor.*, *mkt. t.*, W. Sussex, Eng.; on the Arun; Arundel Castle, seat of Duke of Norfolk; p. (1951) *2,680*.
Aruppukkottai, *t.*, Madras, India, 35 m. S. of Madura; p. (1951) *35,001*.
Aruwimi, *R.*, Central Africa; trib. of Congo; route of Stanley's famous forest march in 1887; length 1,800 m.
Arve, *R.*, Haute-Savoie, France; falls into Rhône near Geneva; length 45 m.
Arvida, *t.*, S. Quebec, Canada; aluminium plant.
Arzobispe, *t.*, Spain; near R. Tagus, W. of Toledo.
Aš, *mftg. t.*, W. Bohemia, Czechoslovakia; 12 m. N.W. of Cheb; textile mnfs.; p. (1945) *24,534*.
Asaba, *t.*, Southern Nigeria, Brit. W. Africa; former administrative ctr. of the Royal Niger Company, p. *7,500*.
Asahikawa, *t.*, Japan; rice-growing ctr.; p. (1950) *123,238*.
Asansol, *t.*, W. Bengal, India; rly. junction; coal-mng., iron, steel.
Asben, *see* Air.
Ascensión, *t.*, Mexico; 12 m. S. of U.S.A. border, p. *1,104*.
Ascension I., part of British colony of St. Helena, Atl. Oc.; 700 m. N.W. of St. Helena; a. 34 sq. m.; p. (1957) *434*.
Aschaffenburg, *t.*, Bavaria, Germany; on R. Main; cas., inds. paper, textiles, engin.; transshipment pt.; p. (estd. 1954) *48,200*.
Aschersleben, *t.*, Saxony–Anhalt, Germany; potash and lignite mining, chemicals, textiles, horticulture; p. (estd. 1954) *43,000*.
Ascoli Piceno, *cath. c.*, Central Italy; cap. of prov. of same name; p. (1951) *44,541*.
Ascot, *par.*, Berks, Eng.; famous racecourse at Ascot Heath.
Asenovgrad, *t.*, Bulgaria; S.E. of Plovdiv; p. *20,920*.
Ashanti, region within the independent state of Ghana; formerly powerful native state; timber, cocoa, gold-mines; cap. Kumasi; a. 24,379 sq. m.; p. (1948) *823,672*
Ashbourne, *mkt. t.*, Derby, Eng.; near Dovedale; p. (1951) *5,440*.
Ashburnham, *t.*, Mass., U.S.A.; furniture mftg.; p. (1950) *2,603*.
Ashburton, *urb. dist.*, Devon, Eng.; old mkt. t. S. gateway to Dartmoor; p. (1951) *2,704*.
Ashburton, *t.*, S. Island, New Zealand; ctr. of great wheat-growing dist.; p. (1951) *8,287*.
Ashburton, *R.*, West Australia; flows into Indian Ocean at Onslow; length 400 m.
Ashby-de-la-Zouch, *urb. dist.*, Leicester, Eng.; hosiery, open-cast mining, soap mftg.; ruined cas. in which Mary Queen of Scots was imprisoned; p. (1951) *6,406*.
Ashby Woulds, *urb. dist.*, Leicester, Eng.; coal and clay mining, pottery; p. (1951) *3,418*.
Asheboro, *t.*, N.C., U.S.A.; chemicals, lumber, furniture, hosiery; p. (1950) *7,701*.
Asheville, *t.*, *winter health resort*, N. Carolina, U.S.A.; leather, textiles, furniture; p. (1950) *53,000*.
Ashford, *urb. dist.*, *mkt. t.*, Kent, Eng.; rly. wks., agr. implements, ironfounding; p. (1951) *24,777*.
Ashikaga, *t.*, Japan; weaving, cultural ctr.; p. (1947) *48,310*.
Ashington, *urb. dist.*, Northumberland, Eng.; coal; p. (1951) *28,723*.
Ashio, *t.*, Japan; 65 m. N. of Tokyo; copper; commerce; p. (1947) *20,997*.
Ashkhabad, *cap.*, Turkmenistan, S.S.R.; textiles, engin., films; p. (1959) *170,000*.
Ashland, *t.*, Kentucky, U.S.A.; on R. Ohio; iron, steel, lumber, leather; p. (1950) *31,131*.
Ashland, *t.*, Penns., U.S.A.; coal-mining, knitwear, mine pumps; p. (1950) *6,192*.
Ashland, *t.*, Wisconsin, U.S.A.; iron, steel; p. (1950) *10,640*.
Ashtabula, *t.*, Ohio, U.S.A.; near L. Erie; farm implements, leather; p. (1950) *23,696*.
Ashton-in-Makerfield, *urb. dist.*, Lancs., Eng.; near Wigan; coal; p. (1951) *19,053*.
Ashton-under-Lyne, *mun. bor.*, *mftg. t.*, Lancs., Eng.; nr. Manchester; iron and steel, coal-mining, textiles, light engin.; p. (1951) *46,490*.
Ashuapmuchuan, *L.*, Quebec, Canada.
Asia, *largest continent*, extends over nearly one-third of the land surface of the earth. Chief mtn. ranges: Himalayas, Kunlun, Tien Shan, Altai; Tibetan plateau; chief Rs.: Ob, Yang-tze-Kiang, Yenisei, Lena, Amur, Hwang-ho; deserts: Arabia, Thar, Takla Makan, Gobi; some very fertile valleys and plains. Climate very varied, extreme in N., monsoonal in S. and E. Gold, coal, oil, iron, manganese, antimony, tin. Principal countries in Asia: Turkey, Arabia, Israel, Jordan, Persia, Afghanistan, India, Pakistan, Burma, China, Viet-Nam and associated states, Siam, Korea, Japan and Asiatic U.S.S.R. Races: Indo-Aryan, Mongolian, Dravidian, Malayan; a. 17,600,000 sq. m. (one-third of land a. of world); p. (approximately) *1,155* millions.
Asiago, *t.*, Vicenza, Italy; straw hats; site of Austro-Italian battle, 1916; p. *2,861*.
Asia Minor (Anatolia), W. portion of Asia, part of Asiatic Turkey; chief c. Izmir, important spt. of Levant.
Asinara, *I.*, Mediterranean Sea; off N.W. coast Sardinia; 11 m. long; the ancient I. of Hercules.
Asir, part of Saudi Arabia, S. Arabia; cst. region between Yemen and Hejaz.
Askeaton, *t.*, on estuary of R. Shannon, Limerick, Ireland.
Asmara, *cap.* former Italian colony of Eritrea, N.E. Africa; on rly. which connects Massawa and Agordat; p. (1948) *131,000*.
Asnières, *t.*, Seine, France; dyes, perfumery, regattas; p. (1954) *77,838*.
Asolo, *t.*, N.E. Italy; Roman remains.
Aspatria, *t.*, Cumberland, Eng.; dairying, etc.; p. (estd.) *3,000*.
Aspropotamos, *R.*, Greece; longest R. in the country; length 115 m.
Aspull, *urb. dist.*, Lancs. Eng.; near Wigan; coal, cotton; p. (1951) *6,522*.
Assam, *st.*, India; Brahmaputra R. flows through it; extensive tea plantations; rice, cotton, coal; cap. Shilong; a. 85,012 sq. m.; p. (estd. 1957) *9,043,707*.
Assen, *t.*, cap. Drenthe, Netherlands; p. (1951) *24,079*.
Assens, *t.*, *I.* of Fyne, Denmark, on the Little Belt, p. *4,826*.
Assiniboine, *R.*, Manitoba, Canada; joins Red R. at Winnipeg; length 1,500 m.
Assisi, *t.*, Umbria, Central Italy; 15 m. S.E. of Perugia; birthplace of St. Francis; fine cath. and old cas; p. *5,353*.
Assynt, *dist.*, *L.*, Sutherland, Scot., 7 m.; agr. and creameries; p. (estd. 1950) *1,050*.
Assyria, *heart of former empire*, N. plain of Mesopotamia, Iraq; drained by R. Tigris; now mainly pastoral farming a.; ruins of many ancient cas.; cap. Nineveh.
Astara, *spt.* on the Caspian, at Persian N.W. frontier; important trading ctr.
Asterabad, *t.*, N. Iran (Persia); on S.E. shore of Caspian Sea; p. *28,000*.
Asti, *t.*, Alessandria, Italy; fine cath.; wines; silk, motor cycles; p. (1951) *52,733*.
Astipalaia, *I.*, Grecian Archipelago.
Astorga, *t.*, Spain, nr. Leon; cath.; p. *14,523*.
Astoria, *t.*, Oregon, U.S.A.; salmon-canning; p. (1950) *12,331*.
Astoria, N.Y., U.S.A.; industl. and residtl.; part of Queen's *bor.*, New York City; p. *10,349*.
Astrakhan, *t.*, R.S.F.S.R.; on delta of R. Volga; univ.; fish, caviare, astrakhan wool, fruits, wheat, elec. power, engin.; p. (1959) *294,000*.
Astrida, *t.*, Ruanda-Urundi terr., E. Belgian Congo.
Astrolabe Bay, on N.E. coast of New Guinea; arm of the Pacific Ocean.

Asturias, *old prov.*, N. Spain; now Oviedo, on Bay of Biscay.
Asunción, *cap.*, Paraguay; on junction of Rs. Paraguay and Pilcomayo; cath.; tobacco, sugar, leather; p. (1950) *205,605*.
Aswan, *administrative div.*, Upper Egypt, N.E. Africa; a. 337 sq. m.; p. (1947) *286,854*.
Aswan, *t.* Upper Egypt; on Nile at 1st cataract, ancient name Syene; near famous ruins, temples, catacombs; tourist centre; p. (1947) *25,397*.
Aswan Dam, Aswan, Upper Egypt; built 1902 to control Nile flood in Egypt, subsequently heightened; rly. extended to Shellal, 2 m. above dam.
Asyut (**Assiut**), *prov.*, Upper Egypt; cap. Asyut; a. 787 sq. m.; p. (1947) *1,378,904*.
Asyut, *t.*, Upper Egypt, N E. Africa; pottery, ivory work; p. (1947) *90,378*.
Atacama, *prov.*, N. Chile; cap. Copiapo; rich in minerals, nitrates, borax, guano; a. 30,834 sq. m.; p. (1957) *96,152*.
Atacama Desert, Chile; arid coastal tract, rich in nitrates.
Atami, *t.*, Japan; wat. pl. on Sagami Sea; p. *14,477*.
Atar, *t.*, Mauritania, W. Africa; rly. terminus, chief inland town; p. (1954) *4,200*.
Atbara, *t.*, Sudan; at confluence of Atbara R. with Nile; rly. wkshps.; p. (estd. 1951) *36,100*.
Atbara R., or **Black Nile**, Ethiopia and Sudan; trib. of Nile; length 790 m.
Ath, *t.*, Hainaut, Belgium; sugar refining, furniture, chemicals, silk; p. (1948) *10,284*.
Athabaska, *R.*, Alberta, Saskatchewan, Canada; navigable by steamers, save at Grand Rapids, near mouth of Clearwater R.; length 740 m.
Athabaska, *L.*, Alberta, Saskatchewan, Canada; a. 3,085 sq. m.
Athelney, hill formerly encircled by marsh near Taunton, Somerset, Eng.; between the Rs. Tone and Parret; King Alfred's hiding-place.
Athenry, *mkt. t.*, Galway, Ireland; old Dominican monastery; p. (1951) *1,181*.
Athens, *cap.* Greece; most renowned c. in antiquity; ancient ctr. of Greek art and learning; Acropolis and many splendid temples; spinning, distilling tanning, carpets; p. (1951) *559,250*, of greater Athens (inc. Piraeus) *1,368,142*.
Athens, *t.*, Georgia, U.S.A.; univ.; cotton goods, lumber; p. (1950) *28,180*.
Athens, *t.*, Ohio, U.S.A.; univ.; coal, light inds.; p. (1950) *11,666*.
Atherstone, *mkt. t.*, *rural dist.*, Warwick., Eng.; N. of Coventry; hats, coalmng., footwear, granite quarrying; p. (rural dist. 1951) *23,662*.
Atherton, *urb. dist.*, Lancs., Eng.; 13 m. N.W. Manchester; coal, cotton, light engin.; p. (1951) *20,591*.
Athis-Mons, *t.*, Seine-et-Oise, France; p. (1954) *14,120*.
Athlone, *urb. dist.*, *military sta.*, Westmeath, Ireland; on R. Shannon; p. (1951) *9,015*.
Atholl, *dist.*, N. Perth, Scot.; extensive deer forests and grouse moors; a. 450 sq. m.
Athos, *mtn.*, Greece; on promontory of Chalkidike, known as the "Holy Mountain" and the "Monks' Peninsula"; self-governing monastic community; cap. Karyai; p. (1951) *3,100*.
Athy, *urb. dist.*, Kildare, Ireland; p. (1951) *3,752*.
Atikokan, *sm. t.*, Ontario, Canada; on Canadian National Rly., 110 m. W. of Fort William; ctr. of Steep Rock iron-ore mines; p. (estd. 1948) *1,000*.
Atiquizaya, *t.*, Ahuachapán, Salvador, Central America; p. *5,901*.
Atlanta, *cap.*, *largest c.*, Georgia, U.S.A.; univ.; cotton, paper, farm implements; p. (1950) *331,314*.
Atlantic City, *summer resort*, N.J., U.S.A.; p. (1950) *61,657*.
Atlantic Ocean, the most important of the three great oceans, lies between the Old and New Worlds. It is 9,000 m. long and from 1,600 to 5,000 m. broad. Total a. (estimated) 33,000,000 sq. m. Greatest depth yet found, 30,246 ft. in the Puerto Rico Deep.
Atlántico, *dep.*, Colombia, S. America; cap. Barranquilla; a. 1,340 sq. m.; p. (1947) *366,450*.
Atlas, *great mtn. range*, N.W. Africa; extending 1,500 m. through Morocco and Algeria to Tunis. Highest point, Tizi-n-Tamjurt, 14,500 ft.
Atlit (**Athlit**), *t.*, Israel, S.W. Asia; S. of Haifa; site of Crusaders' pt.
Atmore, *t.*, Ala., U.S.A.; 35 m. N.E. of Mobile Bay; p. (1950) *5,720*.
Atoka, *t.*, Okla., U.S.A.; flour, lumber mills; p. (1950) *2,653*.
Atrato, *R.*, Colombia, S. America; flowing to G. of Darien, length 275 m.
Atrauli, *t.*, Uttar Pradesh, India; 16 m. from Aligarh.
Atrek, *R.*, Persia; enters Caspian Sea; length 250 m.
Attica and Boeotia, Greece dep.; separated from Boeotia by mtns. Together form modern prov.; olives, grapes, figs; p. (1951) *1,652,896*.
Attica, *t.*, New York, U.S.A.; p. (1950) *2,676*.
Attleboro, *c.*, Bristol, S.E. Mass., U.S.A.; p. (1950) *23,809*.
Attock, *t.*, Pakistan; between Peshawar and Islamabad; oil wells.
Aubagne, *t.*, Bouches-du-Rhône, France; bricks, tiles, corks, meat processing; p. (1954) *17,639*.
Aube, *dep.*, N.E. France; cereals, fruit, livestock; cap. Troyes; a. 2,326 sq. m.; p. (1954) *240,797*.
Aube, *R.* France; trib. Seine; length 1,255 m.
Aubenas, *t.*, Ardèche, France; coal and iron, silk; p. (1946) *7,378*.
Aubervilliers, *t.*, Seine, France; industl.; p. (1954) *58,740*.
Aubrac, *mtns.*, Auvergne, France.
Auburn, *t.*, Ind., U.S.A.; comm. ctr. for agr area; light engin.; p. (1950) *5,879*.
Auburn, *t.*, Maine, U.S.A.; footwear; p. (1950) *23,134*.
Auburn, *t.*, N.Y., U.S.A.; shoes, woollens, farm implements; p. (1950) *36,722*.
Auch, *t.*, *cap.*, Gers, France; cottons, woollens, poultry, wines; p. (1954) *16,382*.
Auchel, *t.*, Pas de Calais, France; coal; p. (1954) *14,825*.
Auchinleck, *par.*, Ayr., Scot.; coal; p. (1951) *6,808*.
Auchterarder, *burgh*, Scot.; 15 m. S.W. of Perth; health resort S. slopes of the vale of Strathearn; p. (1951) *2,434*.
Auchterderran, *par.*, Fife., Scot.; coal; p. (1951) *17,599*.
Auchtermuchty, *burgh*, Fife., Scot.; at S. foot of Ochil Hills, 25 m. N.E. of Alloa; distilling, cotton spinning; p. (1951) *1,330*.
Auckland, *prov.*, N.I., New Zealand; farming, gold, Kauri gum, coal; a. 25,400 sq. m.; p. (estd. 1958) *923,986*.
Auckland, *spt.*, N.I., New Zealand; lgst. c. in N.Z., seat of government 1845–64; extensive tr. and shipping; univ.; sawmills, sugar refinery, shipbldg., glass; p. (estd. 1958) *401,500*.
Auckland Is., uninhabited group in Southern Ocean; 200 m. off New Zealand, discovered by British in 1806.
Aude, *maritime dep.*, S.E. France; grain, fruit, wine; slate, iron; cap. Carcassonne; a. 2,448 sq. m.; p. (1954) *268,254*.
Audenshaw, *urb. dist.*, Lancs., Eng.; metals, leather, pharmaceutics; p. (1951) *12,655*.
Audincourt, *t.*, Doubs, France; forges, automobile and textile plants; p. (1954) *10,282*.
Audubon, *t.*, W. Iowa, U.S.A.; canneries; p. (1950), *2,808*.
Aue, *t.*, Saxony, Germany; nr. Zwickau; uranium-mining, metallurgy, textiles; p. (estd. 1954) *26,000*.
Auerbach, *t.*, Saxony, Germany; textiles; p. (estd. 1954) *19,000*.
Augsburg, *c.*, Bavaria, Germany; at confluence of Rs. Lech and Wertach; cath.; theological institute; textiles, engin., brewing; route ctr.; p. (estd. 1954) *196,600*.
Augusta, *t.*, Sicily, Italy; on sm. I. connected to E. cst.; good harbour used as naval base; little commerce; fishing; p. (1936) *17,716*.
Augusta, *spt.*, S.W. coast, W. Australia.
Augusta, *t.*, *cap.*, Me., U.S.A.; on Kennebec R.; footwear, cotton goods, paper; p. (1950) *20,913*.
Augusta, *t.*, Ga., U.S.A.; on Savannah R.; cotton, cotton-seed oil, chemicals, foundries; p. (1950) *71,508*.
Augustow, *t.*, Poland; on Suwalki canal; p. (1946) *8,338*.

Auja El, *t.*, Israel, S.W. Asia; on Egyptian frontier; p. *2,000.*
Aulnay-sous-Bois, *t.*, Seine-et-Oise, dep., France; p. (1954) *38,534.*
Aunjetitz, *t.*, Czechoslovakia; site of early Bronze Age culture.
Aurangabad, *t.*, Mysore, India; textiles; p. (1951) *166,615.*
Auray, or **Alrac**, *t.*, Morbihan, Brittany, France; oysters, dairy produce.
Aurès, *mtn. massif*, Algeria, N. Africa; Berber stronghold.
Aurignac, *commune*, Haute-Garonne, France; caves, paleolithic remains; tanneries.
Aurillac, *t.*, *cap.*, Cantal, France; industl.; p. (1954) *22,224.*
Aurora, *t.*, Col., U.S.A.; residtl. sub. 5 m. E. of Denver; p. (1950) *11,421.*
Aurora, *t.*, E. Ind., U.S.A.; lumber, mnfs. coffins, furniture; p. (1950) *4,780.*
Aurora, *rly. c.* Ill., U.S.A.; textiles, foundries; p. (1950) *50,576.*
Aurora, *t.*, Mo., U.S.A.; mining region; p. (1950) *4,153.*
Au Sable, *R.*, New York, U.S.A.; flows from the Adirondack Mtns. to L. Champlain.
Au Sable, *R.*, Mich., U.S.A., emptying into L. Huron.
Aussig, *see* **Usti.**
Austin, *t.*, Minn., U.S.A.; food prods.; p. (1950) *23,100.*
Austin, *c.*, *cap.*, Texas, U.S.A.; on R. Colorado; st. univ.; farming ctr.; bricks, furniture; p. (1950) *132,459.*
Austral and Rapa Is., French group in Pacific Ocean; largest I. Rurutu; a. 115 sq. m.; p. (1946) *3,921.*
Australasia, div. of Oceania including Australia, Tasmania, New Zealand, New Guinea and neighbouring archipelagos.
Australia, Commonwealth of, largest I. in world; Cook took possession for Britain 1770; Commonwealth proclaimed 1901, federation of N.S.W., Victoria, Queensland, S. Australia, W. Australia and Tasmania; includes also federal cap. terr., N. Territory; cap. Canberra (administered separately). Mtns. in E.; most salient feature great interior plains, mainly arid; chief rivers: Murray, Darling, Swan; saline lakes. Climate: interior extremely hot and dry, cst. more moderate, N. coast tropical. Agr.: wheat, hay, cane-sugar, fruit; sheep, cattle, dairying; timber; minerals; gold, lead, silver, coal, copper; a. 2,974,581 sq. m.; p. (estd. 1959) *10,000,000.*
Australia, South, *st.* of the Australian Commonwealth; mainly undulating, interior forms part of central plateau of continent, mtns. in S. and S.E., 3,000 ft.; wheat crops, stock-raising, dairying, fruit, olives; lead, iron; exp. corn, wool, mutton; cap. Adelaide; a. 380,070 sq. m.; p. (estd. 1958) *892,149*
Australia, Western, *st.* of the Australian Commonwealth; formerly the Swan R. Settlement; occupies the entire W. part of Australia; from N. to S. 1,480 miles and from E. to W. 1,000 miles; cap. Perth, on the Swan R.; ch. prods.: gold, wool, fruit, wheat, coal, frozen meat; large stretches sandy desert; a. 975,920 sq. m.; p. (estd. 1958) *701,418.*
Australian Alps, *see* **Alps, Australian.**
Australian Antarctic territory, part of Antarctica; between 45° E. and 160° E.; inc. Oates Land, King George V Land, Wilkes Land, Queen Mary Land, Kaiser Wilhelm II Land, Princess Elizabeth Land, MacRobertson Land, Kemp Land, Enderby Land; uninhabited.
Australian Bight, Great, large indentation on Australian S. coast between C. Catastrophe and C. Arid (850 m.).
Australian Capital Territory, area surrounding Canberra, seat of Fed. Govt. of Australia; predominantly pastoral; a. 939 sq. m.; p. (estd. 1958) *40,008.*
Austria, *rep.*, Europe; in 1938 forcibly incorporated in German Reich, liberated in 1945, and recovered its sovereignty and indep. 1955; mountainous, forested, drained by R. Danube; agr.; tourism; lignite, anthracite, iron, textiles, pianos, brewing; cap. Vienna; a. 32,393 sq. m.; p. (1951) *6,933,905.*
Austria, Lower, *st.*, Austria; cap. Vienna; a. (excluding Vienna) 7,098 sq. m.; p. (excluding Vienna) (1951) *1,250,494.*
Austria, Upper, *st.*, Austria; cap. Linz; a. 4,625 sq. m.; p. (1951) *1,108,720.*
Autlán de Navarro, *t.*, Mexico; S.W. Jalisco state; p. *10,915.*
Autun, *c.*, Sâone-et-Loire, France; anc. Augustodunum; Roman remains; oil-shale refinery, leather, furniture, dyes, fertilisers; p. (1954) *14,399.*
Auvergne, old French prov. forming the present deps. of Puy-de-Dôme, Cantal and a small part of Haute-Loire.
Auvergne Mtns., *mtns.*, Central France; in N.W. of Central Plateau; highest peak, Mt. Dore, 6,188 ft.
Aux Cayes, *spt.*, Rep. of Haiti, W. Indies; on S. cst.; p. *25,000.*
Auxerre, *industl. c.*, *cap.*, Yonne, France; cath.; vines, bricks, iron and steel; p. (1954) *26,583.*
Auxonne, *fortfd. t.*, Côte d'Or, France; on R. Saône; mkt. gardening; p. (1954) *5,657.*
Ava, *c.*, Burma; on the Irrawaddy R.; former cap.; many pagodas, now ruins.
Avallon, *t.*, Yonne, France; on Cousin R.; ancient church; tourist ctr.; p. (1954) *5,497.*
Avebury (Abury), *par.*, *vil.*, Wilts., near Marlborough, Eng.; famous for its Megalithic remains.
Aveiro, *spt.*, *t.*, Portugal; wine-producing prov. of Beira Littoral; sardines, fruit; p. (1940) *11,247.*
Avellaneda, *industl. sub.* of Buenos Aires, Argentina; p. *279,572.*
Avellino, *t.*, *cap.*, Avellino prov., Italy; monastery; hazelnuts, linen, paper; p. (1951) *36,892.*
Averno, Alpine valley of Switzerland.
Aversa, *garrison t.*, Italy; W. of Caserta; wine, hemp, soap and chemicals; p. *35,003.*
Aves (Bird Is.), group in the Caribbean Sea, W. Indies, belonging to Venezuela.
Avesnes, *t.*, Nord, France; 11th-century cas.; p. *4,576.*
Avesta, *t.*, Kopparberg, Sweden; on Dal R.; p. *6,325.*
Aveyron, *dep.*, France; on rim of Central Plateau, watered by Rs. Lot, Aveyron, Tarn; extensive forests; grain, dairying, sheep; coal; cap. Rodez; a. 3,385 sq. m.; p. (1954) *292,727.*
Aviemore, *t.*, Inverness, Scot.; on R. Spey, 12 m. S.W. of Grantown; rly. junction; tourist resort.
Avigliano, *t.*, Lucania, Italy; 8. m. N.W. of Potenza; marble; p. *14,333.*
Avignon, *ch. t.*, Vaucluse, S.E. France; residence of Popes 1309–78, and anti-Popes 1378–1417; wines, silk-worm eggs, chemicals, leather; p. (1954) *62,768.*
Avila, *t.*, *cap.*, Avila prov., Spain; univ., cath.; wool, pottery; p. (1949) *23,011.*
Aviles, *spt.*, Oviedo, Spain; exp. coal, lead, zinc, chemicals, fishing; p. (1940) *18,037.*
Avion, *t.*, Pas-de-Calais, France; coal-mining; p. (1954) *19,471.*
Avoca, *R.*, Ireland; drains Wicklow Mtns.
Avola, *t.*, Syracuse, Italy; almonds; p. (1936) *23,344.*
Avon, *R.*, Somerset, Eng.; enters Bristol Channel at Avonmouth; length 80 m.
Avon, *R.*, Warwick., Eng.; flows past Stratford to Severn at Tewkesbury.
Avon, *R.*, Wilts and Hants, Eng.; flows past Salisbury into English Channel at Christchurch; length 65 m.
Avonmouth, *spt.*, Gloucester, Eng.; outport of Bristol; at mouth of R. Avon; docks; seed crushing, petrol refinery.
Avon Plains, *agr. township*, Victoria, Australia; 175 m. N.W. of Melbourne.
Avranches, *t.*, Manche, France; typical Normandy mkt. t. dealing in cider and dairy produce; p. (1954) *8,004.*
Awaji, *I.* at entry of Inland Sea, Japan; a. 219 sq. m.; highest peak, Yurimbayama, 1,998 ft.
Awe, Loch, Argyll, Scot.; 8 m. W. of Inveraray, bordered by Ben Cruachan (16 sq. m.); salmon and trout fishing.
Axar, *fiord*, N. Iceland.
Axbridge, *rural dist.*, Somerset, Eng.; p. (1951) *26,523.*
Axe, *R.*, Somerset, Eng.; rising in Mendip Hills and flowing to Severn.
Axholme, I. of N.W. Lincs, Eng.; formed by Rs. Trent, Don and Idle, and comprising seven

parishes; rural dist. agr. and engin.; p. (estd. 1951) *13,500*.
Axminster, *urb. dist.*, Devon, Eng.; brushes; flour and saw mills; carpet and press tool mftg.; p. (1951) *2,673*.
Axmouth, *t.*, E. Devon; nr. Beer and Seaton; fishing, holiday resort.
Ay, *t.*, Marne, France; Ay wine; p. (1954) *6,806*.
Ayacucho, *t.*, Peru; founded by Pizarro in 1539; univ.; cap. Ayacucho dept.; p. (estd. 1950) *22,389*.
Ayacucho, *dep.*, Peru, S. America; a. 18,185 sq. m.; p. (1947) *461,414*.
Ayamonte, *spt.*, Spain; on Spanish-Portuguese frontier; p. (1936) *12,136*.
Ayaviri, *t.*, Puno, Peru; N.W. of L. Titicaca; p. *6,586*.
Aycliffe, *t.*, Durham, Eng.; 6 m. N.W. of Darlington; coal-mining, plastics, paint, limestone quarrying; one of "New Towns" designated 1947; p. (estd. 1953) *7,500*.
Aydin, *t.*, Turkey; ancient Tralles; rly.; cotton, grapes, olives, magnesite, lignite and arsenic; p. (1950) *20 421*.
Aylesbury, *mun. bor.*, *co. t.*, Bucks, Eng. mkt. t., dairying; p. (1951) *21,054*.
Aylesford, *t.*, Kent, Eng.; scene of battle between Britons and Saxons 445, death of Horsa; mkt. t., cement, paper mills; p. (1951) *3,644*.
Aylesham, *t.*, Kent, Eng.; N. of Dover; on Kent coalfield.
Aylsham, *mkt. t.*, Norfolk, Eng.; p. *2,646*.
Ayr, *burgh*, *spt.*, Ayr., Scot.; on Firth of Clyde, 30 m. S.W. of Glasgow; Burns born near by, 1759; racecourse; carpets, engin., foot-wear; p. (1951) *43,011*.
Ayrshire, *co.*, S.W. Scot.; dairy produce, early potatoes; coal, iron, woollens, cottons; civil nuclear power-sta. at Hunterston, due 1962; a. 1,132 sq. m.; p. (1951) *321,184*.
Ayre, Point of, northernmost point, Isle of Man.
Aysen, *prov.*, Chile; a. 34,348 sq. m.; p. (1957) *31,518*.
Ayutthaya, *t.*, Siam; 42 m. N. of Bangkok; temples; former capital; rice; p. (1937) *326,128*.
Azamgarh, *t.*, Uttar Pradesh, India; p. *25,000*.
Azbest, *t.*, Sverdlovsk dist., U.S.S.R.; asbestos quarries; p. (1946) approx. *50 000*.
Azerbaijan, *prov.*, N.W. Persia; W. of Caspian Sea; a. 41,000 sq. m.; ch. prod. wool.
Azerbaydzhan, Transcaucasia, constituent rep. of the U.S.S.R.; impt. oil industry; chemicals, farming, cattle, fishing; cap. Baku; a. 33,460 sq. m.; p. (1959) *3,700,000*.
Azogues, *t.*, cap. Canar prov., Ecuador; straw hats; p. (1950) *6,579*.
Azores, Portuguese group of islands in mid-Atlantic; abt. 900 m. W. of Lisbon; volcanic; fruit, wine; ch. seaports: Ponta Delgada on San Miguel I., Horta on Fayal I. and Angra do Heroismo on Terceira I.; a. 922 sq. m.; p. (1950) *318,686*.
Azov, *t.*, *spt.*, R.S.F.S.R., on R. Don; fisheries; p. [*27,500*.
Azov., *sea*, U.S.S.R.; joins Black Sea by Kerchenski Strait; fisheries, caviare.
Azpeitia, *t.*, N. Spain; nr. birthplace of St. Ignatius Loyola; mineral springs; p. *8,024*.
Azuay, S. *prov.*, Ecuador, S. America; cap. Cuenca; Panama hats; a. 3,873 sq. m.; p. (1950) *243,920*.
Azusa, *t.*, *spt.*, Cal., U.S.A., exp. citrus fruit; p. (1950) *11,042*.

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Baalbeck, *c.*, Lebanon, S.W. Asia; old Heliopolis; ruins.
Baarn, *t.*, Netherlands; summer resort; p. (1948) *12,141*.
Bab-el-Mandeb, *strait* connecting Red Sea and Indian Ocean, 20 m. wide.
Babul (Barfurush), *spt.*, Persia; on Caspian Sea; fruits, cottons, silks; p. (1956) *36,242*.
Babushkin, *t.*, U.S.S.R.; Moscow a.; p. (1959) *112,000*.
Babuyan Is., group in Pac. Oc.; N. of Luzon in Philippines.
Babylon, *ancient cap.* of Babylonian Empire in Euphrates Valley about 60 m. S. of Baghdad, Iraq.
Bacacay, *t.*, Luzon, Philippines; hemp; p. (1948) [*26,504*.
Bacau, *t.*, E. Romania; on R. Moldava; oil, sawmilling, textiles; p. (1945) *38,123*.
Back R., in N.W. Terr., Canada; falls into Arctic Ocean; length 360 m.
Bacolod, *t.*, *cap.* Negros I., Philippines; tr. ctr., sugar; p. (1948) *101,432*.
Bacup, *mun. bor.*, *mftg. t.*, S.E. Lancs, Eng.; 20 m. Manchester; cotton, iron, brass, footwear; p. (1951) *18,374*.
Badagri, *t.*, W. of Lagos, Nigeria, Brit. W. Africa; on the Bight of Benin, formerly a great slave pt.
Badajoz, *prov.*, Spain; a. 8,349 sq. m.; p. (1950) *815,780*.
Badajoz, *fortfd. t.*, Badajoz prov., Spain; on Guardina R.; cath.; woollens, wax; p. (1950) *79,291*.
Badakshan, *prov.*, Afghan; drained by Oxus and trib.; salt, lapis lazuli; cap. Faizabad.
Badalona, *t.*, Barcelona prov., Spain; p. (1950) *61,654*.
Baden, *Land*, W. Germany; consisting of the S. part of the former st. Baden; cap. Freiburg; agr., grain, tobacco, hops, vines, beet-sugar; a. 3,842 sq. m.; p. (1950) *1,338,629*.
Baden, *t.*, Switzerland; health resort, mineral springs; p. (1950) *11,595*.
Baden-Baden, *t.*, Baden-Württemberg, Germany; p. (estd. 1954) *38,100*.
Baden-bei-Wien, *wat. pl.*, Austria; 14 m. S.W. of Vienna; p. (1948) *19,972*.
Badenoch, *dist.*, Inverness, Scot.; mountainous, drained by Spey; deer forest.
Badenweiler, *wat. pl.*, Baden, W. Germany; W. part of Black Forest.
Baden-Württemberg, *Land*, S.W. Germany; mountainous and afforested (Black Forest with much mineral wealth; salt; cap. Stuttgart; a. 5,960 sq. m.; p. (1957) *7,301,900*.
Bad Lands, S. Dakota, U.S.A.; stretches of infertile badly eroded soil.
Badminton, *vil.*, Gloucester, Eng.; rly. junction.
Badrinath, *mtn.* and *t.*, Uttar Pradesh, India; pilgrim shrine of Vishnu.
Badulla, *t.*, Ceylon; tea; p. *13,387*.
Badwater, *salt pool*, California, U.S.A.; 280 ft. below sea-level, lowest point in N. America.
Baena, *t.*, Spain; olive oil; horse-breeding; p. *24,830*.
Baeza, *t.*, S. Spain; ancient Moorish city; olives, wine; p. *18,136*.
Baffin Bay, Canada; W. of Greenland, joined to the Atlantic by Davis Strait and to Arctic Ocean by Smith Sound; open 4 months a year.
Baffin I., Canada; a. 236,000 sq. m.; inhabited by scattered Eskimos.
Bagamoyo, *spt.*, *tr. ctr.*, Tanganyika Terr., Brit. E. Africa; p. *5,000*.
Bagé, *t.*, S. Brazil; tr. ctr.; p. *31,763*.
Bagenalstown, *t.*, Carlow, Ireland; milling, granite; p. (1946) *1,900*.
Baghdad, *prov.* or *liwa*, Iraq; between Persia and Syrian Desert; inc. some of the most fertile lands in the Tigris and Euphrates valleys; p. (1956) *912,409*.
Baghdad, *cap.*, Iraq; on R. Tigris; airport caravan ctr. textiles, gum; p. (1956) *730,549*.
Bagheria, *t.*, Sicily, Italy; p. *19,000*.
Bagirmi, *dist.*, Fr. Equatorial Africa; S. of L. Chad; cap. Massenia.
Bagnacavallo, *t.*, prov. Ravenna, Italy; p. *3,676*.
Bagnara, *t.*, prov. Reggio, Italy; wine, honey; p. (1936) *11,580*.
Bagnères de Bigorre, *t.*, Pyrenees, France; mineral springs; p. (1954) *11,044*.
Bagnes de Chable, *wat. pl.*, Valais, Switzerland.
Bagneux, *t.*, Seine, France; p. (1954) *13,774*.
Bagni di Lucca, *t.*, Italy; 13 m. N. of Lucca; warm springs; p. (1936) *12,064*.
Bagni de San Guiliano, *t.*, Italy, nr. Pisa; warm, radioactive springs; p. (1936) *21,894*.
Bagnolet, *t.*, Seine, France; p. (1954) *26,779*.
Bagolino, *t.*, prov. Brescia, Italy; sulphur spring; p. *3,613*.
Bagshot, *rural dist.*, Surrey, Eng., adjoining heath of same name; historically old postal town, 26 m. S.W. of London.
Baguio, *summer cap.* of Philippine Is.; in mtn. prov.; p. *24,177*.
Bahamas, *Is.*, Brit. W. Indies; first land in New World sighted by Columbus, extending 780 m. from Florida to Turks Is.; collective cap. Nassau, New Providence; salt, tomatoes, crawfish, sponges, Bahama hemp; a. 4,404 sq. m.; p. (estd. 1957) *130,698*.

Bahawalpur, *st.,* Pakistan; a. 15,918 sq. m.; p. (estd. 1951) *1,820,000.*
Bahia, *spt.,* Ecuador, S. America; p. *10,820.*
Bahia Blanca, *spt.,* Argentina; chief naval sta.; univ.; wool, wheat, maize; p. (1947) *93,122.*
Bahia de Caraquez, *spt.,* Ecuador, S. America; p. *10,499.*
Bahia Honda, *coaling sta.,* Cuba, W. Indies; W. of Havana.
Bahrain Is., sheikhdom group in Persian G.; famous pearl fisheries; oil-wells; cap. Manama; a. about 213 sq. m.; p. (1950) *109,650.*
Bahr El Benat Is., group in Persian G., off coast of Trucial Oman.
Bahr-el-Ghaza, *R.,* Sudan; trib. of White Nile R.
Bahr-el-Ghazal, *prov.,* Sudan, N.E. Africa; cap. Wau (*q.v.*); a. 77,820 sq. m.; p. (estd. 1951) *771,000.*
Baia, *see* Salvador.
Baia, *st.,* Brazil; cap. Salvador; cocoa, thorium; a. 217,670 sq. m.; p. (1950) *4,900,419.*
Baia, *historic vil.,* Campania, Italy; beautifully situated on Bay of Naples; celebrated Roman pleasure resort.
Baia-Mare, *t.,* Romania; on Somes R.; gold, silver, lead, zinc, chemicals, uranium; p. (1948) *20,959.*
Baie-St. Paul, *t.,* Quebec, Canada; summer resort; hunting, fishing; p. *3,500.*
Baii, *t.,* on oil pipe-line, Iraq.
Baikal, *L.,* Siberia, U.S.S.R.; fresh-water; 6th lgst. in the world; frozen Nov.–May; skirted by Trans-Siberian Rly.; sturgeon, salmon; 40 m. wide; a. 13,700 sq. m.
Baildon, *urb. dist.,* W.R. Yorks, Eng.; nr. Bradford; p. (1951) *10,132.*
Baile Atha Cliath, *see* **Dublin.**
Bailen, *t.,* Spain; lead, ore; p. *10,045.*
Bailleul, *t.,* Nord, France; lace, linen; p. (1954) *11,964.*
Baillieston, *t.,* Lanark, Scot.; coal-mining.
Baird, *t.,* Texas, U.S.A.; rly. junction; cotton, oil; p. *1,810.*
Bairnsdale, *t.,* Vic., Australia; on Mitchell R.; agr., pastoral, dairying; p. (1947) *4,604.*
Bakchisaray, *t.,* Crimea, U.S.S.R.; *old cap.* of Tartar Khans.
Baker I., Pacific Ocean.
Baker, *L.,* N.W. Terr., Canada.
Baker, *t.,* Ore., U.S.A.; gold, silver, lead, mineral springs; p. (1950) *9,471.*
Bakersfield, *t.,* S. Cal., U.S.A.; ctr. of oil-wells, refining; p. (1950) *34,474.*
Bakewell, *urb. dist.,* Derby, Eng.: tourist centre, Peak District; agr., mining, woollens; p. (1951) *3,350.*
Bakhchisarai, *t.,* Crimea, U.S.S.R.; leather, copper; p. *10,800.*
Bakony Wald, *mtns.,* forested, Hungary.
Baku, *cap.* Azerbaydzhan, S.S.R.; pt. of Caspian Sea; univ.; oil-wells; p. (1959) *636,000* (inc. subs.) *968,000.*
Bala, *urb. dist.,* N. Wales; nr. Denbigh, Merioneth; light engin.; p. (1951) *1,508.*
Bala, *L.,* Merioneth, N. Wales; drained by the Dee.
Balaclava, *t.,* S. Australia; 67 m. from Adelaide; ctr. of agr. dist.; p. (1947) *1,290.*
Balashov, *t.,* Saratov area, R.S.F.S.R.; on Khoper R.; engin.; p. (1959) *64,000.*
Balasinor, former Gujarat st. now merged into Bombay st., India; a. 189 sq. m.; p. (1941) *61,151.*
Balasore, *spt.,* Orissa, India; p. *10,000.*
Balaton, *L.,* lgst. in Hungary; 50 m. S.W. of Budapest; 50 m. long, 2–7 m. wide.
Balatra, *t.,* Rajasthan, India; p. *10,000.*
Balayan, *t.,* Luzon, Philippine Is.; at head of G. of Balayan; p. (1948) *18,305.*
Balboa, *dist.,* S.E. Canal Zone, Central America; p. *31,502*; *t.,* Pacific end of Panama Canal; p. (1950) *4,117.*
Balbriggan, *spt.,* Dublin, Ireland; hosiery; p. (1951) *2,920.*
Balclutha, *t.,* S.I., N.Z.; nr. Dunedin; p. (1951) *2,621.*
Bald Head Peak, Victoria, alt. 4,625 ft.; highest point in Dividing Range, Australia.
Bald Mtn., peak in Front Range, Col., U.S.A.; alt. 12,000 ft.
Baldock, *urb. dist.,* Herts., Eng.; on N. edge of Chiltern Hills and Gr. N. Road; hosiery, malting, light engin.; p. (1951) *5,967.*
Baldwin, *t.,* N.Y., U.S.A.; on S. Long I.; fisheries; p. (1950) *6,015.*
Baldwinsville, *t.,* N.Y., U.S.A.; agr., livestock, natural gas; p. (1950) *4,495.*
Balearic Is., Spain; include Majorca, Minorca, Iviza, Formentera; *ch.t.* Palma; fruit, fish, pigs; tourist ctr.; a. 1,936 sq. m.; p. (1950) *422,089*
Baleswar, *R.,* one of the chief distributaries of the Ganges to Bay of Bengal.
Balfron, *par.,* Stirling, Scot.; cotton; p. (1951) *1,411.*
Bali, off Java, Indonesia; mainly engaged in agr.; famous native dancers; a. (inc. Lombok) 3,973 sq. m.; p. (1930) (inc. Lombok) *1,802,683.*
Balikesir, *t.,* Turkey; p. (1945) *33,894.*
Balikpapan, *t.,* Borneo, Indonesia; oil; p. *29,843.*
Baliuag, *t.,* Luzon, Philippine Is.; rice, bamboo hats, mkt.; p. (1948) *30,670.*
Balkan Mtns., Bulgaria; highest peak, 7,780 ft.; Shipka Pass.
Balkan Peninsula, the easternmost of the three great southern peninsulas of Europe, between the Adriatic and Ionian seas on the W., and the Black Sea, Sea of Marmara and the Ægean Sea on the E., with an area of, roughly, 200,000 sq. m.; includes Jugoslavia, Bulgaria, Albania, Greece; chief mtns.: Rhodope, Pindus, Balkan; ch. rivers: Danube, Maritza, Vardar; ch. lakes: Scutari, Okhrida.
Balkh, *dist.,* Afghanistan; between the Kabul and the Oxus; corresponding to the ancient Bactria, rival of Nineveh and Babylon.
Balkh, *t.,* Afghanistan; associated with Zoroaster, called the "Mother of Cities"; destroyed by Jenghis Khan in 1221; silk; p. *12,465.*
Balkhash, *L.,* U.S.S.R.; fresh water, nr. frontier of W. Mongolia; receives the Ili R., but has no outlet, length 450 m., width 30–50 m.
Ballachulish, *vil.,* Argyll, Scot.; on S. shore of L. Leven, N.E. of Oban; slate quarries.
Ballaghadorreen, *t.,* Roscommon, Ireland; p. (1951) *1,359.*
Ballantrae, *par.,* Ayr., Scot.; fishing; p. (1951) *885.*
Ballapali, forest reserve, Madras, India.
Ballarat, *c.,* Victoria, Australia; 73 m. N.W. Melbourne, former gold-field dist.; farming ctr.; flour milling, wool; p. (1958) *51,330.*
Ballater, *burgh,* Aberdeen, Scot.; on R. Dee, 37 m. S.W. of Aberdeen; tourist resort, mineral wells; nr. the royal Highland residence of Balmoral; p. (1951) *1,301.*
Ballenas Bay, W. Coast, Lower California, Mexico.
Balleny Is., S. Ocean; volcanic isles.
Ballina, *urb. dist., spt.,* Mayo, Ireland; agr. machin., flour mills; p. (1951) *6,220*
Ballina, *t.,* N.S.W., Australia; 530 m. from Sydney at mouth of Richmond R.; p. *3,201.*
Ballinasloe, *urb. dist.,* Galway and Roscommon, Ireland; large cattle fair; p. (1951) *5,596.*
Ballinger, *t.,* Texas, U.S.A.; grain, cattle, cotton-seed oil, flour; p. (1950) *5,302.*
Ballinrobe, *rural dist.,* Mayo, Ireland; E. of L. Mask; p. (1951) *15,339.*
Ballon D'Alsace, *mtns.* (4,101 ft.), Vosges, France; highest peak Ballon de Guebwiller, 4,690 ft.
Ballston Spa, *wat. pl.,* Saratoga, N.Y., U.S.A., p. (1950) *4,937.*
Bally L., Roscommon, Ireland, nr. Castlereagh.
Ballycastle, *spt., mkt. t., urb. dist.,* Antrim, N. Ireland; abbey and cas. ruins; p. (1951) *2,553.*
Ballyclare, *urb. dist.,* Antrim, N. Ireland; paper, linen, dyeing; p. (1951) *3,982.*
Ballycottin Is., Ballycottin Bay, Cork, Ireland.
Ballymena, *mkt. t., mun. bor.,* Antrim, N. Ireland; on R. Braid; linen and dyeing; p. (1951) *14,165.*
Ballymoney, *mkt. t., urb. dist.,* Antrim, N. Ireland; 40 m. N.W. of Belfast; linen, dairying; p. (1951) *3,306.*
Ballyness Bay, Donegal, Ireland.
Ballyshannon, *rural dist., spt.,* Donegal, Ireland; at mouth of R. Erne; salmon fishery; p. (1951) *6,909.*
Balmain, *t.,* N.S.W., Australia; industl. sub. of Sydney; foundries, chemicals, glass, shipbldg., lumber; p. (1947) *28,268.*
Balmoral Cas., Aberdeen, Scot.; royal residence, on R. Dee, 8 m. W. of Ballater.
Balquhidder, *par.,* Perth, Scot.; p. (1951) *671.*
Balranald, *t.,* N.S.W., Australia; on R. Murrumbidgee, p. *1,249.*
Balsas, *R.,* Mexico; flows S. to Pacific Ocean through impt. sugar-cane growing valley of Morelos; length approx. 500 m.
Balta I., Shetland Is., Scot.
Balta, *t.,* Ukraine, U.S.S.R.; wheat, horses, cattle; p. *25,000.*

Baltic Is. (Fyn, Lolland, Nykobing, etc.); farming div. of Denmark; a. 5,123 sq. m.; p. *1,291,772.*
Baltic Sea, an arm of the Atlantic, opens into N. Sea by narrow channels between Denmark and Sweden; joined to White Sea and Arctic by White Sea Canal; surrounded by Sweden, Denmark, Germany, Finland and the Baltic Reps. of the U.S.S.R.; 900 m. long, greatest width 200 m., a. 160,000 sq. m.; partly frozen in winter.
Baltic–White Sea Canal, *see* **Stalin Canal.**
Baltimore, *c., spt.*, Maryland, U.S.A.; nr. head of Chesapeake Bay; fine harbour; extensive tr.; clothing, machin., shipbldg., food canning; p. (1950) *949,708.*
Baltinglass, *t.*, Wicklow, Ireland; p. *860.*
Baluchistan, *prov.*, Pakistan; S. of Afghanistan; largely desert and rugged barren mtns.; cap. Quetta; a. 52,900 sq. m.; cereals, potatoes, fruits, dates; p. (estd. 1951) *622,000.*
Baluchistan States, consist of 4 States, Kalat, Las Bela, Kharan and Mekran, all of which have acceded to the Dominion of Pakistan; p. (estd. 1951) *556,000.*
Bam, *t.*, Persia; dates, henna; p. (1942) *13,938.*
Bamako, *c.*, Sudan; p. (1946) *70,492.*
Bamangwato, *tr. dist.*, Bechuanaland Protectorate, S. Africa.
Bamberg, *c.* Bavaria, Germany; cath.; philosophical and theological institute; textiles, elec., leather and engin. inds.; p. (estd. 1954) *76,200.*
Bamberg, *t.*, S.C., U.S.A.; agr., lumbering, pine timber; p. (1950) *2,954.*
Bambuk or **Bambouk**, Senegambia, W. Africa; gold and iron dist.
Bamburgh, *t.*, Northumberland, Eng.; birthplace of Grace Darling, cas.
Bamian, *t.*, Afghanistan, N.W. of Kabul; rock-cut caves, colossal Buddhist statues.
Banam, *t.*, Cambodia, Indo-China; on Mekong R.; boat bldg., rice distilling; p. *28,000.*
Banana, *t.*, *pt.*, Belgian Congo, Africa; nr. mouth of Congo R.; p. *1,000.*
Banana I., Brazil; length 220 m., width 50 m.
Banana Is., sm. group nr. Sierra Leone.
Banat, *dist.*, Romania; N. of R. Danube and E. of R. Tisza; p. (1948) *948,596.*
Banbridge, *t. urb. dist.*, Down, N. Ireland; on Bann R.; linen; p. (1951) *6,098.*
Banbury, *mun. bor., mkt. t.*, Oxford, Eng.; 80 m. from London; aluminium ind., furniture, printing; p. (1951) *18,917.*
Banchory, *burgh*, Kincardine, Scot.; on R. Dee, 17 m. S.W. of Aberdeen; p. (1951) *1,958.*
Banda, *t.*, Uttar Pradesh, India; cotton; p. *29,070.*
Banda Is., group in Moluccas, in Banda Sea, Indonesia; produce; nutmegs and mace.
Bandar Abbas, *spt.*, Persia; dates, raisins, almonds, carpets; p. *10,000.*
Bandar Shah, *spt.* on Caspian Sea, N. Persia.
Bandar Shahpur, *spt.* Persia; on N. end Persian G.
Bandawe, *mission sta.* on L. Nyasa, Africa.
Bandoeng or **Bandung**, *t.*, W. Java; quinine, rubber, chemicals; radio sta.; p. *166,815.*
Bandon, *mkt. t.*, Cork, Ireland; on Bandon R.; distilling, tanning; p. (1951) *2,527.*
Banff, *burgh, cap.*, Banff, Scot.; on Moray Firth at mouth of R. Deveron; fisheries; p. (1951) *3,359.*
Banff, *co.*, Scot.; oats, barley, slate, fisheries; a. 630 sq. m.; p. (1951) *50,135.*
Banff, *t.*, Alberta, Canada; tourist ctr. in Rocky Mtns.; p. (1946) *2,081.*
Bangalore, *c.*, Mysore st., India; former Brit. military sta. and administrative H.Q.; silks, cottons, carpets, aircraft; p. (1951) *778,977.*
Bangka (Banka), *I.*, between Sumatra and Borneo, Indonesia; tin; a. 4,611 sq. m.; p. (1930) *205,363.*
Bangkok (**Krung Thep**), *spt., cap.*, Thailand; on Menam R.; 20 m. from the sea; Royal Palace, univ.; rice, tea, teak; p. (1956) *1,208,865.*
Bangor, *c., mun. bor.*, Caernarvon, Wales; on S. shore of Menai Strait; cath., univ., college; slate, light engin.; p. (1951) *12,822.*
Bangor, *wat. pl., mun. bor.*, Down., N. Ireland; on S. shore of Belfast Lough, 10 m. N.E. of Belfast; linen, fisheries; p. (1951) *20,615.*
Bangor, *pt.*, Maine, U.S.A.; on Penobscot R., lumber, boots, shoes, clothing, paper; p. (1950) *31,558.*
Bangor, *bor.*, E. Penns., U.S.A.; slate, agr., clothes; p. (1950) *6,050.*
Bangui, *cap.* of Ubangi-Shari terr., Fr. Equatorial Africa; on R. Ubangi; p. (1950) *41,100.*
Bangweulu, *L.*, N. Rhodesia; 150 m. long, 80 m. wide, contains 3 islands. Dr. Livingstone died at Ilala, on S. shore of this L., in 1873.
Banias, *spt.*, Syria; terminus of oil pipe-line from Kirkuk, opened 1952.
Banjaluka, *t.*, Bosnia and Hercegovina, Jugoslavia; hot springs; tobacco; p. (1953) *38,135.*
Benjermassin, *t.*, Borneo, Indonesia; wax, resins; p. *65,698.*
Banka, *see* **Bangka.**
Banks I., Canada, Arctic Ocean; separated by Banks Strait from Melville I.
Banks Is., group of sm. Is. in S. Pacific; N.E. of New Hebrides.
Banks Peninsula, on E. coast of S.I., New Zealand.
Banks Strait, separating Furneaux Is. from Tasmania.
Bankura, *t.*, W. Bengal, India; on Hooghly R.; shellac, silk; p. (1951) *46,617.*
Bann, Upper and Lower R., N. Ireland; rises in co. Down, and flows through Lough Neagh to Atlantic nr. Coleraine; length 90 m.
Bannockburn, *vil.*, Stirling, Scot.; 3 m. S. of Stirling; Bruce's victory over Edward II, June 24th, 1314; coal, confectionery.
Bannu, *t.*, N.W. Frontier Prov., Pakistan; on Kurram R.; military sta.; p. *38,504.*
Baños, *t.*, N. of Valladolid, Spain.
Bansda, *dist.*, Bombay st., India; a. 215 sq. m.; p. *54,764.*
Banska Stiavnica, *t.*, Czechoslovakia; tr. ctr., gold, silver prod., lead, copper, zinc; p. (1947) (inc. Banska Bela) *11,870.*
Banstead, *urb. dist.*, Surrey, Eng.; p. (1951) *33,526.*
Bantam, *dist.*, W. Java; suffered severely from fever and volcanic eruption.
Bantry, *rural dist.* and *spt.*, Cork, Ireland; at head of Bantry Bay; fishing, farming; p. (1951 *8,565.*
Banwy, *R.*, Montgomery, Wales.
Banzyville, *t.*, Belgian Congo; on R. Uele; p. *1,000.*
Ba'quba, *t.*, Iraq; on Diyala R., 32 m. N.E. of Baghdad; agr., rly.; p. *10,000.*
Bar, *spt.*, Dalmatian cst. Jugoslavia; p. *5,500.*
Bar Harbor, *t.*, S.E. Me., U.S.A.; holiday resort; p. (1950) *2,572.*
Baraboo, *t.*, Wis., U.S.A.; agr. tr. ctr.; p. (1950) *7,264.*
Baracaldo, *t.*, Biscay, Spain; ironwks.; p. *36,165.*
Baracoa, *spt.*, Cuba; bananas, coconuts; p. *10,395.*
Barada, *R.*, Syria; in plain of Damascus.
Barajas, *vil.*, Madrid, Spain; airport; p. *1,800.*
Baranovichi, *t.*, Byelorussian S.S.R.; 80 m. S.W. of Minsk; p. (1959) *58,000.*
Barbacena, *t.*, E. Brazil; creameries; ceramics, glass; p. (1950) *25,768.*
Barbados, *I.* most easterly of T.W.I.; sugar, molasses, rum, cotton; cap. Bridgetown; a. 166 sq. m.; p. (estd. 1957) *232,227.*
Barbary, *region*, N. Africa; includes Morocco, Algeria, Tunis, Tripoli, Barka and Fezzan.
Barbary Coast, general name applied to Mediterranean cst. of N. Africa between Strait of Gibraltar and C. Bon.
Barbastro, *t.*, Huesca, Spain; on the R. Cinca; p. *9,388.*
Barberton, *t.*, Transvaal, S. Africa; citrus fruits, gold, asbestos; p. *5,279.*
Barberton, *t.*, Ohio, U.S.A.; p. (1950) *27,820.*
Barbizon, *vil.*, nr. forest of Fontainebleau; haunt of painters.
Barbuda and Redonda, *Is.*, Leeward Is., T.W.I.; dependencies of Antigua; sea-island cotton; a. 63 sq. m.; p. *1,000.*
Barcaldine, *t.*, Queensland, Australia; p. (1947) *1,682.*
Barcarrota, *t.*, Spain; p. *8,020.*
Barcellona, *t.*, Sicily, Italy; silks; p. *25,580.*
Barcelona, *prov.*, N.E. Spain; cap. Barcelona; a. 2,942 sq. m.; p. (1950) *2,232,119.*
Barcelona, *c., spt., cap.*, Barcelona prov., Spain; "Manchester of Spain"; cottons, paper, leather, glass, soap; exp. olives, wines, cork; p. (1950) *1,280,179*
Barcelona, *t.*, N. Venezuela; *cap.* of Azoátegui st.; agr. tr.; p. (1950) *26,446.*

Barcoo R., *see* **Cooper's Creek.**
Bardejov, *t.*, Czechoslovakia; hot springs; p. (1947) *6,394*.
Bardera, *t.*, Somaliland; head of navigation on Juba R.; p. *1,500*.
Bardi, *t.*, Piacenza, Italy; p. *7,850*.
Bardsey, *I.*, Irish Sea; off coast of Wales, nr. N. point of Cardigan Bay; lighthouse.
Bareilly, *c.*, Uttar Pradesh, India; bamboo, furniture; p. (1951) *208,083*.
Barents Sea, part of Arctic Ocean E. of Spitzbergen to N. Cape; cod, haddock.
Barfurush, *see* **Babul.**
Bari, *spt.*, S. Italy; on Adriatic, 69 m. N.W. of Brindisi; cath.; olive oil, wines, fruit, soap; p. (1951) *267,795*.
Baria, *dist.*, Bombay st., India; a. 879 sq. m.; p. (1941) *202,055*.
Barisal, *t.*, E. Bengal, Pakistan; nr. Tetulia at mouth of Ganges; river pt.; p. (1941) *61,316*.
Barka, *dist.*, Libya, N. Africa.
Barking, *mun. bor.*, Essex, Eng.; on R. Roding; part of Greater London; metal refining and smelting, insulation, cellulose; lge. power sta. and lgst. gaswks. in Europe; p. (1951) *78,197*.
Barkly East, *t.*, C. of Good Hope, S. Africa.
Barkly Tableland, N. Terr., Australia.
Barkly West, *t.*, C. of Good Hope, S. Africa; diamonds.
Barkul, *t.*, Shensi, W. China; p. (estd. 1947) *19,097*.
Barlad, *t.*, Romania, Moldavia; soap, textiles; p. (1948) *24,035*.
Bar-le-Duc, *t.*, *cap.*, Meuse, France; cotton, hosiery; p. (1954) *16,609*.
Barlee, *L.*, W. Australia.
Barletta, *t.*, *spt.*, Italy; wine; p. *62,057*.
Barlin, *t.*, Pas de Calais, France; coal-mines, lime, cement; p. (1954) *9,186*.
Barmouth, *t.*, *urb. dist.*, Merioneth, Wales; on cst. of Cardigan Bay; chemicals; p. (1951) *2,466*.
Barnack, *rural dist.*, Soke of Peterborough, Eng.; p. (1951) *3,099*.
Barnard Castle, *mkt. t.*, *urb. dist.*, Durham, Eng.; health resort; woollens, penicillin; p. (1951) *4,433*.
Barnaul, *t.*, W. Siberia, R.S.F.S.R.; chemicals, engin., textiles, sawmilling; p. (1959) *320,000*.
Barnes, *mun. bor.*, Surrey, Eng.; sub. of London, on R. Thames; p. (1951) *40,558*.
Barnesboro, *bor.*, Penns., U.S.A.; soft coal, clothing; p. (1950) *3,442*.
Barnesville, *t.*, Ga., U.S.A.; cotton mills; p. (1950) *4,185*.
Barnesville, *t.*, Ohio U.S.A.; coal, natural gas, glass, paper, evaporated milk; p. (1950) *4,665*.
Barnet, *t.*, *urb. dist.*, Herts, Eng.; 10 m. N.W. London; residtl.; p. (1951) *25,017*.
Barneveld, *t.*, Gelderland, Netherlands; p. (1951) *20,058*.
Barnoldswick, *urb. dist.*, W.R. Yorks, Eng.; p. (1951) *10,282*.
Barnsdall, *t.*, N. Okla., U.S.A.; oil, gas, agr.; p. (1950) *1,708*.
Barnsley, *mftg. t.*, *co. bor.*, W.R. Yorks, Eng.; coal, machin.; p. (1951) *75,625*.
Barnstable, *t.*, Mass., U.S.A.; summer resort; fisheries; p. (1950) *10,480*.
Barnstaple, *mkt. t.*, *mun. bor.*, Devon, Eng.; on R. Taw; seaside resort; concrete, glove mkg.; p. (1951) *16,302*.
Baroda, *former st.*, India; one of the most impt. of former Indian sts., N. of Bombay; now part of Bombay st.; cereals, cotton, sugar, tobacco, opium; a. 8,235 sq. m.; p. (1941) *2,855,010*.
Baroda, *t.*, N. Bombay, India; palaces, Hindu temples; p. (1951) *211,407*.
Barotse, *cty.*, N. Rhodesia, Africa.
Barquisimeto, *t.*, W. Venezuela, S. America; sugar, sisal; p. (1950) *105,080*.
Barr, *t.*, France; at foot of Vosges; p. (1954) *4,322*.
Barra Is., southerly groups, Outer Hebrides, Scot.; a. 348 sq. m.; lighthouse on Barra Head; p. *2,250*. [wool.
Barraba, *t.*, Darling, N.S.W., Australia; pastoral;
Barrafranca, *t.*, Sicily, Italy; sulphur springs; mines.
Barrage, *vil.*, Egypt, N.E Africa; on Nile, 35 m. N. of Cairo.
Barranca Bermeja, *t.*, Colombia, S. America; oil-field, oil-refining, asphalt; p. *9,307*.
Barranqueras, *t.*, Chaco terr., N. Argentina; on Parana R.; exp. hardwoods, cotton.
Barranquilla, *pt.*, Colombia, S. America, on left bank nr. mouth of R. Magdalena; rivals Cartagena as comm. ctr. of the Republic; coffee, bananas, cotton, platinum; p. (1951) *278,269*.
Barre, *c.*, Vt., U.S.A.; granite; p. (1950) *10,922*.
Barren I., volcano in Bay of Bengal.
Barren R., Ky. U.S.A.; length 120 m.
Barrhead, *mftg. burgh*, Renfrew, Scot.; 7 m. S.W. of Glasgow; iron and cotton; p. (1951) *12,971*.
Barrie, *c.*, Ontario, Canada; light inds., boat bldg.; p. *20,243*.
Barrier Ranges, *mtns.*, on boundary of S. Australia and N.S.W., Australia; alt. 2,000 ft.
Barrier Reef, Great, *coral reef*, Pac. Oc.; extending for 1,200 m., 10–150 m. from coast of Australia.
Barrington, *t.*, R.I., U.S.A.; shipbuilding, fish, residtl. resort; p. (1950) *8,246*.
Barron, *t.*, Wis., U.S.A.; dairy products, lumber; p. (1950) *2,355*.
Barrow, *C.*, Mackenzie, Canada.
Barrow Falls, nr. Keswick, Cumberland, Eng.
Barrow, *R.*, Leinster, Ireland; rises in Slieve Bloom Mtns., and flows to Waterford Harbour.
Barrow-in-Furness, *spt. co. bor.*, N. Lancs, Eng.; iron and steel, paper, shipbldg., engin.; p. (1951) *67,473*.
Barrow-on-Soar, *rural dist.* and *t.*, Leicester, Eng.; p. (rural dist. 1951) *47,376*.
Barrow Point, most northerly headland in Alaska, N. America.
Barry, *mun. bor.*, Glamorgan, Wales; "outport" of Cardiff; coal, tin-plate; p. (1951) *40,979*.
Barsac, *t.*, Gironde, France; Sauterne wine; p. (1954) *2,320*.
Barsi, *t.*, India; cotton, oil-seeds; p. *27,600*.
Barstow, *t.*, Cal., U.S.A.; early silver mining and frontier town; p. (1950) *6,135*.
Bar-sur-Aube, *t.*, Aube, France; wine, brandy; furniture; p. (1954) *4,387*.
Bar-sur-Seine, *t.*, Aube, France; p. (1954) *2,422*.
Bartan, *t.*, N. Turkey; p. *8,740*.
Barth, *spt.*, Mecklenburg, Germany; shipyard engin., furniture, sugar inds.; p. (estd. 1954) *14,300*.
Bartholomew Bayou, *R.*, Ark., U.S.A., l. 275 m.
Bartlesville, *t.*, Okla., U.S.A.; p. (1950) *19,228*.
Barton-upon-Humber, *urb. dist.*, Lindsey, Lincs, Eng.; cycles, rope-making, bricks, tiles, chemical manure; p. (1951) *6,235*.
Bartow, *t.*, Fla., U.S.A.; phosphates, citrus canneries, cigar-mkg.; p. (1950) *8,694*.
Barvas, *par.*, Lewis, Scot.; p. *5,876*.
Basel, *can.*, Switzerland; divided into the half-cantons, Basel-Stadt, a. 14 sq. m., cap. Basel, and Baselland, a. 165 sq. m., cap. Liestal; farming, vines, forests; p. (1950) *304,047*.
Basel, *c.*, *cap.*, Basel, Switzerland; head of barge navigation on Rhine; chemicals, ribbons; p. (1950) *183,543*.
Bashee R., C. of Good Hope, S. Africa.
Bashi I., gr. in Pac. Oc.; N. of Luzon in the Philippines.
Bashkir, *Rep.* R.S.F.S.R., U.S.S.R.; farming, gold, copper, coal; cap. Ufa; p. *2,741,000*.
Basildon, *t.*, Essex, Eng.; in lower Thames valley, 8 m. S.E. of Brentwood; one of "New Towns" designated 1949 to relieve population congestion in London; incorporated S. part of Billericay urb. dist. and N. part of Thurrock urb. dist.; p. (estd. 1959) *46,500*.
Basilicata, *dep.*, Italy; wheat, maize, vines, olive oil; a. 3,855 sq. m.; p. (1951) *628,197*.
Basingstoke, *mftg. and mkt. t.*, *mun. bor.*, N. Hants, Eng.; 50 m. W. London; motor vehicles, farm implements, pharmaceutics; p. (1951) *16,979*.
Basle, *see* **Basel.**
Basque Prov., Spain; comprising three provs., Alava, Guipuzcoa, Vizcaya, where Basque language is spoken and also N. of Pyrenees in France.
Basra, *prov.* or *liwa* on Euphrates, Iraq; 60 m. from the sea; p. (1956) *404,308*.
Basra, *t.*, *river pt.*, Iraq; dates; p. (1956) *159,355*.
Bas-Rhin, *see* **Rhin** (Bas).
Bass Rock, in Firth of Forth, opposite Tantallon Castle, E. Lothian, Scot.
Bass Strait, between Victoria and Tasmania; length about 200 m., breadth about 140 m.

Bassac, *t.*, Indo-China; on R. Mekong; p. (1941) *3,117*.
Bassano, *t.*, Italy; on R. Brenia; vines, olives, majolica; p. *20,527*.
Bassein, *t.*, Burma; on mouth of Irrawaddy R., exp. rice; p. (1931) *45,662*.
Bassein, *R.*, Burma.
Bassenthwaite, *L.*, Cumberland, Eng.; length 4 m., breadth 1 m.; fishing.
Basses-Alpes, *frontier dep.*, S.E. France; olives, wines; cap. Digne; a. 2,697 sq. m.; p. (1954) *84,335*.
Basses-Pyrénées, *dep.*, France; cattle, sheep, forest; cap. Pau; a. 2,977 sq. m.; p. (1954) *85,067*.
Basse-Terre, *ch. t.*, Guadeloupe, Fr. W. Indies; p. *13,638*.
Basseterre, *cap.*, St. Kitts I., Leeward group; T.W.I.; p. (1957) *35,878*.
Båstad, *t.*, Sweden; p. (1945) *2,206*.
Bastia, *t.*, *spt.*, Corsica, France; p. (estd 1954) *40,000*.
Bastogne, *t.*, Belgium, nr. Luxembourg; p. (estd. 1948) *4,991*.
Bastrop, *t.*, N. La., U.S.A.; natural gas, paper mills; p. (1950) *12,769*.
Bastrop, *t.*, Texas, U.S.A.; on Colorado R.; lignite; p. (1950) *3,176*.
Basutoland, Brit. Terr., S. Africa; at head of Orange R., and enclosed on S. by the Drakensberg Mtns.; mountainous plateau, purely native territory; mainly agr., maize, wool, mohair; cap. Maseru; a. 11,716 sq. m.; p. (1956) *634,000*.
Bata, *ch. t.*, Spanish Guinea, W. Africa; p. *5,000*.
Bataan, *t.*, Philippine Is.
Batabanó, *t.*, Cuba; p. (1946) *3,177*.
Batangas, *t.*, Philippine Is., coconuts.
Batavia, *see* **Jakarta**.
Batavia, *c.*, N.Y., U.S.A.; farm implements; p. (1950) *17,799*.
Bataysk, *t.*, Rostov region, R.S.F.S.R.; rly. junction; grain and cattle, engin., p. (1959) *52,000*.
Batesar, *t.*, Agra dist., India; on the R. Jumna; comm. ctr.
Batesville, *t.*, Ark., U.S.A.; marble, manganese; p. (1950) *6,414*.
Batesville, *t.*, Ind., U.S.A.; furniture; p. (1950) *3,194*.
Bath, *t.*, Maine, U.S.A.; on R. Kennebec; p. (1950) *10,644*.
Bath, *c.*, *co. bor.*, Somerset, Eng.; Roman baths, hot springs, medicinal waters; fine Regency architecture; elect. engin., metals and limestone; p. (1951) *79,275*.
Bathgate, *burgh*, West Lothian, Scot.; 6 m. S. of Linlithgow; coal-mng., quarrying, metal, elec., hosiery inds.; p. (1951) *11,290*.
Bathurst, *I.*, off coast of N. Terr., Australia; 30 m. long.
Bathurst, *t.*, C. of Good Hope, S. Africa.
Bathurst, *t.*, N.S.W., Australia; gold-mining; ctr. of pastoral, agr., fruit district; brewing, boots and shoes; p. (1958) *16,990*.
Bathurst, *spt.*, *cap.*, Gambia colony, W. Africa; at mouth of Gambia R.; airport; groundnuts; p. (estd. 1956) *28,820*.
Bathurst Is., N.W. Terr., Canada.
Batina, fertile coastal plain Muscat and Oman, Arabia; produces early-ripening dates famous for flavour.
Batley, *industl. t.*, *mun. bor.*, W.R. Yorks, Eng.; woollens, shoddy; p. (1951) *40 192*.
Batna, *commune*, Algeria; N. Africa; rly. to Biskra; p. *10,622*.
Baton Rouge, *cap.*, Louisiana, U.S.A.; on Mississippi R.; cotton seed, oil-refining; p. (1950) *125,629*.
Battambang, Cambodia, Fr. Fed. Indo-China; 180 m. N.E. of Pnom-Penh; p. (1941) *23,567*.
Battam I., Malay Arch.; 20 m. S. of Singapore.
Battersea, *metropolitan bor.*, London, Eng.; p. (1951) *117,130*.
Batticaloa, *t.*, *cap.*, E. Prov., Ceylon; p. *12,984*.
Battle, *t.*, *rural dist.*, Sussex, Eng.; battle of Hastings fought here 1066; p. (rural dist. 1951) *30,400*
Battle Creek, *c.*, Michigan, U.S.A.; on Kalamazoo R.; engin., cereal prod.; p. (1950) *48,666*.
Battleford, N., *t.*, Canada; at junction of Battle R. with Saskatchewan R.; mixed farming; p. (1951) *7,489*.
Battle Harbour, nr. Strait of Belle I., Labrador.
Battle Mountain, *t.*, Nev., U.S.A.; copper-mines.
Batu Gajah, *t.*, Malaya; in valley Kinta R.; tin-mines; residtl.; p. (1947) *7,480*.
Batu, I., E. Indies, Indonesia.
Batumi, *t.*, *spt.*, Georgian S.S.R.; oil, engin; p. (1959) *82,000*.
Baturite, *t.*, Brazil; p. *5,320*.
Bauchi, *t.*, central Nigeria; ctr. of impt. tin-mining a.; p. *10,000*.
Baud, *t.*, Orissa, India; on R. Mahanadi.
Bauld, *C.*, northernmost part of Newfoundland, N. America.
Baures, *R.*, E. Bolivia; flowing from L. Guazamire to R. Guapore; length 300 m.
Bautzen, *t.*, Saxony, Germany; on R. Spree; textiles, engin., iron inds.; p. (estd. 1954) *42,000*.
Bauya, *t.*, Sierra Leone, Brit. W. Africa; rly. junction.
Bavaria, *Land*, Germany; hilly, forested; ch. rivers; Danube, Main, Inn, Rhine; ch. inds.: agr., dairying, rye, oats, hops, sugar-beet, brewing, glass, sugar, toys, chemicals, jewellery; cap. Munich (*q.v.*); a. 27,112 sq. m.; p. (1950) *9,126,010*.
Bavarian Alps, *mtns.*, Germany.
Bawdwin, *t.*, Burma; wolfram, lead, zinc, silver, rubies.
Bawtry, *mkt. t.*, W.R. Yorks, Eng.; 8 m. S. of Doncaster; p. (1951) *1,460*.
Baxley, *t.*, S.E. Ga., U.S.A.; pecan nuts, tobacco; p. (1950) *3,234*.
Baxter Springs, *t.*, S.E. Kan., U.S.A.; lead- and zinc-mines; p. (1950) *4,647*.
Bayamon, *t.*, Puerto Rico, W. Indies; fruit, tobacco, sugar, coffee; p. (1950) *20,171*.
Baybay, *t.*, Leyte, Philippine Is.; impt. comm pt.; p. (1948) *50,725*.
Bayburt, *t.*, Turkey, p. *9,473*.
Bay City, *mftg. t.*, Mich., U.S.A.; on Saginaw R., 108 m. N.W. of Detroit; fishing, chemicals, beet-sugar; p. (1950) *52,523*.
Bay City, *t.*, Texas, U.S.A.; sulphur, oil; p. (1950) *9,427*.
Bayeux, *t.*, Calvados, France; cath., museum, Bayeux tapestry; p. (1954) *10,077*.
Bay Is., group G. of Honduras, Central America; lgst., Ruatan.
Bay of Islands, inlet and harbour on N.I., New Zealand.
Bayombong, *t.*, Philippine Is.; p. (1948) *14,079*.
Bayonne, *fortfd. t.*, Basses-Pyrénées, S.W. France; cath.; noted for fine hams, invention of bayonet; aircraft; p. (1954) *32,575*.
Bayonne, *t.*, N.J., U.S.A.; 6 m. from New York; chemicals, oil-refining; p. (1950) *77,203*.
Bayport, *t.*, Minn., U.S.A.; on St. Croix R.; state prison; p. (1950) *2,502*.
Bayreuth, *c.*, Bavaria, S. Germany; home of Wagner; famous for musical festivals in magnificent national theatre; textiles, porcelain, engin.; p. (estd. 1954) *60,400*.
Baytown, *t.*, S.E. Texas, U.S.A.; oil-wells, toluene factory; p. (1950) *22,983*.
Baza, *t.*, S. Spain; W. of Lorca; p. *20,772*.
Beachy Head, 575 ft. high, on Sussex cst., loftiest headland in S. Eng.
Beaconsfield, *t.*, Tasmania, Australia; on W. of estuary of Tamar R.; tin mining.
Beaconsfield, *urb. dist.*, Bucks., Eng.; residtl.; p. (1951) *7,909*.
Beaconsfield, *t.*, C. of Good Hope, S. Africa; diamonds.
Bear I., Arctic Ocean; 130 m. S. of Spitzbergen.
Bear L., on border of Idaho and Utah, U.S.A.
Bear L., Great, N.W. Terr., Canada; outlet to Mackenzie R. through Great Bear R.; a. 14,000 sq. m.
Béarn, *old prov.* now Basses-Pyrénées, France.
Beas (Bias), *R.*, Punjab, Pakistan; trib. of Sutlej R.; one of the "five rivers."
Beas de Segura, *t.*, Spain; wine, oil, fruits, flax; p. *14,953*.
Beatrice, Neb., U.S.A.; health resort on Big Blue R.; p. (1950) *11,813*.
Beattock, *pass*, S. Uplands, Scot.; gives access from valley of R. Clyde to R. Annan; used by main W. cst. rly. route from Carlisle to Glasgow and Edinburgh; alt. 1,014 ft.
Beaucaire, *t.*, Gard, France; noted fair; p. (1954) *10,197*.
Beauce, *natural division* ("*pays*"), Central France; low, level, plateau of limestone S.W.

of Paris and R. Seine; arid, few surface streams; thin layer of loam (limon) permits agr.; impt. wheat-growing area; population mainly grouped in lge. vils.

Beaufort, *t.*, S.C., U.S.A.; tourists, mkt. gardens, canneries, shrimps, oysters, phosphates; p. (1950) *5,081*.

Beaufort West, *t.*, C. of Good Hope, S. Africa; sheep, karakul; p. (1946) *10,908*.

Beauharnois, *t.*, Quebec, Canada; p. *3,550*.

Beaujolais, France; wine-growing dist.

Beaulieu, *par.*, Hants, Eng.; on Beaulieu R.; yachting; p. *1,201*.

Beauly, *R.*, Inverness, Scot.; flows to Beauly Loch.

Beauly, *t.*, Inverness, Scot.; on Beauly R.; p. *890*.

Beaumaris, *mun. bor.*, *wat. pl.*, cap. Anglesey, N. Wales; on Menai Strait; cas., ruins; light engin.; p. (1951) *2,128*.

Beaumont, *c.*, E. Texas, U.S.A.; lumbering, petroleum; p. (1950) *94,014*.

Beaune, *t.*, Côte d'Or, France; wines, casks, farm implements; p. (1954) *13,175*.

Beausoleil, *t.*, Alpes-Maritime, France; p. (1954) *11,504*.

Beauvais, *t.*, *cap.*, Oise, France; cath.; Gobelin tapestry; p. (1954) *26,756*

Beaver, *R.*, Penns., Ohio, U.S.A.; rises in Allegheny Plateau, flows N. towards L. Erie, turns S.E. into R. Ohio just below Pittsburgh; valley provides easiest route from Pittsburgh to L. Erie pts., contains many steel-mkg. ts., Youngstown, Newcastle, Warren; length 130 m.

Beaver Dam, *c.*, Wisconsin, U.S.A.; summer resort on L.; p. (1950) *11,867*.

Beaver Falls, *t.*, Penns., U.S.A.; machin., pottery, coal, natural gas; p. (1950) *17,375*.

Beaver Meadows, *bor.*, E. Penns., U.S.A.; anthracite, textiles; p. (1950) *1,723*.

Beawar, *t.*, India; cotton; p. *36,700*.

Bebington, *mun. bor.*, Cheshire, Eng.; soap, chemicals, engin.; p. (1951) *47,742*.

Bebra, *t.*, Hessen, Germany; on R. Fulda; textiles; p. (1946) *6,922*.

Beccles, *mun. bor.*, Suffolk, Eng.; printing, engin., malting; p. (1951) *6,869*.

Bechuanaland, *Brit. protectorate*, S.W. Africa; stretches from Orange R. to Zambesi R., and merges westward into the Kalahari desert; comprises various tribes of which the ch. is the Bamangwato; cap. Serowe; cattle-rearing. Admin. ctr., Mafeking; a. approx. 275,000 sq. m.; p. (1956) *327,335*, inc. Mafeking.

Beckenham, *mun. bor.*, Kent, Eng.; residtl. sub. of London; p. (1951) *74,834*.

Beckley, *c.*, S.W. Va., U.S.A.; coal; p. (1950) *19,397*.

Beckum, *t.*, N. Rhine-Westphalia, Germany; cement, chalk, engin. wks.; p. (estd. 1950) *17,800*.

Bedale, *mkt. t.*, N.R. Yorks, Eng.; at N. end of Vale of York; p. *1,043*.

Beddgelert, *par.*, Caernarvon, Wales; resort; slate.

Beddington and Wallington, *mun. bor.*, Surrey, Eng. nr. Croydon; p. (1951) *32,751*.

Bedford, *mun. bor.*, Beds, Eng.; on R. Ouse, 50 m. N. of London; general engin. inc. marine and elect., bricks, ironfounding, aero research; p. (1951) *53,065*.

Bedfordshire, S. Midland *co.*, Eng.; co. t. Bedford (*q.v.*); agr., mkt. gardening, brickmkg., cement, vehicles, engin.; a. 473 sq. m.; p. (1951) *311,844*.

Bedford, *t.*, Indiana, U.S.A.; p. (1950) *12,562*.

Bedford, *t.*, Ohio, U.S.A.; p. (1950) *9,105*.

Bedford Level, once over 400,000 acres of peat marsh in S. Fenland; first successful draining initiated by Earl of Bedford in 1634.

Bedlington, *urb. dist.*, Northumberland, Eng.; iron, coal; p. (1951) *28,836*.

Bedloe's I., or **Liberty I.**, N.Y. harbour, U.S.A.; on which statue of Liberty stands.

Bedminster, *t.*, Somerset, Eng.; sub. of Bristol.

Bedourie, *t.*, Queensland, Australia.

Bedrashem, *t.*, Egypt, N.E. Africa; on R. Nile.

Bedwas and Machen, *urb. dist.*, Mon., Eng.; gas, coal and coke by-prods.; p. (1951) *8,712*.

Bedwellty, *urb. dist.*, Mon., Eng.; coal, iron, elec. goods, car upholstery; p. (1951) *28,826*.

Bedworth, *urb. dist.*, Warwick., Eng.; coal-mng., limestone quarrying, engin., textiles; p. (1951) *24,866*.

Bedzin, *commune*, S. Poland; coal, zinc, metals, chemicals, bricks, sugar-beet; p. (1946) *27,754*.

Beechworth, *t.*, Victoria, Australia; gold, pastoral and agr.

Beechy Point, *C.*, N.E. cst. Alaska, N. America.

Beemaning Mtn., highest peak Blue Mtns, N.S.W., Australia; alt. 4,100 ft.

Beenleigh, *t.*, Queensland, Australia; 24 m. S. Brisbane.

Beerberg, *highest mtn.*, Thüringer Wald, Germany; alt. 3,266 ft.

Beernem, *t.*, W. Flanders, Belgium.

Beersheba, *t.*, Israel; ctr. for development of the Negev; p. (1953) over *20,000*.

Beeskow, *t.*, Germany; on R. Spree.

Beeston and Stapleford, *urb. dist.*, Nottingham, Eng.; engin., drugs, telephones; p. (1951) *49,849*.

Beeville, *c.*, Texas, U.S.A.; mnfs. oilfield equipment; oil-wells; p. (1950) *9,348*.

Beg, *L.*, Antrim, N. Ireland.

Bega, *R.*, S. Hungary; canalised trib. to R. Tisza.

Bègles, *t.*, Gironde, France; mftg.; p. (1954) *23,176*.

Beheira, *prov.*, Lower Egypt, N.E. Africa; in delta of Nile R.; cotton; a. 1,639 sq. m.; p. (1947) *1,245,943*.

Behistun, *t.*, Iraq; in ruins; monuments of Darius the Great.

Beilan, *t.*, *mtn. pass*, Syria-S.W. Asia; E. of G. of Iskenderun; ancient Amanus of "Syrian Gates."

Beilngries, *t.*, Bavaria, Germany; on Ludwig's canal.

Beilstein, *t.*, Germany; on R. Moselle.

Beira, *spt.*, *cap.*, prov. Manica and Sofala, Mozambique; airport; rly. runs inland to Salisbury (N. Rhodesia) and Blantyre (Nyasaland); exp. sugar, maize, cotton; p. (1950) *42,549*.

Beira Alta, *prov.*, Portugal; a. 3,682 sq. m.; p. (1940) *662,616*.

Beira Baixa, *prov.*, Portugal; a. 2,897 sq. m.; p. (1940) *334,788*.

Beira Litoral, *prov.*, Portugal; a. 2,908 sq. m.; p. (1940) *896,719*.

Beirut, *cap.* Lebanon, S.W. Asia; most impt. *spt.* Syria and Lebanon; ancient historic t., now busy shipping and mercantile ctr.; silk, wool, fruits; p. (estd. 1950) *247,000*.

Beitbridge, *t.*, S. Rhodesia; on Limpopo R.

Beit el Faki, *t.*, Yemen, Arabia; coffee.

Beith, *par.*, N. Ayr, Scot.; industl.; p. (1951) *6,908*.

Beit Jala, *t.*, Jordan, S.W. Asia; p. (estd. 1946) *3,740*.

Beit Jibrin, *t.*, Israel, S.W. Asia; in Judæan Hills, 20 m. W.S.W. Jerusalem; p. *1,000*.

Beja, *dist.*, Portugal; pig-breeding dist.; olive oil, pottery; cath.; p. (1950) *288,411*.

Bejar, *t.*, Spain; cloth; p. *12,875*.

Bekes, *t.*, Hungary; wheat; p. *29,283*.

Békéscsaba, *t.*, Hungary; milling; rly. junction; p. *52,404*.

Bela, *t.*, Baluchistan, Pakistan; p. *4,000*.

Bela Crkva, *t.*, Jugoslavia; p. *9,373*.

Belalcazar, *t.*, Spain; woollen mnfs.; p. *9,471*.

Belaya Tserkov, *t.*, N. Ukrainian S.S.R.; agr. and comm. ctr.; p. (1959) *71,000*.

Belbeis, *t.*, Egypt, N.E. Africa; agr. ctr. on W. edge of cultivated Nile delta.

Belcher Is., two sm. groups in Hudson Bay, N.W Terr., Canada.

Belding, *c.*, Mich., U.S.A.; silk mills; p. (1950) *4,436*.

Belem, *sub.* of Lisbon, Portugal; fine church, monastery.

Belém, *cap.*, Pará st., Brazil; cath., bishop's palace; arsenal, museum; coaling sta., rubber, rice, sugar; p. (1950) *260,608*.

Belen, *t.*, Catamarca, Argentina.

Bélep Arch., about 7 m. N.E. of New Caledonia.

Belfast, *spt.*, *co. bor.*, *cap.* N. Ireland; Antrim (and partly Down), at head of Belfast Lough; linen mnf., rope, tobacco, shipbldg., distilling, aircraft, patent glazing; univ.; Houses of Parliament, Stormont Cas.; p. (1951) *443,670*.

Belfast, *t.*, Maine, U.S.A.; p. (1950) *5,960*.

Belfodio, *t.*, Ethiopia; nr. border with Sudan; p. *1,000*.

Belford, *rural dist.*, Northumberland, Eng.; agr., whinstone quarrying; p. (1951) *51,580*.

Belfort, *t.*, Belfort, France; between Jura and

the Vosges; strongly fortified; cotton, brewing machin.; p. (1954) *43,434*.
Belfort, *dep.*, France; ch. t., Belfort; a. 235 sq. m.; p. (1954) *99,427*. [*85,988*
Belgaum, *t.*, Bombay, India; cotton; p. (1951)
Belgian Congo, Central Africa; basin of Congo; climate, uniformly hot, heavy rains, tropical forests; races: Bantu origin; agr., palm oil, cotton, rice, copal, coffee, ivory, rubber; minerals: copper, gold, diamonds, tin, uranium; communications: mainly river, some rail; cap. Leopoldville; ch. ts.: Boma, Stanleyville, Elisabethville; a. (estd.) 904,757 sq. m.; p. (1956) *12,843,574* (Bantu origin), *107,413* (white).
Belgium, *cty.*, W. Europe; climate temperate; ch. rivers: Scheldt, Meuse; races: Flemish, Walloon; languages: Flemish, French; religion: Roman Catholic; ch. inds.: agr., cereals, sugar-beet, potatoes, cattle, pigs, horses; minerals: coal; mnfs.: iron and steel machin., engin., metals, shipbldg., textiles, brewing, distilling; exp. mnf. goods; communications: rail, road, canal; cap. Brussels; ch. port, Antwerp; univ. at Brussels, Ghent, Liége, Louvain; a. 11,755 sq. m.; p. (1957) *9,026,778*.
Belgorod, *t.*, Kursk, R.S.F.S.R.; chalk, lumber, soap, leather, engin.; p. (1959) *71,000*.
Belgorod, Dnestrovski, *t.*, Ukraine, U.S.S.R.; mouth of Dniester R.; wine, wool, fruit.
Belgrade (**Beograd**), *c. cap.*, Serbia, Jugoslavia; at junc. of Save and Danube; univ.; mnfs. tobacco, woollens, aircraft; p. (estd. 1958) *520,000*.
Belhaven, *t.*, N.C., U.S.A.; on Pamlico Sound; fishing, lumbering; p. (1950) *2,528*.
Belitong or **Billiton**, *I.* Between Sumatra and Borneo, Indonesia; a. 1,866 sq. m.; p. (1930) *73,429*.
Belize, *t.*, *cap.*, British Honduras, Central America; mahogany, dyewoods, bananas; p. (1946) *21,886*.
Bell, *I.*, Newfoundland, E. Canada; in Conception Bay, 20 m. N.W. of St. Johns; impt. Wabana iron-ore deposits outcrop on N.W. cst., smelted on Pictou coalfield, Nova Scotia; a. 12 sq. m.; p. of Wabana (1956) *7,873*.
Bell, *R.*, Quebec, Canada; flows N. into James Bay.
Bell, *t.*, Cal., U.S.A.; residtl. c. 5 m. S. of Los Angeles; p. (1950) *15,430*.
Bell Rock, Scot.; famous rock and lighthouse 12 m. S.E. of Arbroath.
Bellagio, *t.*, Italy; on L. Como; resort.
Bellaire, *mftg. t.*, Ohio, U.S.A.; p. (1950) *12,573*.
Bellary, *fortfd. c.*, Madras, India; cotton; p. *56,148*.
Belleek, *par.* and *vil.*, Fermanagh, N. Ireland; on Erne R.; china; p. *1,300*.
Bellefontaine, *t.*, Ohio, U.S.A.; agr. ctr., light mnfs.; holiday resort; p. (1950) *10,232*.
Bellefonte, *bor.*, Penns., U.S.A.; limestone quarries; p. (1950) *5,651*.
Belle Fourche, *t.*, S.D., U.S.A.; on Belle Fourche R.; beet sugar, flour, bricks, dairy produce; p. (1950) *3,540*.
Bellegarde, *fort* on frontier of France and Switzerland, near Geneva.
Belle Ile, *I.* off S. coast of Brittany, France.
Belle Isle Strait, N. America; between Newfoundland and Labrador, on N. shipping route to Canada from Europe.
Bellenden Ker Hills, *mtn. range*, N. Queensland, Australia.
Belleville, *t.*, Ontario, Canada; dairying, fruit; p. *15,710*.
Belleville, *t.*, Ill., U.S.A.; brewing, iron founding, shoes, flour; p. (1950) *32,721*.
Belleville, *t.*, N.J., U.S.A.; p. (1950) *32,019*.
Bellevue, *t.*, Ohio, U.S.A.; limestone, farm implements, car parts; p. (1950) *6,906*.
Bellevue, *t.*, Penns., U.S.A.; p. (1950) *11,604*.
Bellevue, *t.*, Queensland, Australia; goldfields.
Belley, *t.*, Ain, France; p. (1954) *5,470*.
Bellingham, *rural dist.*, Hexham, Northumberland, Eng.; coal; p. (1951) *5,350*.
Bellingham, *t.*, *spt.*, Wash., U.S.A.; saw-mills, paper-mills, salmon canning; p. (1950) *34,112*.
Bellingshausen, S. Antarctica.
Bellinzona, *t.*, Switzerland; on R. Ticino; 14 m. N. of Lugano; three castles built on hills dominating t.; p. (1950) *12,073*.
Bellot Strait, channel on Arctic coast, N. America; separates Boothia and N. Somerset.
Bellows Falls, *t.*, Vt., U.S.A., on Connecticut, R.; paper, farm implements; p. (1950) *3,881*.
Bellshill, *t.*, Lanark, Scot.; mining.
Belluno, *c.*, Venetia, N. Italy; fine cath.; silk; p. (1951) *29,138*.
Belluno, *prov.*, Venetia, N. Italy; a. 1,276 sq. m.; p. (1951) *236,782*.
Belmar, *t.*, N.J., U.S.A.; seaside resort, fishing; p. (1950) *4,636*.
Belmez, *t.*, Córdoba prov., S. Spain; on. N. flank of Sierra Morena, 38 m. N.W. of Córdoba; ctr. of sm. coalfield.
Belmont, *t.*, C. of Good Hope, 56 m. S. of Kimberley, S. Africa.
Belmont, *t.*, Mass., U.S.A.; p. (1950) *27,381*.
Belmont, *t.*, N.C., U.S.A.; p. (1950) *5,330*.
Belmonte, *spt.*, Brazil; N. of Porto Seguro; p. *6,137*.
Belmullet, *vil.*, Mayo, Ireland; fish.
Belo Horizonte, *t.*, *cap.*, Minas Gerais st., Brazil; gold, iron, manganese; diamond-cutting; p. (1950) *360,313*.
Beloit, *c.*, Wisconsin, U.S.A.; on Rock R., diesel engines, farm implements; p. (1950) *29,590*.
Beloit, *c.*, Kan., U.S.A.; on Solomon R.; tr. ctr. for agr. region; p. (1950) *4,085*.
Belomorsk, *spt.*, R.S.F.S.R. on White Sea; exp. lumber. [*107,000*.
Belovo *t.*, W. Siberia, R.S.F.S.R.; p. (1959)
Belper, *urb. dist.*, Derby, Eng.; hosiery, textiles, paint, oil wks., iron foundries; p. (1951) *15,716*.
Belt, Great, *strait*, Denmark; separates Fyn I. from Zealand I.; deep-water channel too winding for easy navigation; crossed by train ferry at its narrowest point (16 m.) between Nyborg and Korsor; approx. length 37 m.
Belt, Little, *strait*, Denmark; separates Fyn I. from Jutland; too shallow for large ships; bridged by road-railway bridge nr. Fredericia; approx. length 30 m.
Belterra, *dist.*, Para st., N.E. Brazil; on R. Tapajoz, 30 m. S. of confluence with R. Amazon at Santarem; experimental Ford rubber plantations; a. 950 sq. m.; p. (with Fordlandia) *12,000*.
Beltsy, *t.*, Moldavian S.S.R.; on trib. of Dniester R.; p. (1959) *67,000*.
Belturbet, *t.*, *urb. dist.*, Cavan, Ireland; on R. Erne; distilling; p. (1951) *1,152*.
Belvidere, *t.*, N.J., U.S.A.; p. *2,060*.
Bembridge, *vil.*, I. of Wight, Eng.; resort, yachting; p. *1,975* (par.).
Bemidji, *t.*, Minn., U.S.A.; lumber, cement, bricks, woollen goods; resort; p. (1950) *10,001*.
Ben Alder, *mtn.*, Grampian Range, Scot.; nr. Loch Erich; alt. 3,757 ft.
Ben Arthur, *mtn.*, Argyll, Scot.; alt. 2,891 ft.
Ben Attow, *mtn.*, Ross and Inverness, Scot.; alt. 3,383 ft.
Ben Avon, *mtn.*, Aberdeen, Scot.; alt. 3,834 ft.
Ben Cruachan, *mtn.*, Argyll, Scot.; alt. 3,689 ft.
Ben Doran or **Doireann**, *mtn.*, Argyll, Scot.; alt. 3,523 ft.
Ben Hope, *mtn.*, Sutherland, Scot.; alt. 3,040 ft.
Ben Lawers, *mtn.*, Perth, Scot.; by Loch Tay; alt. 3,984 ft. [alt. 2,875 ft.
Ben Ledi, *mtn.*, Perth, Scot.; N.W. of Callander;
Ben Lomond, *mtn.*, Stirling, Scot.; E. side of L. Lomond; alt. 3,192 ft.
Ben Lomond, *mtn.*, New England range, N.S.W., Australia; alt. 5,000 ft.
Ben Lomond, *mtn.*, Tasmania, Australia; alt. 5,010 ft.
Ben Macdhui, *mtn.*, S.W. Aberdeen, Scot.; Cairngorm gr; second highest peak in Brit. Is.; alt. 4,296 ft.
Ben More, *mtn.*, S.W. Perth, Scot.; 10 m. W. of Loch Earn; alt. 3,843 ft.; also mtns. in Sutherland, the Hebrides and the I. of Mull.
Ben Nevis, *mtn.*, Inverness, Scot.; at Lochiel; highest peak in Brit. Isles, alt. 4,406 ft.
Ben Nevis, *mtn.*, Otago, New Zealand; alt. 9,125 ft.
Ben Nevis, *mtn.*, Cornwall, Tasmania, Australia; alt. 3,910 ft.
Ben Venue, *mtn.*, nr. Loch Katrine, Perth, Scot.; alt. 2,393 ft.
Ben Vorlich, *mtn.*, Perth, Scot.; alt. 3,224 ft.
Ben Wyvis, *mtn.*, Ross, Scot.; nr. Dingwall; alt. 3,429 ft.
Benalla, *t.*, *dist.*, Victoria, Australia; pastoral and agr.; p. (1958) *7,100*.
Benares, *see* Varnasi.

Benbecula I., Outer Hebrides, Inverness, Scot.; a. 36 sq. m.
Benbecula Sound, passage between the I. and S. Uist.
Bend, *t.*, Oregon, U.S.A.; p. (1950) *11,409*.
Bendery, *t.*, Moldavian S.S.R.; textiles, p. (1941) *15,075*.
Bendigo, *c.*, Victoria, Australia; gold-mining dist., rich farming and wine-producing terr.; p. (1958) *39,370*.
Benevento, *prov.*, Italy; a. 819 sq. m., containing many Roman remains; p. (1951) *331,647*.
Benevento, *c.*, Italy; cath.; leather; p. (1951) *47,220*.
Benfleet, *urb. dist.*, Essex, Eng.; p. (1951) *19,881*.
Bengal, *former prov.*, split into W. Bengal (India) (a. 34,590 sq. m.) and E. Bengal (Pakistan) (a. 54,501 sq. m.); Calcutta is the chief city, cap. of W.; Dacca is cap. of E. alluvial plain; ch. rivers: Ganges, Brahmaputra; ch. inds.: agr., rice, jute, sugar-cane, oil seeds; minerals: coal, iron; mnfs.: cottons, silks, gunny bags; p. (W. Bengal, 1956) *26,500,000*; (E. Bengal, 1951) *42,119,000*.
Bengal, Bay of, part of Indian Ocean washing E. shores of India and W. shores of the Indo-Chinese Peninsula; receives waters of Rs. Krishna, Ganges, Brahmaputra, Irrawaddy.
Benghazi, *spt.*, Libya, N. Africa; on the G. of Sidra; joint cap. with Tripoli; starting-point for caravans to Egypt and the interior; cereals; p. (estd. 1951) *62,300*.
Bengore Head, *C.*, Antrim, N. coast Ireland; E. of Giant's Causeway.
Benguela, *cap. c.*, Angola, S.W. Africa; exp. rubber; rly. runs inland to Katanga prov., Belgian Congo and N. Rhodesia; p. *17,696*.
Benha, *t.*, Egypt; impt. mkt. t., rail and road ctr. in heart of cultivated a. of Nile delta.
Benholm, *par.*, Kincardine, Scot.; ancient cas.; p. (1951) *1,028*.
Beni, *dep.*, N.E. Bolivia, S. America; cap. Trinidad; a. 93,354 sq. m.; p. (1950) *119,770*.
Benicarlo, *spt.*, Valencia, Spain; on Mediterranean cst. 80 m. N.E. of Valencia; wines; p. *9,598*.
Benin, W. Africa; between Niger delta and Dahomey; traversed by Benin R.; former African kingdom and slaving ctr., now dist. incorporated in Nigeria; palm prod. and foodstuffs; famous African bronze ctr.; ch. t. Benin.
Benin, *t.*, Nigeria; W. Africa; palm oil, mahogany; p. (1953) *54,000*.
Benin, Bight of, part of G. of Guinea, W. Africa.
Beni Suef, *t.*, Egypt; on Nile, 60 m. S. of Cairo; carpets, cotton; p. (1947) *57,464*.
Benkulen, *spt.*, Sumatra, Indonesia; p. *13,418*.
Benmore, *C.*, Antrim, N.E. point of N. Ireland; alt. 636 ft.
Bennettsville, *t.*, S.C., U.S.A.; yarn, tyre linings, lumber; p. (1950) *5,140*.
Bennington, *t.*, Vt., U.S.A.; p. (1950) *8,002*.
Benoni, *t.*, Transvaal, S. Africa; p. (1946) *76,925* (inc. *24,366* Europeans).
Benrath, *t.*, Germany; on Rhine R.; R. pt. and industl. t.; chemicals, machin.; p. *25,929*.
Bensberg, *t.*, N. Rhine-Westphalia, Germany; 10 m. from Cologne; iron-mining, foundries; p. (estd. 1954) *23,100*.
Bensheim, *t.*, Hessen, Germany; ctr. of fruit and wine dist.; textiles, paper, metallurgy; p. (estd. 1954) *22,300*.
Bentang (Bintang) *t.*, Borneo, Indonesia.
Bentley with Arksey, *urb. dist.*, W.R. Yorks, Eng.; p. (1951) *19,826*.
Benton, *t.*, Ark., U.S.A.; p. (1950) *6,277*.
Benton, *t.*, Ill., U.S.A.; p. (1950) *7,848*.
Benton Harbor, *t.*, Mich., U.S.A.; midway along E. cst. L. Michigan; p. (1950) *18,769*.
Benue, *R.*, W. Africa; chief trib. of Niger.
Benwell, *t.*, Northumberland, Eng.; sub. of Newcastle.
Ben-y-Gloe, *mtn.*, Glen Tilt, Perth, Scot.; alt. 3,671 ft.
Beograd, *see* **Belgrade**.
Berar, *see* **Madhya Pradesh**.
Berati, *prefecture*, Albania; p. (estd.) *169,431*.
Berati, *c.*, Albania; p. (1945) *11,872*.
Berbera, *spt.*, *cap.*, Brit. Somaliland Protectorate, N.E. Africa; on G. of Aden; exp. gum, raisins, skins; p. in hot season about *15,000*, in cold season about *30,000*.
Berbice, *co.*, Brit. Guiana, S. America; bauxite; p. (1946) *96,623*.
Berchem, *commune*, Belgium; sub. of Antwerp; metals; p. (estd. 1957) *47,310*.
Berdichev, *see* **Ossipevsk**.
Berck-sur-Mer, *wat. pl.*, France, on Eng. Channel; p. (1954) *14,285*.
Berdyansk, *see* **Osipenko**.
Berea, *t.*, N. Ohio, U.S.A.; sandstone quarries, building blocks; p. (1950) *12,051*.
Bere Regis, *mkt. t.*, Dorset, Eng.
Berezina, *R.*, U.S.S.R.; trib. Dnieper; French disaster on the retreat from Moscow; length 350 m.
Berezniki, *t.*, R.S.F.S.R., salt, chemicals, paper; p. (1959) *106,000*.
Berezov, *t.*, U.S.S.R.; gold.
Berga, *t.*, Spain; medieval cas.
Bergama, *t.*, Turkey; ancient Pergamos, ruins; p. *16,351*.
Bergamo, *c.*, Lombardy, Italy; 34 m. N.E. Milan; fine cath. and academy; silk industry; p. (1951) *103,164*.
Bergedorf, *t.*, Germany; sub. of Hamburg; on R. Elbe; glass, leather; p. *19,962*.
Bergen, *spt.*, W. coast Norway; most impt. comm. pt. in kingdom; shipping, fishing; p. (1950) *112,845*.
Bergenfield, *t.*, N. J., U.S.A.; clothing, light mnfs., pianos; p. (1950) *17,647*.
Bergen-op-Zoom, *t.*, Netherlands; sugar-beet; p. (1951) *30,326*.
Bergerac, *t.*, Dordogne, France; on R. Dordogne; grain, wine; ancient Huguenot stronghold; p. (1954) *23,622*.
Bergisch-Gladbach, *t.*, N. Rhine-Westphalia, Germany; E. of Cologne; paper, metallurgy, textiles; p. (estd. 1954) *33,100*.
Berhampur, *t.*, Orissa st., India.
Bering I., most W. of the Aleutian Is., N. America.
Bering Sea, part of N. Pac. Oc. between Aleutian Is. and Bering Strait, upwards of 1,600 sq. m.; fishing.
Bering Strait, *narrow sea* which separates Asia from N. America; 36 m. wide at narrowest part.
Bering Current (Okhotsk Current, or Oyashio), *ocean current*, N. Pac. Oc.; flows through Bering Strait from Arctic, along E. cst. of Kamchatka and Japanese Is. Hokkaido, Honshu; relatively cold; moderate summer temperatures along cst. causes fogs.
Berislav, *t.*, Ukrainian S.S.R.; p. *10,000*.
Berja, *t.*, Almeria, Spain; wine and fruit; p. *12,476*.
Berkeley, *t.*, Gloucester, Eng.; nr. R. Severn, 2 m. S. of Sharpness; civil nuclear power-sta., due 1960–61; p. *670*.
Berkeley, *c.*, Cal., U.S.A.; univ.; p. (1950) *113,805*.
Berkeley Canal, Gloucester, Eng.; connects Sharpness on S. side Severn estuary with Gloucester; navigable only for small coasting vessels; opened 1827; length 15 m., depth 11 ft.
Berkhampstead (Berkhamsted), *urb. dist.*, Herts, Eng.; chemicals, wooden ware; p. (1951) *10,777*.
Berkley, *t.*, Mich., U.S.A.; sub. of Detroit; p. (1950) *17,931*.
Berkshire, *co.*, Eng.; downland including Inkpen Beacon, White Horse Hills, drained by Thames and tribs., Kennet, Cole, Pang; wooded; agr.; oats, dairying; biscuits; co. t. Reading; a. 725 sq. m.; p. (1951) *402,939*.
Berlin, *c.*, former cap. of Germany; on R. Spree; fourth c. on continent of Europe for population; at present under military control of U.S.A., Great Britain, France and U.S.S.R.; total a. 890 sq. km.; inds. include, elec. goods, optical and chemical prod., furniture, paper, foodstuffs, textiles, machin., publishing and printing; gr. route ctr. (each occupying force has 1 airfield); p. (1953) *3,481,001* (of these more than 2 millions live in West Berlin).
Berlin, *t.*, New Hampshire, U.S.A.; p. (1950) *16,615*.
Berlin, *t.*, Wisconsin, U.S.A.; p. (1950) *4,693*.
Bermejo, *t.*, Tarija dep., Bolivia; oil.
Bermejo R., *trib.* R. Parana, Argentina.
Bermeo, *spt.*, Spain; nr. Bilbao, Bay of Biscay; p. *11,739*.
Bermondsey, *met. bor.*, London, Eng.; chiefly occupied by tanneries, wharves, wool stores, warehouses; p. (1951) *60,661*.
Bermuda, Brit. group coral islands (360 in number) N. Atlantic; about 600 miles E. of S. Carolina, U.S.A.; total area 21 sq. m.; Hamil-

ton, on Long Island, is the ch. t.; British and U.S. air and naval stations; favourite winter resort for Americans; potatoes, onions, lily bulbs; bananas; p. (of gr.) (estd. 1957) *42,780*.
Bermudez, asphalt lake, Venezuela, S. America; a. 2 sq. m.
Bernard, Great St., one of the Alps in the S. of the Valais, Switzerland; highest point 11,116 ft.; height of mtn. pass between Italy and Switzerland, 8,108 ft.; famous hospice for travellers in monastery on mtn.
Bernard, Little St., one of Graian Alps, Savoy, S. of Mt. Blanc, France; pass traversed by Hannibal 218 B.C.
Bernay, *t.*, Eure, France; horse fair; dairying, clothing mftg., soap; p. (1954) *8,798*.
Bernburg, *t.*, Saxony-Anhalt, Germany; cas.; chemicals, machin.; p. (estd. 1954) *54,000*
Berne, *c.*, *cap.* can. Berne and *fed. cap.* Switzerland; on Aar R.; cath., univ.; textiles; p. (1950) *146,499*.
Berne, *can.*, Switzerland; fertile valleys, dairying; watches; tourist district; a. 2,657 sq. m.; p. (1950) *801,943*.
Bernese Oberland, Switzerland; Alpine region; ch. peaks: Finsteraarhorn, Jungfrau; resorts: Interlaken, Grindelwald; summer and winter ctrs.
Bernina, *pass* and *mtn.*, Switzerland; alt. 13,300 ft.
Beroun, *t.*, Bohemia, Czechoslovakia; textiles, sugar ref., cement, coal, iron, limestone; p. *12,345*.
Berry, *t.*, N.S.W., Australia; dairying.
Bertinoro, *t.*, Forli, Italy; famous wines.
Berwick, *maritime co.*, S.E. of Scot.; co. t. Duns; hilly; agr.; sheep, cattle; woollens, fishing, paper; a. 457 sq. m.; p. (1951) *25,060*.
Berwick-on-Tweed, *spt.*, *mun. bor.*, Northumberland, Eng.; fishing, light engin., tweeds, knitwear; p. (including Tweedmouth and Spittall) (1951) *12,550*.
Berwyn, *t.*, Ill., U.S.A.; p. (1950) *51,280*.
Berwyn Mtns., range mid-Wales; alt. of highest peak 2,716 ft.
Besançon, *t.*, Doubs, France; observatory; univ.; farm implements, textiles; watch- and clock-making; p. (1954) *73,445*.
Besikias, now **Besiktas**, *dist. and sub.*, Istanbul, Turkey; p. (1950) *63,611*.
Beskids, W. and E., *mtn. range*, Poland, Czechoslovakia, E. Europe; northern range of Carpathian mtn. system, seldom exceeds alt. 4,000 ft., many passes; forested; length 200 m.
Bessarabia, *terr.*, ceded to U.S.S.R. by Romania, 1940, and now part of Moldavian S.S.R.; agr. region.
Bessbrooke, *t.*, Armagh, N. Ireland; on Newry Canal; p. (1951) *2,886*.
Bessèges, *t.*, Gard, France; coal-mining, steel, silk; p. (1954) *5,823*.
Bessemer, *t.*, Ala., U.S.A.; iron and steel; p. (1950) *28,445*.
Bessemer, *t.*, Mich., U.S.A.; iron; p. (1950) *3,509*.
Besshi, *see* **Niihama**.
Besuki, *mountainous prov.*, E. Java, Indonesia.
Betanzos, *t.*, Spain; p. *10,504*.
Bethany, *vil.* on Mt. of Olives 2 m. Jerusalem, now Eizariya.
Bethany, *missionary sta.*, S.W. Africa; p. *544*.
Bethel, *anc. c.*, the modern Beitin, Jordan; 10 m. N. Jerusalem.
Bethel, *t.*, C. of Good Hope, S. Africa.
Bethelsdorp, *t.*, C. of Good Hope, S. Africa.
Bethesda, *urb. dist.*, Caernarvon, Wales; slate, light engin.; p. (1951) *4,436*.
Bethlehem, *t.*, Jordan; 5½ m. S.W. Jerusalem; birthplace of Christ; p. (estd. 1946) *9,140*.
Bethlehem, *t.*, Penns., U.S.A.; 50 m. N. of Philadelphia; iron-wks.; p. (1950) *66,340*.
Bethnal Green, *metropolitan bor.*, London, Eng.; p. (1951) *58,374*.
Bethphage, former vil. on Mt. of Olives, above Bethany, Israel, S.W. Asia.
Bethsaida, ancient vil. on W. side of Sea of Galilee, Israel, S.W. Asia.
Bethshemesh, *t.*, Israel, S.W. Asia; 24 m. W. of Jerusalem; archaeological site.
Béthune, *t.*, Pas de Calais, France; oil, salt, coal; p. (1954) *22,376*.
Bettendorf, *t.*, Iowa, U.S.A.; steel, oil burners; p. (1950) *5,132*.
Betteshanger, *mining vil.*, Kent, Eng.; on N. flank of N. Downs, 4 m. W. of Deal; on Kent Coalfield, coal despatched by overhead cable to Dover.
Bettws-y-Coed, *urb. dist.*, Caernarvon, Wales; tourist and artists' resort; p. (1951) *776*.
Betul, *t.*, Madhya Pradesh, India; p. *10,000*.
Betwa, *R.*, of Bhopal, India, trib. of Jumna R.; length 360 m.
Beuel, *t.*, N. Rhine-Westphalia, Germany; on R. Rhine opposite Bonn; chemicals, furniture; p. (estd. 1954) *25,500*.
Beuthen, *see* **Bytom**.
Beuzeval, *t.*, Calvados, France; on Eng. Channel; seaside resort.
Beveland, *I.*, S. Netherlands; between the old Maas and Hollands Diep.
Beverley, *mkt. t.*, *mun. bor.*, E.R. Yorks, Eng.; fine minster; p. (1951) *15,499*.
Beverly, *t.*, Mass., U.S.A.; boots, shoes, machin.; p. (1950) *28,884*.
Beverly Hills, *t.*, California, U.S.A.; p. (1950) *29,032*.
Beverwyk, *t.*, nr. Haarlem, N. Holland, Netherlands; p. (1951) *28,328*.
Bewdley, *mun. bor.*, Worcester, Eng.; p. (1951) *4,914*.
Bexhill, *mun. bor.*, Sussex, Eng.; resort; p. (1951) *25,668*.
Bexley, *mun. bor.*, W. Kent, Eng.; 15 m. S.E. London; plastics; p. (1951) *88,767*.
Bexley, *t.*, Ohio, U.S.A.; p. (1950) *12,378*.
Beykoz, *t.*, Turkey; on Bosporus Strait; p. (1945) *25,611*.
Beyoglu, *div.* of Istanbul, Turkey; residtl. quarter of Europeans; p. (1945) *234,750*.
Beypazari, *t.*, Turkey; 65 m. W. of Ankara; rice, fruit, cotton; p. *21,000*.
Beysehir, *L.*, Turkey; 25 m. long; alt. 7,068 ft.
Bezhitsa, *t.*, R.S.F.S.R.; on Desna R.; elec. power engin., steel, chemicals; p. (1954) *95,000*.
Beziers, *t.*, Herault, France; wines, brandy, chemicals; p. (1954) *64,929*.
Bezons, *sub.* of Paris, France; on Seine R.; light mnfs; p. (1954) *16,993*.
Bezwade, *t.*, Madras, India; rice; irrigation headquarters on Kistna R.; p. *86,214*.
Bhadravati, *t.*, Mysore, India; steel; p. (estd. 1956) *80,000*.
Bhagalpur, *t.*, Patna, Bihar, India; rice, maize; p. (1951) *114,530*.
Bhamo, *t.*, Upper Burma; on R. Irrawaddy; ancient cap. of Shan State of Manmaw; teak; p. *8,611*.
Bhandara, *dist.*, Madhya Pradesh, India, a. 3,623 sq. m.; rice, oilseeds, wheat, bamboo, tobacco; p. *718,000*.
Bhandara, *cap.* of Bhandara dist., India; 30 m. E. of Nagpur; cotton cloth, brass mftg.; p. *14,000*.
Bharatpur, *t.*, India; cloth; p. *25,000*.
Bhavnagar, *dist.*, India; a. 3,740 sq. m.; p. *713,240*.
Bhavnagar, *t.*, *spt.*, India; cotton; p. (1951) *137,951*.
Bhilai, Madhya Pradesh, India; steel plant; rails and rly. sleepers.
Bhim-Gora, sacred pool, place of Hindu pilgrimage, Uttar Pradesh, India.
Bhir, *dist.*, Hyderabad, India; a. 4,460 sq. m.; wheat, cotton, linseed, sugar; p. *400,000*, cap. Bhir, 190 m. E. of Bombay
Bhiwani, *t.*, India; cottons; p. *10,000*.
Bhopal, *c.*, Madhya Pradesh, India; p (1951) *102,333*.
Bhor, *st.*, India; rice; chief t. Bhor; a. 910 sq. m.; p. *155,961*.
Bhuj, *ch. t.*, Kutch, Gujarat, Bombay, India; p. *26,331*.
Bhutan, *independent st.*, E. Himalayas; under Brit. protection since 1864, and now in negotiation with Indian Union; cap. Punakha; ch. prod.: Indian corn, millet, lac, rice, cloth; valuable forests; a. (approx.) 18,000 sq. m.; p. comparatively scanty, scattered and nomadic, (about) *700,000*.
Bhuvaneshwar, *cap.*, Orissa, India; 18 m. from Cuttack.
Biafra, Bight of, W. Africa.
Biala-Krakowska, *commune*, Krakow dep., Poland; agr., tr. ctr., cattle, textiles; p. *30,337*.
Bialogard, *c.*, N.W. Poland; formerly in Germany; industl. and transport ctr.; p. (1946) *12,211*.
Bialystok, *prov.*, E. Poland; cap. Bialystok; a. 9,021 sq. m.; p. (estd. 1950) *961,052*.
Bialystok, *t.*, Poland; *cap.* of Bialystok prov.;

nr. Grodno; engin., textiles, chemicals, saw-milling; p. (1957) *110,000*.
Biancavilla, *t.*, Sicily, Italy; oranges.
Biarritz, *t.*, Basses-Pyrénées, France; on Bay of Biscay; seaside resort; p. (1954) *22,922*.
Biba-El-Kubra, *t.*, Egypt, N.E. Africa; on Nile; p. *1,000*.
Biberach, *t.*, Baden-Württemberg, Germany; on R. Riss; spa; wood, metal and engin. inds.; p. (estd. 1954) *15,300*.
Bibi Eibat, *locality*, Azerbaijan, U.S.S.R.; very rich oilfields.
Bicester, *urb. dist.*, Oxford, Eng.; rly. junction; lace; p. (1951) *4,171*.
Bida, *t.*, N. Nigeria, W. Africa; p. *10,000*.
Bidassoa, *R.*, on Spanish-French frontier.
Biddeford, *c.*, Maine, U.S.A.; cotton mnf.; resort; p. (1950) *20,836*.
Biddulph, *urb. dist.*, Stafford, Eng.; nr. Leek; coal mng., machin., textiles, furniture; p. (1951) *10,898*.
Bideford, *mun. bor.*, N. Devon, Eng.; on R. Torridge; ropes, sails, boat bldg.; p. (1951) *10,100*.
Biebrich, *t.*, Germany; on Rhine; dyes; p. *19,504*.
Biel (Bienne), *t.*, Berne, Switzerland; watches; p. (1950) *48,342*.
Bielawa, *t.*, Wroclaw prov., S.W. Poland; textiles; p. (1946) *17,269*.
Bielaya-Tserkov, *t.*, Ukraine, U.S.S.R.; on trib. of Dnieper R.; fairs, tr. in cattle, beer, grain; p. *54,000*.
Bielefeld, *t.*, Rhine-Westphalia, Germany; ch. ctr. of linen industry; machin., foodstuffs; p. (estd. 1954) *168,100*.
Biella, *t.*, Novara, Italy; textiles; p. *28,210*.
Bielsko, *t.*, Katowice prov., Poland; woollens, linen, metal, chem.; p. *25,725*.
Bien-hoa, *t.*, nr. Saigon, S. Viet-Nam; p. *5,000*.
Bienne, *L.*, N.E. Neuchâtel, Switzerland.
Bierley, *par.*, W. Riding, Yorks, Eng.; coal, iron; p. *16,000*.
Bies-Bosch, reclaimed fenland area between N. Brabant and S.W. Netherlands; sugar refining, dairying; a. 55 sq. m.; p. (1947) *1,517*.
Big Black, *R.*, trib. of Mississippi, U.S.A.
Big Bone Lick, *locality*, N. Ky., U.S.A.; E. of Ohio R.; deposit of fossil mammoth.
Biggar, *burgh*, Lanark, Scot.; in S. Uplands, 10 m. S.E. of Lanark; p. (1951) *1,437*.
Biggarsberg, *mtns.*, Natal, S. Africa; branch of the Drakensberg, highest point, Indumeni, 7,200 ft.
Biggleswade, *urb. dist.*, Beds, Eng.; in valley of R. Ouse, 9 m. S.E. of Bedford; ctr. of fruit-growing and mkt. gardening dist.; hydraulic machin. tools, hosiery; p. (1951) *7,280*.
Big Horn Mtns, Wyo. and Mont., U.S.A.; Rockies; highest alt., 12,000 ft.
Big Horn, *R.*, Wyo., U.S.A.; trib. of Yellowstone R.
Bihač, *t.*, Jugoslavia; on R. Una; p. *8,330*.
Bihar, *state*, Indian Union; a. 67,164 sq. m.; cap. Patna (*q.v.*); ch. R., Ganges; agr.: rice, wheat, maize, sugar-cane, tobacco, oil-seeds; minerals: coal, iron, mica; ind.: iron and steel, oil refining at Barauni; p. (estd. 1957) *38,783,778*.
Bihé, *dist.*, Angola (Port. W. Africa).
Bihor Mtns., Romania.
Biisk, *c.*, Siberia, U.S.S.R.; p. (1939) *80,190*.
Bijapur, *t.*, Bombay, India; cotton; ruins; p. (1951) *65,734*.
Bijawar, *former st.*, central India; a. 973 sq. m.; lumber, barley, iron ore; p. *112,000*.
Bijawar, *t.*, India; p. *6,000*.
Bijeljina, *t.*, Jugoslavia; p. *13,830*.
Bijnore, *t.*, Uttar Pradesh, India; p. *27,900*.
Bikaner, *t.*, Rajasthan, India; p. (1951) *117,113*.
Bikini, *atoll*, Pacific Ocean; scene of atomic-bomb tests.
Bilaspur, *t.*, India; silks, cottons; p. (1951) *126,099*.
Bilbao, *spt.*, N. Spain; cap. Basque prov. of Viscaya; formerly famous for rapier making; iron ore, smelting; p. (1951) *222,091*.
Bilecik, *t.*, Turkey; p. (1950) *4,886*.
Bilina, *c.*, Bohemia, Czechoslovakia; wat. pl., mineral springs; p. (1947) *7,915*.
Billabong, *R.*, N.S.W., Australia.
Billericay, *mun. bor.*, Essex, Eng.; p. (1951) *43,352*.
Billinge and Winstanley, *urb. dist.*, Lancs, Eng.; coal bricks; p. (1951) *6,157*.
Billingham, *t.*, *urb. dist.*, Durham, Eng.; on N. of Tees estuary; chemicals, shipbldg. and repairing, iron and steel, plastics, fertilisers; p. (1951) *23,944*.
Billings, *t.*, Montana, U.S.A.; cattle-raising, wool; p. (1950) *31,834*.
Billingsgate, London, Eng.; old river-gate and wharf, now chief fish mkt. of England.
Billiton (Belitung) I., Indonesia; tin.
Bilma, *oasis*, Fr. W. Africa; p. *1,000*.
Biloxi, *t.*, Missouri, U.S.A.; fishing.
Bilsen, *t.*, Belgium; mkt. ctr. for fruit growing area; p. (estd. 1948) *5,155*.
Bilston, *mun. bor.*, Stafford, Eng.; coal mng., iron, steel, non-ferrous castings; p. (1951) *33,464*.
Bima, *t.*, Sumbawa, Indonesia.
Bimlipatam, *t.*, Madras, India.
Binab, *t.*, Azerbaijan, Persia; nr. L. Urmia.
Binalbagan, *mun.*, Philippine Is.; sugar; p. (1948) *19,748*.
Binalonam, *t.*, Luzon, Philippine Is.; road ctr.; p. (1948) *23,260*.
Binan, *t.*, Luzon, Philippines; rice; p. (1948) *20,794*.
Binangonan, *t.*, Luzon, Philippine Is.; cement; p. (1948) *20,422*.
Binche, *t.*, Belgium; lace, clothing; p. (estd. 1948) *10,716*.
Binderbango, *t.*, Queensland, Australia.
Bingara, *t.*, N.S.W., Australia; wool, wheat, cattle.
Bingen, *t.*, Rhineland Palatinate, Germany; on Rhine R.; at S. entrance to Rhine gorge; wine; beautiful scenery; p. (estd. 1954) *17,300*.
Bingerville, *spt.*, Ivory Coast, Fr. W. Africa.
Bingham, *rural dist.*; Notts., agr.; p. estd. *18,148*.
Bingham Canyon, *t.*, N. Utah, U.S.A.; copper, silver, gold, lead; p. (1950) *2,569*.
Binghamton, N.Y., U.S.A.; on Susquehanna R.; boot factories; p. (1950) *80,674*.
Bingley, *urb. dist.*, *mkt. t.*, W.R. Yorks, Eng.; on R. Aire, 16 m. N.W. of Leeds; textiles, engin., agr.; p. (1951) *21,566*.
Bingol-dag, *mtns.*, Turkey; S. of Erzurum; highest peak 12,310 ft.
Bintang I., largest island of the Riouw Archipelago, Indonesia; bauxite.
Bio-Bio, *R.*, Chile; rises in Andes, flows N.W. to Pac. Oc. at Talcahuano; length 300 m.
Bio-Bio, *prov.*, Chile; cap. Los Angeles; a. 4,342 sq. m.; p. (1957) *165,975*.
Birbhum, *dist.*, India; cap. Suri; healthy climate; rice, sugar; mnfs. silk, cotton; a. 1,752 sq. m.; p. *847,000*.
Birchington, *t.*, Kent, Eng.
Birdsboro, *bor.*, Penns., U.S.A.; on Schuylkill R.; coal, steel; p. (1950) *3,158*.
Birdum, *t.*, N. Terr., Australia; on rly., 300 m. S. of Darwin; cattle.
Birjand, *t.*, Persia; p. *25,000*.
Birkenfeld, *t.*, Germany; p. (1946) *3,802*.
Birkenhead, *co. bor.*, Cheshire, Eng.; on R. Mersey, opp. Liverpool; docks, shipbldg., engin., clothing, metal, wood, glass; p. (1951) *142,392*.
Birket El Carun, "Lake of the Horns," Fayum, Egypt, N.E. Africa.
Birmingham, *co. bor.*, Warwick, Eng.; industl. cap. Midlands, second lgst. c. Gt. Britain; famous for its metal mnfs.; motors and cycles, plastics; univ., cath., town hall; p. (1951) *1,112,340*.
Birmingham, *t.*, *cap.*, Ala., U.S.A.; coal, iron, cotton; p. (1950) *326,037*.
Birmingham, *t.*, Mich., U.S.A.; p. (1950) *15,467*.
Birnam, *vil.*, Perth, Scot.; location of Birnam Wood—Macbeth; former royal forest.
Birni, *t.*, Dahomey, Fr. W. Africa; p. *1,000*.
Birobidzhan, *t.*, U.S.S.R.; p. *33,000*.
Birr, *mkt. t.*, *urb. dist.*, Offaly, Ireland; on Little Brosna R.; farming; observatory; p (1951) *3,285*.
Bir Tlacsin, Libya, Africa; 120 m. S.W. Tripoli; oilfields.
Bisbee, *t.*, Arizona, U.S.A.; very rich copper deposits, gold, silver, lead; p. (1950) *3,801*.
Biscay, *see* **Vizcaya**.
Biscay, Bay of, stormy area of the Atlantic, W. of France and N. of Spain, extending from Ushant to Cape Ortegal; the Roman Sinus Aquitanicus; heavy seas.
Bisceglie, *t.*, *spt.*; Apulia, Italy; on E. cst. 22 m. N.W. of Bari; fishing; p. *31,477*.
Bischheim, *t.*, Bas-Rhin, France; N.W. sub.

of Strasbourg, furniture, porcelain; p. (1954) *11,430.*
Bischoff, Mt., *t.*, Tasmania, Australia; tin.
Bischofswerda, *t.*, Saxony, Germany; quarrying, glass and iron inds.; rly. ctr.; p. (estd. 1954) *11,000.*
Bishop, *t.*, Cal., U.S.A.; cattle, tungsten; p. (1950) *2,891.*
Bishop Auckland, *urb. dist.*, Durham, Eng.; contains palace of Bishop of Durham; coal, iron, light engin; p. (1951) *36,350.*
Bishop Rock, *isolated rock, lighthouse*, Scilly Is., 36 m. S.W. of Land's End, Cornwall; recognised internationally as E. end of trans-Atlantic ocean crossing.
Bishop's Castle, *mun. bor.*, Salop. Eng.; p. (1951) *1,291.*
Bishop's Stortford, *mkt. t., urb. dist.*, Herts., Eng.; on Stort R.; grain; p. (1951) *12,772.*
Bishop's Waltham, *par.*, Hants, Eng.; bricks.
Bishop Wearmouth, *t.*, pt. of Sunderland, Co. Durham.
Biskra, *t.*, Algeria, N. Africa; olives, dates; winter resort; p. *36,347.*
Bisley, *t.*, Gloucester, Eng.; nr. Stroud; source of R. Thames.
Bismarck, *cap. c.*, N. Dakota, U.S.A.; on Missouri R.; p. (1950) *18,640.*
Bismarck Arch., 3 large and several small islands off New Guinea, formerly German, now Australian Trust Terr.; total native p. (1941) *142,332.*
Bissagos Is., off W. Africa, Port Guinea; ch. t. Bolama.
Bissao, *t., spt.*, Port Guinea; p. *5,000.*
Bistrita, *t.*, Romania; p. (1945) *15,801.*
Bitburg, *t.*, Rhineland Palatinate, Germany; p. (1946) *3,864.*
Bitetto, *t., sm. spt.*, Apulia, Italy; on E. cst. 5. m. N.W. of Bari; fishing; p. *5,991.*
Bitlis, *I.*, Turkey; p. (1945) *74,449.*
Bitlis, *t.*, Turkey; minerals, Armenian massacre; p. (1950) *11,152.*
Bitolj (Monastir), *t.*, Macedonia, Jugoslavia; many mosques, military H.Q., great tr. in corn, grain, flour, hides and woollen stuffs; tanning, carpets; p. (1953) *37,564.*
Bitonto, *t.*, Apulia, on E. cst. 7 m. N.W. of Bari; Italy; olive oil, wine; fine cath.; p. *29,731.*
Bitterfeld, *t.*, Saxony-Anhalt, Germany; lignite mining; engin., chemicals; p. (estd. 1954) *25,000.*
Bitterfontein, *t.*, C. of Good Hope, S. Africa.
Bitter Lakes, Isthmus of Suez, Egypt; utilised by Suez Canal.
Bitterroot, *mtns.*, U.S.A.; range of the Rockies, highest point Ajax Mtn., 10,900 ft.; rly. tunnel 2 m. long.
Bitton, *t.*, Gloucester, Eng.; mining.
Biwa, *L.*, Japan; a. 180 sq. m.; 330 ft. above sea-level; 300 ft. deep; connected by canal with Osaka.
Biyala, *t.*, Gharbiya prov.; Lower Egypt; N.E. Africa; rice, millet, cotton; p. (1947) *17,731.*
Biysk, *t.*, W. Siberia, R.S.F.S.R.; p. (1959) *146,000.*
Bizerta, *spt.*, Tunisia, N. Africa; the ancient Hippo Zaritus; fishing; p. (1946) *39,327*, mainly Arabs.
Bizot, *commune*, N.E. Algeria; p. *10,845.*
Bjelovar, *t.*, Jugoslavia; p. *13,147.*
Björnborg, *see* **Pori.**
Blaauw B. Mtns., Transvaal, S. Africa.
Blaavands Huk, Denmark; nr. Esbjerg.
Black Belt, *area* on coastlands of Miss. and Ala., U.S.A.; black soil prairie land, good for cotton.
Black Bluff, *mtn.*, N. Tasmania, Australia.
Blackburn, *co. bor.*, Lancs, Eng.; textiles, engin., light inds.; p. (1951) *111,217.*
Black Country, Eng., Midlands; formerly impt. iron-working and coal-mining district round the Birmingham area.
Blackdown Hills, Devon, Eng.
Black Forest, *mtns.*, Germany; resort, forests, a. 1,844 sq. m.; highest peak Feldberg, alt. 4,696 ft.
Black Gang Chine, picturesque ravine on S. Coast, Isle of Wight, Eng.
Black Hawk, *mining t.*, Rocky Mtns., Colorado, U.S.A.
Black Head, *C.*, Galway Bay, Clare, Ireland.
Blackhead, *C.*, on N. entrance to Belfast Lough, N. Ireland; lighthouse.
Blackheath, *open common*, S.E. London, Eng.; a. 267 acres.
Black Hills, *mtns.*, between S.D. and Wyo., U.S.A.; highest, Horney Peak, alt. 7,240 ft.
Black Isle, *peninsula*, between Cromarty and Beauly Firths, Ross and Cromarty, Scot.; agr., fisheries, quarrying; a. 240 sq. m.
Black Lake, *t.*, S. Quebec, Canada; asbestos mines; p. *2,270.*
Blackley, *t.*, S.W. Lancs, Eng.; N. sub. of Manchester; dye wks.
Black Mountain, *t.*, N.C., U.S.A.; resort.
Black Mtns., range of Appalachians, U.S.A.; Mt. Mitchell, alt. 6,684 ft.
Black Mtns., *range*, Brecknock, S. Wales; highest peak, Brecknock Van, alt. 2,631 ft.
Blackpool, *co. bor., seaside resort*, Lancs, Eng. on cst. of Fylde dist.; p. (1951) *147,131.*
Black Prairie, *region*, Texas, U.S.A.; extends 350 m. S.W. from Ouochita Mtns. to Austin; contains very fertile Black Waxy and Grande Prairie sub-regions devoted almost entirely to cotton growing; ch. ts., Dallas, Fort Worth, Austin; a. 30,000 sq. m.
Black River Falls, *t.*, Wis., U.S.A.; lumber, flour, dairying, poultry.
Blackrock, *t.*, Ireland; sub. 4 m. from Dublin.
Blackrod, *urb. dist.*, Lancs, Eng.; nr. Chorley; weaving; p. (1951) *3,151.*
Black Sea, *inland sea* between Russia and Turkey; 740 m. long, 390 broad; receives waters of Danube, Dnieper, Dniester, Don, Bug and other rivers; communicates with Mediterranean by Strait of Bosporus, Sea of Marmara and Dardanelles.
Blacksod Bay, coast of Mayo, Ireland.
Blackstone, *t.*, Mass., U.S.A.; textiles; p. (1950) [*4,968.*
Blackstone, *t.*, Va., U.S.A.; tobacco mkt.; p. (1950) *3,536.*
Black Volta, *R.*, Fr. W. Africa and Ghana; rises in Futa Jallon Plateau, flows E., S. and E. into R. Volta; length, over 800 m.
Black Warrior, *R.*, Ala., U.S.A.; flows through coalfields; navigable; water power.
Blackwater, *R.*, Hants and Essex, Eng.
Blackwater, *R.*, Ireland; three of this name.
Blackwater, *R.*, U.S.A. (Mont., Fla., and Va.).
Black Waxy, *see* **Black Prairie.**
Blackwell, *c.*, Okla., U.S.A.; gas, oil, wells, refining, zinc smelting; meat packing; p. (1950) *9,199.*
Blaneau Ffestiniog, *see* **Ffestiniog.**
Blaenavon, *t., urb. dist.*, Monmouth, Eng.; mining; p. (1951) *9,777.*
Blagoevgrad, *t.*, formerly Gorna Dzhumaya, **ch. t.** Bulgarian Macedonia.
Blagoveshchensk, now **Blagoyevgrad**, *t.*, E. Siberia, R.S.F.S.R. on R. Amur; wat. pl.; engin., sawmilling; p. (1959) *94,000.*
Blair Atholl, *par.*, Perth, Scot.; tourist resort; p. (1951) *1,868.*
Blairgowrie and Rattray, *burgh*, Perth, Scot.; at foot of Scot. Highlands, 18 m. N.E. of Perth; fruit; linen; p. (1951) *5,383.*
Blairmore, *t.*, Alberta, W. Canada; on Canadian Pacific Rly., 160 m. S.W. of Medicine Hat, at approach to Crow's Nest Pass; coal-mining ctr. on Alberta Coalfield.
Blairsville, *t.*, Penns., U.S.A.; p. (1950) *5,002.*
Blakely, *t.*, Ga., U.S.A.; peanuts, lumber, turpentine; p. (1950) *3,234.*
Blanc-Mesnil (Le), *t.*, Seine-et-Oise, France; p. (1954) *25,363.*
Blanc, Mt., France; highest peak of Alps; alt. [15,782 ft.
Blanca Pk., Col., U.S.A.; alt. 14,390 ft.
Blanche Bay, on N.E. coast of New Britain, Bismarck Arch.; inner part site of Rabaul.
Blanchester, *t.*, Ohio, U.S.A.; textiles, pumps; p. (1950) *2,109.*
Blanco, *t.*, C. of Good Hope, S. Africa.
Blandford, or **Blandford Forum**, *mkt. t., mun. bor.*, Dorset, Eng.; lime and stone, agr. implements; p. (1951) *3,663.*
Blanes, *spt.*, Spain; N.E. of Barcelona.
Blankenberge, *spt.*, N. Belgium; seaside resort; p. (estd. 1948) *9,024.*
Blankenheim, *t.*, Germany; p. *5,000.*
rly. to Beira; p. (estd. 1949) *6,443.*
Blantyre-Limbe, *t.*, Nyasaland, in Shire Highlands; linked by rail to Beira; comm. ctr.; p. *33,000* (inc. *3,400* Europeans).
Blantyre, *par.*, Lanark, Scot.; birthplace of Dr. Livingstone; aero engines; p. (1951) *17,766.*
Blarney, *vil.*, 4 m. N.W. Cork, Ireland; cas. and Blarney stone.

Blaydon, *urb. dist.*, Durham, Eng.; coal-mining; p. (1951) *30,791*.
Blekinge, *co.*, Sweden; a. 1,173 sq. m.; p. (1950) *146,135*.
Blenheim, *t.*, S.I., New Zealand; fruit; p. (1951) *7,051*.
Blessington, *mkt. t.*, Wicklow, Ireland.
Bletchley, *urb. dist.*, Bucks, Eng.; rly. junction, bricks, brushes; p. (1951) *10,916*.
Blida, *t.*, Algeria, N. Africa; flour, citrus fruits; p. (1948) *61,607*.
Bloemfontein, *t.*, *cap.*, O.F.S., S. Africa; cattle ctr.; p. (1951) *109,130*.
Blois, *c.*, Loire-et-Cher, France; on Loire; 30 m. S.W. of Orleans; château; wines; p. (1954) *28,190*.
Blood R., Natal, S. Africa.
Bloody-Foreland, *C.*, Donegal, N.W. Ireland.
Bloomfield, *t.*, Ind., U.S.A.; grain, lumber, cattle; p. (1950) *49,307*.
Bloomfield, *t.*, N.J., U.S.A.; p. (1950) *49,307*.
Bloomington, *t.*, Ill., U.S.A.; coal, motor cars; p. (1950) *34,163*.
Bloomington, *t.*, Ind., U.S.A.; furniture; p. (1950) *28,163*.
Bloomsburg, *t.*, Pa., U.S.A.; iron; p. (1950) *10,633*.
Blorca, *t.*, Java, Indonesia; teak; p. *18,451*.
Bludenz, *t.*, Austria; cotton, watches; p. (1948) *9,790*.
Bluefield, *t.*, W. Va., U.S.A.; coal, iron, limestone, steel foundries, silica, lumber; p. (1950) *21,506*.
Bluefields, *R.* in Nicaragua, Central America.
Bluefields, *t.*, Nicaragua; on E. cst.; p. (1947) *20,278*.
Blue Grass, *dist.*, Ky., U.S.A., area where blue grass abundant; horse breeding.
Blue Mountains, chain in N.S.W., Australia; highest peak, 4,100 ft.
Blue Mountains, *t.*, N.S.W., Australia; tourist centre; p. (1958) *23,640*.
Blue Mountains, Jamaica, W. Indies.
Blue Nile (Bahr-el-Azrek), *R.*, rising in tablelands of Ethiopia, joins the White Nile at Khartoum; its seasonal flooding provides the bulk of water for irrigation in Sudan and Egypt.
Blue Nile, *prov.*, Sudan; a. 54,577 sq. m.; cap. Wad Medani (*q.v.*); p. (estd. 1951) *1,840,600*.
Blue Point, Long I., U.S.A.; oysters.
Blue Ridge Mtns., U.S.A.; most E. ridge of Appalachian Mtns. in Virginia and N. Carolina.
Bluff, *t.*, S.I., New Zealand; p. (1951) *2,253*.
Bluff Harbour, S.I., New Zealand.
Bluffton, *t.*, Ind., U.S.A.; farm implements, lumber; p. (1950) *6,076*.
Blumenau, *t.*, Brazil; butter, sugar; p. *88,000*.
Blumenthal, *t.*, Hanover, Germany; on R. Weser; industl.; p. *12,764*.
Blyth, *spt. mun. bor.*, Northumberland, Eng.; exp. coal; shipbldg.; p. (1951) *34,742*.
Blytheville, *t.*, Ark., U.S.A.; tr. ctr. for agr. region; p. (1950) *16,234*.
Blythswood, *t.*, C. of Good Hope, S. Africa.
Bo, *t.*, Sierra Leone, B.W.A., second lgst. t. in protectorate; gold; adm. hdqtrs.; p. (estd.) *18,000*.
Boa Vista, *t.*, *cap.* Rio Branco terr., Brazil; p. *1,398*.
Bobadilla, *t.*, S. Spain; N. of Malaga.
Bobbili, *t.*, India; tr. ctr. in agr. a.; p. *22,090*.
Bobigny, *t.*, Seine, France; p. (1954) *18,521*.
Bobo-Dioulasso, *ch. t.*, Upper Volta, Ivory Coast, Fr. W. Africa; terminus Abidjan–Niger rly.; cotton, kapok, wax; p. *34,500*.
Bobrawa, *R.*, Lower Silesia; W. Poland; trib. of R. Oder; length 158 m.
Bobrek Karb, *t.*, Silesia, Poland; German before 1945; coal, coke, steel, ammonia; p. (1939) *22,095*.
Bobrinets, *t.*, Ukrainian S.S.R.; tobacco factories; p. *10,000*.
Bobruisk, *fortress*, *t.*, Byelorussian S.S.R., on R. Berezina; engin., sawmilling; p. (1959) *97,000*.
Bocas del Toro, *prov.*, Panama; cap. B. del T.; p. (1950) *22,392*.
Bochetta, La, *pass*, Liguria, Italy; used by main routes across Ligurian Apennines from Genoa to Lombardy Plain.
Bocholt, *t.*, N. Rhine–Westphalia, Germany; machin., textiles, elect. goods; p. (1950) *37,662*.
Bochum, *t.*, N. Rhine–Westphalia, Germany; 11 m. W. of Dortmund; ctr. of steel ind.; coal and iron, chemicals, foodstuffs; p. (estd. 1954) *326,100*.
Bockum-Hövel, *t.*, N. Rhine–Westphalia, Germany; N.W. of Hamm; coal-mining; p. (estd. 1954) *22,500*.
Bodaibo, *t.*, R.S.F.S.R.; N.E. of L. Baikal; gold, engin.
Bodele, *area*, French W. Africa; cotton, tobacco, forage grasses.
Boden, *t.*, Sweden; on Lulea R.; footwear, woodworking; p. (1950) *11,458*.
Bodensee, *see* **Constance, L.**
Bodmin, *mun. bor.*, *co. t.*, Cornwall, Eng.; on S.W. flank of Bodmin Moor; china clay, lt. engin.; p. (1951) *6,058*.
Bodmin Moor, *upland*, N.E. Cornwall, Eng.; granite quarries, kaolin; lower slopes cultivated, higher slopes used for sheep pastures; average alt. 1,000 ft., highest point, Brown Willy, alt. 1,375 ft.
Bodö, *spt.*, Norway; within Arctic Circle at entrance to Salten Fjord; fishing; p. *6,174*.
Boeleleng, *spt.*, Bali, Indonesia; rice; harbour unsafe during monsoon.
Boeotia and Attica, *prov.*, Greece; a. 2,481 sq. m.; p. (1951) *1,652,896*.
Bogalusa, *t.*, La., U.S.A.; p. (1950) *17,798*.
Bognor Regis, *t*, *urb. dist.*, Sussex, Eng.; seaside resort; p. (1951) *25,624*.
Bognor, *t.*, Java, Indonesia; p. *65,431*.
Bogotá, *cap.*, Rep. of Colombia, S. America; cath., museum, univ.; mnfs. soap, cloth, cordage, iron-ore mined; p. (1951) *643,187*.
Bogovodsk, *t.*, R.S.F.S.R.; 35 m. E. of Moscow; textiles, chemicals; p. *35,000*.
Bohemia, former W. prov. of Czechoslovakia; abolished 1948; plateau girdled by mountains; drained by R. Elbe; agr.: wheat, rye, hops, flax, sugar-beet; minerals: lignite, graphite; mnfs. textiles, sugar, pottery, machin., boots; cap. Prague; a. 20,101 sq. m.; p. (1947) *5,627,181*.
Böhmerwald (Bohemian Forest) Mtns., forested range between Czechoslovakia and Bavaria; 150 m. long; highest points; Aber, alt. 4,848 ft., Rachelberg, alt. 4,743 ft.
Bohol, **L.**, Philippines; 1,492 sq. m.
Bohotle, *t.*, Brit. Somaliland, Africa; p. *1,000*.
Boiro, *commune*, La Coruña, Spain; cattle, fishing, sardine canning; p. *11,668*.
Bois-Colombes, *t.*, Seine, France; p. (1954) *27,899*.
Boise City, *t.*, *cap.*, Idaho, U.S.A.; silver, hot springs; p. (1950) *34,393*.
Boise, *R.*, Idaho, U.S.A.
Boissevain, *t.*, Manitoba, Canada; p. *836*.
Bojador, *C.*, Rio de Oro, Africa.
Bokhara, *t.*, *see* **Bukhara**.
Bokn Fjord, Norway; N. of Stavanger, 35 m. long, 10–15 m. wide.
Boksburg, *t.*, Transvaal, S. Africa; gold, coal; p. (1946) (inc. *20,527* whites) *53,419*.
Bolama, *spt.*, Port. Guinea; p. *4,000*.
Bolan Pass, Baluchistan, Pakistan; pass from Pakistan to Afghanistan; summit 5,900 ft.
Bolbec, *t.*, Seine-Maritime, France; 12 m. E. of Le Havre; p. (1954) *11,716*.
Boleslawiec (Bunzlau), *t.*, Lower Silesia, Poland, German before 1945; on the Bobrawa R., pottery; p. (estd. 1939) *22,500*.
Bolgrad, *t.*, Ukrainian S.S.R.; corn; p. *10,000*.
Bolivar, *t.*, Argentina; p. (1947) *13,773*.
Bolivar, *terr.*, Colombia, S. America, cap. Cartagena; a. 22,981 sq. m.; p. (1947) *968,280* (mainly whites).
Bolivar, *prov.*, Ecuador, S. America; cap. Guarando; a. 1,150 sq. m.; p. (1950) *109,305*.
Bolivar, *st.*, Venezuela; ch. t., Cuidad Bolivar; a. 91,868 sq. m.; p. (1950) *122,114*.
Bolivia, *inland rep.*, S. America, bounded by Brazil, Paraguay, Argentina, Chile and Peru; cap. nominally Sucre, actual administrative H.Q. La Paz; plateau, mountains; Boliv. Andes; volcanoes; L. Titicaca, Poope, drained by tribs. of Amazon; climate varies with elevation; monkeys, jaguars; forests; savannahs; agr. in backward condition; rubber, quinine, cattle, hides; ch. exp. tin; petroleum; language Spanish; a. 514,155 sq. m.; p. (estd. 1957) *3,273,000*.
Bolkhov, *t.*, Ukrainian S.S.R., monastery; impt. inds.; p. *10,000*.
Bollington, *t.*, *urb. dist.*, Cheshire, Eng.; nr.

Macclesfield, cotton, calico printing and dye wks.; p. (1951) *5,313*.
Bolobo, *t.*, Belg. Congo, Africa on R. Ubangi.
Bologna, *ancient c.*, Emilia, N. Italy; on N. flank of Apennines; impt. route ctr. commanding road (over Futa Pass) and rly. (through Apennine Tunnel) across Apennines to Florence; mnfs. sugar, macaroni; p. (1951) *339,195*.
Bologna, *prov.*, Italy; a. 1,465 sq. m.; p. (1951) *762,726*.
Bologoye, *t.*, R.S.F.S.R.; depot and impt. junction on the Leningrad and Moscow Rly.; p. *10,000*.
Bolonchen, *t.*, Campeche, Mexico.
Bolsena, *L.*, Latium region, Italy; occupies lge. extinct volcanic crater in S. of Tuscan Hills; a. (approx.) 50 sq. m.
Bolson de Mapimi, *t.*, Sierra Majada, Mexico.
Bolsover, *urb. dist.*, Derby, Eng.; limestone, coal, textiles; p. (1951) *10,815*.
Bolsward, *t.*, Netherlands; dairying, linseed, bricks; p. (1947) *7,389*.
Bolt Hd., *headland*, Devon, Eng.; alt. 430 ft.
Bolton, *co. bor.*, Lancs, Eng.; cotton, iron, coal, chemicals; p. (1951) *167,162*.
Bolton, Abbey, W.R. Yorks, Eng.; famous ruined abbey.
Bolu, *vil.*, Turkey; t. in Asia Minor; in ancient state of Bithynia; at Hija, S. of the t., are warm medicinal springs; p. (1945) *277,625*.
Bolus Head, *C.*, Kerry, Ireland.
Bolzano, *t.*, Venetia Tridentina, Italy; on R. Isarco at S. approach to Brenner Pass; resort; p. (1951) *62,128*.
Boma, *former cap.*, Belg. Congo, Africa, p. *10,839*.
Bombay, *lgst. state*, India; absorbed Maharashtra, Gujarat, Kutch and Marathwada at States reorganisation, 1 Nov. 1956. Ch. physical features: W Ghats, Satpura Range; Rs.: Indus, Narbada, Tapti; agr.: cotton; inds.: carpets, silks, brass; hydro-electric power, W. Ghats; a. 190,919 sq. m.; p. (estd. 1957) *48,265,221*.
Bombay, *spt.*, *cap. state* Bombay, India; harbour, docks, rly. ctr.; mnfs. cottons, metals, dyeing, tanning, oil refining; p. (1951) *2,839,270*.
Bomnak, *t.*, Chita Region, U.S.S.R.; on S. slopes of Stanovoi Mtns., in valley of R. Zeya; centre of alluvial gold workings.
Bona, *see* Bône.
Bonaca I., Honduras, Central America; in Caribbean Sea.
Bonaire I., Netherlands W. Indies; located off N. coast of Venezuela; goat rearing; scantily populated.
Bonavista, *t.*, Newfoundland, Canada; p. (1951) *3,781*.
Bonavista Bay, Newfoundland, Canada.
Bonduku, *t.*, Fr. W. Africa; N. of Gold Coast; impt. trading sta.; p. (estd. 1949) *5,400*.
Bondy, *commune*, France; N.E. sub. of Paris; brewing, chemicals; p. (1954) *22,411*.
Bône, *spt.*, Algeria; 280 m. E. of Algiers; fertile plain; exp. phosphates, sheep, esparto grass; p. (1948) *102,823*.
Bo'ness, *spt.*, *burgh*, W. Lothian, Scot.; on Firth of Forth, 4 m. E. of Grangemouth; mng., quarrying, distilling, marine engin., iron-founding; p. (1951) *9,949*.
Bonfim, *t.*, Brazil, S. America; p. *7,269*.
Bonham, *t.*, Texas, U.S.A.; cotton; p. (1950) *7,049*.
Bonhill, *par.*, Dunbarton, Scot.; dyeing; p. (1951) *16,338*.
Bonifacio, *spt.*, *fort.*, Corsica, France; opposite Sardinia, on Strait of Bonifacio; cork, olive-oil, oyster tr.; p. (1954) *2,157*.
Bonin Is., Pacific Ocean; 20 islands, volcanic.
Bonn, *t.*, federal cap. W. Germany; at confluence of Rs. Sieg and Rhine; univ.; seat of W. German parliament; birthplace of Beethoven; metal, paper and elect goods; p. (estd. 1954) *135,100*.
Bonne Terre, *c.*, E. Mo., U.S.A.; lead mines; p. *3,730*.
Bonneville Dam, Ore., Wash., U.S.A.; across R. Columbia 40 m. above Portland (Ore.); provides irrigation to valleys in Columbia–Snake Plateau; lge. hydro-electric power-sta.; locks permit navigation from Portland up middle courses of Columbia and Snake Rs.
Bonneville Salt Flats, Utah, U.S.A.; remains of ancient lake; world automobile speed tests, 1937–47.
Bonny, *t.*, S. Nigeria, Brit. W. Africa; at mouth of R. Bonny, Bight of Biafra.
Bonnyrigg and Lasswade, *burgh*, Midlothian, Scot.; 7 m. S.E. of Edinburgh; paper, carpets; p. (1951) *5,434*.
Bonthe, *t.*, Sierra Leone, Brit. W. Africa; p. *4,404*.
Boom, *t.*, Belgium; bricks, tanning, brewing.
Boonah, *t.*, Queensland, Australia; dairying.
Boone, *t.*, Iowa, U.S.A.; coal; p. (1950) *12,164*.
Booneville, *c.*, W. Ark., U.S.A.; lumber and cotton mills; tuberculosis sanatorium; p. *2,324*.
Boonton, *t.*, N.J., U.S.A.; agr. and industl. ctr.; p. (1950) *7,163*.
Boothia, *peninsula* (a. 13,100 sq. m.) and G. on Arctic coast; Franklin dist. Canada.
Bootle, *co. bor.*, Lancs, Eng.; on E. side of entrance to Mersey estuary; shipping, engin., timber, flour; p. (1951) *74,302*.
Boppard, *t.*, Rhineland Palatinate, Germany; p (1946) *7,189*.
Borås, *t.*, S. Sweden; on R. Wiske, nr. Göteberg; cotton spinning and weaving; p. (1951) *58,076*.
Bordeaux, *spt.*, Gironde, France; nr. mouth of R. Garonne; cath., univ.; exp. wines, liqueurs, sugar, potatoes, pit props; p. (1954) *257,946*.
Bordentown, *c.*, N.J., U.S.A.; on Delaware R.; formerly impt. pt.; p. (1950) *5,497*.
Bordeyri, *t.*, Iceland; on Rumaflot inlet.
Bordighera, *t.*, Italy; Riviera winter resort; p. *5,462*.
Bordon, Hants, Eng.; military camp.
Boreham Wood, *t.*, Herts, Eng.; light engin., computors, film studios.
Borga, *t.*, Finland; p. (estd. 1949) *8,478*.
Borger, *c.*, N.W. Texas, U.S.A.; gas and petroleum; p. (1950) *18,059*.
Borgerhout, sub. of Antwerp, Belgium; candle and tobacco factories; p. (estd. 1957) *50,210*.
Borgholm, *t.*, Sweden; p. *2,025*.
Borgo, San Donnino, *t.*, Italy; cath.; p. *17,154*.
Borgo, San Lorenzo, *t.*, Italy; olives and wine.
Borgosesia, *commune*, N.W. Italy; on Sesia R.; textiles; p. *13,716*.
Borgo Val di Taro, *commune*, N. Italy; lignite; p. *15,209*.
Borinage, *dist.* round Mons, Belgium; coal.
Borislav, *c.*, Ukrainian S.S.R., formerly Polish; oilfield, natural gas; p. (1954) *50,000*.
Borisoglebsk, *t.*, R.S.F.S.R.; p. (1959) *54,000*.
Borisokova, *t.*, Kursk, U.S.S.R.; metals.
Borisov, *t.*, Byelorussian S.S.R.; scene of defeat of Napoleon, 1812; chemicals; p. (1959) *59,000*.
Borispool, *t.*, Ukrainian S.S.R.; p. *25,000*.
Borlänge, *t.*, Sweden; p. (1951) *21,614*.
Bormio, *vil.*, Lombardy, Italy; alpine resort; mineral springs; p. *1,910*.
Borna, *t.*, Saxony, Germany; lignite, machin.; p. (estd. 1954) *18,500*.
Borneo, lgst. island Malay Arch.; a. 285,000 sq. m., length 830 m., breadth 600 m.; Kinibalu Range, alt. 13,700 ft.; forests, jungle, swamps; rice, sago, spices, coconuts, rubber, hardwood; politically divided into Dutch (cap. Banjermassin) and British.
Borneo, Dutch, Indonesia; a. 208,286 sq. m.; p. (1930) *2,168,661*.
Borneo, N., *col.*, Brit. Borneo, E. Indies; tropical climate but equable, heavy rainfall; largely forested; hardwoods, rubber, tobacco, copra, cutch, hemp; cap. Jesselton; a. 29,387 sq. m.; p. (estd. 1957) *400,836*.
Bornholm, Danish I., Baltic; a. 210 sq. m.; agr.; fishing; porcelain, clay; cap. Rönne.
Bornu, *cty.*, Central Sudan, Africa; S.W. Lake Chad; formerly a Negro kingdom, now partly under French domination and partly within Brit. Protectorate of Nigeria; a. 51,000 sq. m.; p. (estd.) *5,000,000*.
Boroboedoer, Java, Indonesia; gr. Buddhist temple, once ruined, now restored under government care.
Boronga Is., in Bay of Bengal.
Borongan, *t.*, Philippine Is.
Borovichi, *t.*, R.S.F.S.R.; p. *25,000*.
Borroloola, N. Terr., Australia; sheep.
Borromean Is., four sm. islets in L. Maggiore; incl. Isola Bella, site of Stresa Conf., 1935.
Borrowdale, *valley*, Cumberland, Eng.; tourist resort; blacklead mines.
Borthwick, *par.*, Midlothian, Scot.; with old cas.; p. (1951) *3,133*.
Borzhom, *wat. pl.*, Georgian S.S.R.; hot mineral springs; p. *8,218*.
Boscastle, *sm. spt.*, Cornwall, Eng.; resort; pilchard fishing.

Boscobel, *t.*, Wis., U.S.A.; agr. tr. ctr.; p. (1950) *2,347*.
Bosham, *vil.*, Sussex, Eng.; 4 m. W. of Chichester; court of King Canute and Roman Emperor Vespasian; Saxon church; resort, yachting, fishing.
Boshof, *t.*, O.F.S., S. Africa; woollens, health resort; p. (1946) *2,641*.
Boskoop, *commune*, Netherlands; flowering-shrub nurseries; p. (1947) *8,571*.
Bosnia and Hercegovino, *fed. unit*, Jugoslavia; formerly part of Austria; cap. Sarajevo; mountainous, forested, fertile valleys; agr.; tobacco, cereals, fruit; cattle, sheep, pigs; a. 19,768 sq. m.; p. (1948) *2,561,961*.
Bosporus or Strait of Constantinople, between Black Sea and Sea of Marmara.
Boston, *t.*, *mun. bor.*, *spt.*, Holland, Lincs, Eng.; on R. Witham, 4 m. from the Wash; shipping, agr. mkt., timber, fruit and vegetable canning; p. (1951) *24,453*.
Boston, *spt. c.*, *cap.* Mass., U.S.A.; univ., museum; fine harbour; 2nd Atlantic pt.; inds.: printing, textiles, boots; rly. ctr.; p. (1950) *801,444*.
Bosworth or Market Bosworth, *t.*, Leics., Eng.; battle between Richard III and Henry VII, 1485.
Botany Bay, N.S.W., Australia; on E. cst., 10 m. S. of Sydney; resort; first settled by British in 1787; old penal colony.
Bothnia, G. of, N. of Baltic; between Finland and Sweden, breadth about 100 m.
Bothwell, *par.*, Lanark, Scot.; coal, iron; p. (1951) *63,185*.
Botosani, *t.*, N. Moldavia, Romania; rich pastoral cty; flour milling, tanning; p. (1948) *29,145*.
Bottrop, *t.*, N. Rhine–Westphalia, Germany; N.W. of Essen; coal, coke, chemicals; p. (estd. 1954) *102,800*.
Botucatu, *t.*, Brazil.
Bouches-du-Rhône, *prosperous dep.*, S. France; cap. Marseilles; cereals, olives, vines; pottery, silk; a. 2,025 sq. m.; p. (1954) *1,048,762*.
Bougainville I., Solomon Is., Pac. Oc.; a. 3,880 sq. m.; p. (1941) *50,206*.
Bougainville, *C.*, jutting into Timor Sea, W. Australia.
Bougie, *spt.*, dep. Constantine, Algeria; impt. tr. ctr.; exp. wood, hides; oil pipe-line connection to Hassi-Messoud; p. (1954) *43,934*.
Bouillon, *t.*, Ardennes, Belgium; p. (1948) *2,835*.
Boulder, *t.*, West Australia; gold-mining; p. (1947) *6,463*.
Boulder, *t.*, Col., U.S.A.; gold- and silver-mining dist.; univ.; p. (1950) *19,999*.
Boulder City, *t.*, Nevada, U.S.A.; nr. Great Boulder Dam, gr. engineering project; p. (1950) *3,903*.
Boulogne-Billancourt, S.W. sub. of Paris, France; p. (1954) *93,998*.
Boulogne-sur-Mer, *spt.*, Pas de Calais, France; resort; fishing; cement; chocolates; channel ferry; p. (1954) *41,870*.
Boundary, *t.*, Yukon, Canada.
Bound Brook, *bor.*, N.J., U.S.A.; paints, chemicals, asbestos, clothing; p. (1950) *8,374*.
Bountiful, *t.*, Utah, U.S.A.; mkt. gardens, fruit, especially cherries; irrigation necessary; p. (1950) *6,004*.
Bounty I., New Zealand, S. Pac. Oc.
Bourbon l'Archambault, *t.*, France.
Bourbonnais, *old prov.*, France.
Bourbonne-es-Bains, *t.*, France; mineral springs; p. *2,881*.
Bourg-en-Bresse, *t.*, *cap.*, Ain dep., France; copper goods, pottery; p. (1954) *26,699*.
Bourges, *t.*, *cap.*, Cher dep., France; cath.; brewing, cutlery, machin., aircraft; p. (1954) *53,879*.
Bourget, *L.*, Savoy, France.
Bourg-la-Reine, *t.*, Seine, France; p. (1954) *11,708*.
Bourg-Madame, *vil.*, France; on Franco-Spanish border; international bridge. [*6 488*.
Bourgoin, *t.*, Isère, France; industl.; p. (1946)
Bourke, *t.*, N.S.W., Australia; on R. Darling nr. head of intermittent navigation, terminus of rly. running inland from Sydney and Newcastle; collects wool from sheep farms and despatches by R. to Adelaide (S. Australia) and by rail to Sydney; p. (1947) *2,205*.
Bourne, *urb. dist.*, Kesteven, Lincs., Eng.; agr. machin., manures, malting, seed growing; B.R.M. car mftg.; p. (1951) *5,100*.
Bournemouth, *co. bor.*, Hants, Eng.; on S. cst., E. of Poole Harbour; seaside resort; p. (1951) *144,726*.
Bournville, *model industl. t.*, Eng.; 4 m. S.W. of Birmingham; initiated by Mr. Geo. Cadbury; chocolate and cocoa wks.
Bourtange, *t.*, Netherlands; nr. German frontier.
Boussu, *commune*, Belgium; coal, industl.; p. (1948) *12,371*.
Bouvet I., uninhabited island in S. Atlantic belonging to Norway, a. about 22 sq. m.
Boves, *t.*, Sommes dep., France; S.E. Amiens.
Bovino, *t.*, Apulia, Italy.
Bow, *bor.*, E. London, Eng.; industl.; properly Stratford-at-Bow.
Bow, *R.*, Alberta, N.W. Canada; head of Saskatchewan R.
Bow Fell, Pennine range, W.R., Yorks, Eng.
Bowen, *spt.*, N. Queensland; on Port Denison, 725 m. N.W. of Brisbane; in fine pastoral country; p. (1948) *3,276*.
Bowes, *t.*, W.R., Yorks, Eng.; on R. Greta S.W. of Barnard Castle; mkt. t. for Stainmore dist. of Pennines.
Bowesdorp, *t.*, C. of Good Hope, S. Africa.
Bowie, *t.*, N. Texas, U.S.A.; oil, gas, coal, clay mining; p. (1950) *4,544*.
Bowland, Forest of, *hills*, Lancs, Eng.; millstone grit moors; many reservoirs supply water to industl. S. Lancs.
Bowling, *vil.*, Dumbarton, Scot.; on N. bank of R. Clyde, 10 m. N.W. of Glasgow; at W. entrance to Forth and Clyde Canal; large oil refinery.
Bowling Green, *t.*, Ky., U.S.A.; tr. ctr. for agr. a.; limestone; p. (1950) *18,347*.
Bowmanville, *pt.* L. Ontario, Canada; p. (1950) *4,113*.
Bowness, *t.*, Westmorland, Eng.; on L. Windermere; tourist ctr.
Bowness, *par.*, Cumberland, Eng.; p. *1,050*.
Box Hill, nr. Dorking, Surrey, Eng.; E. of R. Mole gap through N. Downs; chalk; wooded, fine views.
Boyacá, *dep.*, Colombia, S. America; cap. Tunja; a. 24,928 sq. m.; p. (1947) *777,460*.
Boyle, *mkt. t.*, Roscommon, Ireland; on R. Boyle; dairying; p. (1951) *1,934*.
Boyne, *R.*, Leinster, Ireland; length 80 m.
Bozrah, *ancient c.*, S. Damascus, Syria, S.W. Asia; modern Busra; many arch. remains.
Bra, *t.*, Piedmont, Italy; 28 m. S. of Turin; p. *22,263*.
Brabant, *cent. prov.*, Belgium; fertile and wooded; many breweries; mnfs. linen, cloth, paper, lace; cap. Brussels (*q.v.*); a. 1,267 sq. m.; p. (estd. 1957) *1,919,837*.
Brabant, North, *prov.*, Netherlands; S. of Gelderland; N. half of former Duchy; cattle rearing; grain, hops, beetroot, etc.; cap. s'Hertogenbosch; a. 1920 sq. m.; p. (1947) *1,192,640*.
Brac, *I.*, Adriatic Sea, Jugoslavia.
Bracadale, *vil.* and *L.*, Skye, Scotland.
Bracebridge, *par.*, Kesteven, Lincs, Eng.; p. *4,472*.
Bracebridge, *t.*, Ontario, Canada; p. *2,500*.
Brackley, *t.*, Northants, Eng.; p. (1951) *2,545*.
Bracknell, *t.*, Berkshire, Eng.; on Thames Valley terrace, 8 m. S.W. of Windsor; one of "New Towns" designated 1949 to relieve population congestion in London; extends N. and W. of old vil. of Bracknell; p. (estd. 1959) *16,000*.
Brackwede, *t.*, N. Rhine–Westphalia, Germany; S.W. of Bielefeld; iron and machin.; p. (estd. 1954) *23,000*
Brad, *t.*, Romania, on R. Muresul; p. (1948) *6,210*.
Braddock, *t.*, Penns., U.S.A.; iron and steel; p. (1950) *16,488*.
Bradford, *t.*, Penns., U.S.A.; oil; p. (1950) *17,354*.
Bradford, *co. bor.*, *c.*, W.R. Yorks, Eng.; 9 m. W. of Leeds; wool, textile, engin., and chemical inds.; p. (1951) *292,394*.
Bradford-on-Avon, *t.*, *urb. dist.*, Wilts, Eng.; on R. Avon on E. flank of Cotswolds; mnfs. rubber goods, elect. instruments; p. (1951) *5,627*.
Brading, *par.*, Isle of Wight, Eng.; commands gap through central chalk ridge.
Bradwell, Essex, mouth of R. Blackwater; civil nuclear power-sta. under construction.
Brady, *t.*, Texas, U.S.A.; p. (1950) *5,944*.
Braemar, *par.*, in the Grampians, Aberdeen, Scot.;

containing Balmoral estate; p. (1951 with Crathie) *1,291*.
Braeriach, *mtn.*, Scot.; Inverness and Aberdeen; alt. 4,248 ft.
Braga, *c. cap.*, Minho, Portugal, nr. Oporto; cath.; wine-growing dist.; steel; p. (1950) *84,801*.
Bragança, *dist.*, Tras-os-Montes, Portugal; silk; p. (1950) *229,422*.
Bragança, *t.*, Portugal; mediæval cas.; p. (1940) *6,977*.
Brahmaputra, *R.*, India, Tsangpo in Tibet; length 1,800 m.
Braich-y-Pwll, S.W. point of Caernarvon, Wales.
Braila, *t.*, Romania; on Danube, nr. Galati; grain ctr.; p. (1956) *102,491*.
Braintree, *t.*, Mass., U.S.A.; p. (1950) *23,161*.
Braintree and Bocking, *urb. dist.*, Essex, Eng.; on Blackwater; rayon mftg.; p. (1951) *17,480*.
Brakpan, *t.*, Transvaal, S. Africa; p. (1946) *83,071* (inc. *27,368* whites).
Brampton, *par.*, Cumberland, Eng.; tweeds; p. (1951) *2,526*.
Brampton, *t.*, Ontario, Canada; flower growing ctr., tanning, timber; p. *6,020*.
Brancaster, *par.*, Norfolk, Eng.; p. *900*.
Branco, *C.*, Brazil, Pernambuco st.
Brandenburg, *Land*, Soviet Zone, Germany; prosperous mining and agr. prov.; flax, barley, coal; a. 26,976 sq. km.; p. (1946) *2,527,492*.
Brandenburg, *t.*, Brandenburg, Germany; on R. Havel; steel, tractors, bicycles, textiles, machin.; p. (estd. 1954) *83,000*.
Brandon, *t.*, Manitoba, Canada; machin.; p. (1956) *24,796*.
Brandon and Byshottles, *urb. dist.*, Durham, Eng.; coal-mining; p. (1951) *19,751*.
Brandywine Creek, *R.*, Pa., U.S.A.; Americans defeated by British, 1777.
Branford, *t.*, Conn., U.S.A.; light, mnfs., fishing, oysters; resort; p. (1950) *2,552*.
Braniewo (Braunsberg), *t.*, E. Prussia, Poland; German before 1945; brewing; p. (1946) *1,373*.
Brantford, *t.*, Ontario, Canada; farm implements, cycles; p. (1946) *31,948*.
Brasilia, *new cap.* Brazil in the state of Goiás under construction (inauguration before end of 1960).
Brass, *t.*, Nigeria, W. Africa; at mouth of Brass R.; trading settlement.
Bratislava, *t.*, Czechoslovakia; on R. Danube 30 m. below Vienna; univ.; 2 palaces; rly. ctr.; textiles, chemicals, engin., oil refining; p. (1957) *246,695*.
Bratsk, *sm. t.*, W. central Irkutsk oblast, R.S.F.S.R. on Angara R., at mouth of Oka R., 115 m. N.N.E. of Tulun. Site of Angara R. rapids at downstream end of navigation; ship repair yards, lumber, iron-ore; large hydro-electric sta. project 1956; p. (1959) *51,000*.
Brattleboro, *t.*, Vt., U.S.A.; p. (1950) *9,606*.
Braunsberg, *see* **Braniewo.**
Brava, *spt.*, Italian Trust Terr., Somalia; p. *4,000*.
Bray, *urb. dist.*, Wicklow, Ireland; on Irish Sea cst., 11 m. S. of Dublin; popular wat. pl.; p. (1951) *12,062*.
Bray Head, point on E. cst. of Ireland, S. of Dublin.
Brazil, *rep.* S. America; length 2,600 m.; greatest breadth 2,690 m.; in S. Plateau bounded on E. by mtns., in N. Amazon; mainly tropical climate, temperate on plateaus; vast forests; ch. R Amazon and tribs.; agr.: coffee, maize, sugar-cane, cotton, rubber, fruits, hardwoods; cattle-raising; minerals: manganese, iron, gold, diamonds; mnfs.: textiles, brewing; religion R.C.; administered through 20 sts., fed. dist. and 4 terrs.; cap. Brasilia; a. 3,288,063 sq. m.; p. (estd. 1958) *63,101,627*.
Brazil, *t.*, Ind., U.S.A.; coal, clay, bricks, china; p. (1950) *8,434*.
Brazil Current, *Ocean current*; flows S. along E. cst. of Brazil; relatively warm.
Brazos, *R.*, Texas, U.S.A.; length 950 m.
Brazzaville, *cap.*, Congo Rep., Equatorial Africa; connected by rly. with the Atlantic at Pointe-Noire; R. pt. under construction; airport; p. (estd. 1950) *83,390*.
Breadalbane, *mountainous dist.*, W. Perth, Scot.
Brechin, *par.*; Angus, Scot.; with ancient cath., on S. Esk; sail-cloth, linen, distilling; p. (1951) *7,264*.
Breckenridge, *t.*, N. Texas, U.S.A.; oil, gas wells; exp. cattle, grain; p. (1950) *6,610*.
Breckland, *geographical region*, S.W. Norfolk, N.W. Suffolk, Eng.; chalk, overlain by sand, gives dry soils; much heathland; sm. fertile valleys cultivated, wheat, rye, sugar-beet; ch. ts. Brandon, Lakenheath; a. 200 sq. m.
Brecknock, *co.*, Wales; mountainous; rs. Wye, Usk; cereals, dairy produce; timber; coal, iron; a. 744 sq. m.; p. (1951) *56,484*.
Brecon, (Brecknock), *mun. bor.*, Wales; agr.; p. (1951) *6,466*.
Brecon Beacons, *mtns.*, S. Wales, 5 m. S. of Brecon; highest peak, 2,910 ft.; National Park.
Breda, *ancient t.*, Netherlands; fortress; rayon, linen, carpets, soap, brewing; p. (estd. 1955) *98,000*.
Bredasdorp, *t.*, C. of Good Hope, S. Africa; p. (1946) *3,375*.
Bredbury and Romiley, *urb. dist.*, Cheshire, Eng.; iron, steel, paper; p. (1951) *17,810*.
Bregenz, *cap.*, Vorarlberg, Austria; at E. end of L. Constance; the Roman Brigantium; resort; p. (1948) *20,439*.
Breidha Fjord, large inlet, W. coast, Iceland.
Bremen, *t.*, *spt.*, cap. of "Land" Bremen, Germany; on R. Weser 40 m. from N. Sea; ocean liner, tr. and trans-shipment pt.; imports cotton, cereals, tobacco; inds.: cars, machin., textiles, tobacco, shipbldg.; p. (estd. 1954) *483,600*.
Bremen, *Land*, W. Germany; cattle rearing, mkt. gardening; a. 156 sq. m.; p. (1950) *558,619*.
Bremerhaven, *spt.*, Germany; "outport" of Bremen at mouth of Weser R.; docks; impt. fish. pt., shipbldg.; p. (estd. 1954) *124,400*.
Bremersdorp, *t.*, Swaziland, S. Africa.
Bremerton, *t.*, Wash., U.S.A.; on Puget Sound; naval dockyard; elec. equipment, machin.; p. (1950) *27,678*.
Brenham, *t.*, Texas, U.S.A.; oil, cotton, dairy produce; p. (1950) *6,941*.
Brenner Pass, Italy; famous pass leading from Italy into Austria, over Alps.
Brentford and Chiswick, *mun. bor.*, Middx., Eng.; brewing, soap, coal gas, light engin.; p. (1951) *59,354*.
Brentwood, *urb. dist.*, *mkt. t.*, Essex, Eng.; films, agr. implements, steel-tubing; p. (1951) *29,898*.
Brentwood, *sub.* of St. Louis, Mo., U.S.A.; residtl.; p. *4,383*.
Brescia, *t.*, Italy; cath.; palace; silks, woollens, iron and steel; p. (1951) *141,808*.
Breslau, *see* **Wroclaw.**
Bressanone, *t.*, N.E. Italy; ceded to Italy 1919 by Austria; cath., health resort; p. *9,503*.
Bressay I., Shetland Is., Scotland.
Brest, *t.*, *spt.*, Finistère dep., N.W. France; naval sta., arsenal; fishing, ropes, soap; p. (1954) *110,713*.
Brest (**Brest Litovsk**), *t.*, Byelorussian S.S.R., on Polish frontier; Treaty of Brest Litovsk, March, 1918, annulled by Treaty of Versailles 1919; textiles; p. (1959) *73,000*.
Bretton Woods, N.H., U.S.A.; resort; site of U.S. Monetary and Financial Conference, 1944.
Brevik, *t.*, *pt.*, Norway; p. *2,140*.
Brewer, *t.*, Me., U.S.A.; on Penobscot R.; wood pulp, paper, bricks; p. (1950) *6,862*.
Briançon, *t.*, France; p. (1954) *8,274*.
Briare, *t.*, France; p. (1946) *3,367*.
Bridgend, *urb. dist.*, *mkt. t.*, Glamorgan, S. Wales; industl. trading estate; iron, coal, stone; p. (1951) *13,646*.
Bridge of Allan, *burgh*, Stirling, Scot.; 2 m. N. of Stirling; mineral springs; glass; p. (1951) *3,173*.
Bridgeport, *t.*, Conn., U.S.A.; sewing machines, typewriters, valves, hardware, machin.; p. (1950) *158,709*.
Bridgeport, *t.*, Ohio, U.S.A.; on Ohio R.; glass, tin, sheet metal, boat bldg.; p. (1950) *4,309*.
Bridgeport, *bor.*, Penns., U.S.A.; iron and steel, woollens, quarrying; p. (1950) *5,827*.
Bridgeton, *t.*, N.J., U.S.A.; founded by Quakers; glasswks., packs and exp. fruit; p. (1950) *18,378*.
Bridgetown, *t.*, Barbados, T.W.I.; p. (1957) *18,650*.
Bridgewater, *mftg. t.*, Mass., U.S.A.; nr. Boston; p. (1950) *3,445*.

Bridgewater, *t., spt.,* Nova Scotia, Canada; salmon; p. *3,445.*
Bridgewater Canal, Manchester–Runcorn–Leigh; crosses ship canal by means of Barton swing bridge, length 38 m.
Bridgnorth, *mun. bor., mkt. t.,* Salop, Eng.; cas.; carpets, radio equipment; p. (1951) *6,244.*
Bridgwater, *mun. bor., pt.,* Somerset, Eng.; on R. Parrett, 10 m. from Bristol Channel; bricks and tiles, engin., wire rope, fibre fabrics, cellophane; p. (1951) *22,221.*
Bridlington, *mun. bor.* E. Riding, Yorks, Eng.; on Bridlington Bay, S. of Flamborough Head; impt. fishing; seaside resort; p. (1951) *24,767.*
Bridport, *mun. bor., mkt. t.,* Dorset, Eng.; rope, line and twine, engin., concrete prods.; sm. seaside resort; p. (1951) *6,273.*
Brie, *natural division* ("*pays*"), Central France; low, level, plateau of limestones and clays, S.E. of Paris; loam (limon) cover and plentiful water supply encourage agr.; grains, sugar-beet, fruit, dairy cattle; densely populated.
Brieg, *see* **Brzeg.**
Briel, *fortfd. spt.,* R. Maas, S. Holland, Netherlands; on Voorn I.
Brienz, *t.,* Switzerland; resort; wood carving; on L. Brienz; p. *2,637.*
Brierfield, *urb. dist.,* Lancs, Eng.; cotton weaving; p. (1951) *7,005.*
Brierley Hill, *urb. dist.,* Staffs., Eng.; on R. Stour; cut glass, castable metal goods, fire-bricks, roofing and tiling; p. (1951) *48,943.*
Brigg, *mkt. t., urb. dist.,* Lindsey, Lincs, Eng.; ctr. of agr. dist. between Lincoln Heights and Wolds; sugar-beet, jam, seed crushing, hosiery; p. (1951) *4,508.*
Brigham, *t.,* Utah, U.S.A.; sugar-beet, peaches, canning, woollens; p. (1950) *6,790.*
Brighouse, *industl. t., mun. bor.,* W.R., Yorkshire, Eng.; on R. Calder, 3 m. S.E. of Halifax; textiles and engin.; p. (1951) *30,587.*
Brightlingsea, *urb. dist.,* Essex, Eng.; on R. Colne; oysters, boat bldg.; p. (1951) *4,501.*
Brighton, *co. bor.,* E. Sussex, Eng.; 50 m. S. of London; lge. seaside resort and residtl. t.; light inds.; p. (1951) *156,440.*
Brindisi, *spt.,* Apulia, S. Italy; on Adriatic cst. with sea and air connections to Middle East; cath.; cas.; wine, olive oil, silk; p. (1951) *58,220.*
Brinkley, *t.,* Ark., U.S.A.; cotton, lumber; p. (1950) *4,173.*
Brioude, *t.,* Haute-Loire, France; tr. ctr. for agr. a.; p. (1954) *5,687.*
Brisbane, *t., pt., cap.,* Queensland, Australia; univ.; docks; meats, wool, hides and skins; p. (1957) *543,000.*
Bristol, *t.,* Conn., U.S.A.; foundries, ball bearings, clocks, bells; p. (1950) *35,961.*
Bristol, *c., co., co. bor., spt.,* Gloucester–Somerset border, Eng.; on R. Avon 9 m. from Bristol Channel; "outport" at Avonmouth; cath., univ.; docks; aircraft engin., tobacco, printing and light inds.; p. (1951) *442,281.*
Bristol, *t.,* Pa., U.S.A.; cottons, woollens; p. (1950) *12,710.*
Bristol, *c.,* Va., U.S.A.; dairy produce, tobacco; p. (1950) *15,954.*
Bristol, *t.,* R.I., U.S.A.; fish, textiles, rubber goods, shoes, wire, yacht wks., yachting; p. (1950) *10,335.*
Bristol, *t.,* Tenn., U.S.A.; rayon, paper, leather goods, furniture, mining equipment, transport ctr., especially for cattle; p. (1950) *16,771.*
Bristol Channel, arm of the Atlantic between S. cst. of Wales and Somerset and Devon; noted tidal bores.
British Caribbean Federation, reverted to The West Indies (1957); inc. Jamaica, Trinidad and Tobago, Barbados, Windward Is. and Leeward Is. excluding Virgin Is.; p. (1954) *2,914,300.*
British Columbia, *prov.,* Canada; mountainous, largely forested; principal Rs.: Columbia, Fraser, Kootenay, Peace; climate: temperate, rainy on coast, drier interior; communications: rlys.; farming, dairying and livestock; fruit growing, canning, lumbering, salmon fisheries; minerals: coal, copper, gold, lead, silver; cap. Victoria; a. 355,855 sq. m.; p. (1956) *1,398,464.*
British East Africa, *extensive terr.* on E. cst. of Africa, inc. Kenya Colony and Prot.; Tanganyika Trust Terr., Uganda Prot., together with the islands of Zanzibar and Pemba, all dealt with under their respective headings.
British Guiana, *crown col.,* S. America; flat, swampy coast, interior highlands; climate, very hot, heavy rainfall along cst.; tropical forests; agr.: sugar, rice, coffee; cattle; hardwoods; minerals: bauxite, diamonds, gold; poor communications; cap. Georgetown; a. 83,000 sq. m.; p. (estd. 1958) *539,940.*
British Honduras, *crown col.,* Central America; climate, heavy rainfall; tropical forests; mahogany, logwood, bananas; poor communications; cap. Belize; a. 8,866 sq. m.; p. (1956) *82,000.*
British Is., *archipelago,* N.W. Europe, comprising 2 large islands: Great Britain, Ireland; and 5,000 small islands; a. 121,633 sq. m.
British Solomon Is., *prot.,* W. Pacific; coconuts, rubber, pineapples, bananas; a. 11,500 sq. m.; p. (1952) *99,000.*
British Somaliland, *see* **Somaliland, British.**
British Virgin Islands, *see* **Virgin Islands.**
British West Africa, includes the Gambia, Sierra Leone, and the Trusteeship Terr. of the Cameroons under Brit. admin.
British West Indies, *see* **The West Indies.**
Briton Ferry, *t., pt.,* Glam., S. Wales; at mouth of R. Neath; coal; blast furnaces, steel wks.
Brittany, *prov.,* France; farming; fishing; a. 13,643 sq. m.; p. *3,000,000.*
Brittle, *L.,* Skye, Scot.
Brive, *t.,* Corrèze dep., France; vegetables, wines; truffles, straw; p. (1954) *36,088.*
Brixen, *t.,* Italy; resort; sericulture; wines.
Brixham, *urb. dist.,* S. Devon, Eng.; fishing; resort; p. (1951) *8,761.*
Brixton, *dist.,* S.W. London, Eng.
Brno, *t.,* Czechoslovakia; brewing, cloth, engin.; cath., univ.; p. (1957) *306,371.*
Broad Law, *mtn.,* Peebles, Scot.
Broads, The, Norfolk, Eng.; yachting, fishing and fowling centre.
Broadstairs, *urb. dist.,* Kent, Eng.; seaside resort; 3. m. N.E. of Ramsgate; p. (1951) *15,082.*
Broadway, *par.,* Worcester, Eng.; tourist ctr., Cotswolds; p. *1,860.*
Brocken, Harz Mtns., Germany; highest point (3,745 ft.).
Brockport, *t.,* N.Y., U.S.A.; dairying, mkt. gardens; N.Y. St. Teachers' College; p. (1950) *4,748.*
Brockton, *c.,* Mass., U.S.A.; shoes, machin.; p. (1950) *62,860.*
Brockville, *t.,* Ontario, Canada; pt. of entry on R. St. Lawrence; farm implements; p. *11,342.*
Brod, *t.,* Slavonia, Jugoslavia; nr. Save R.; p. *15,176.*
Broken Hill, *c.,* N.S.W., Australia; silver, lead, zinc; ctr. wool-producing area; p. (1958) *33,720.*
Broken Hill, N. Rhodesia; comm. and mng. ctr., lead, zinc, vanadium; p. *30,000* (inc. *4,400* Europeans).
Bromberg, *see* **Bydgoszcz.**
Bromborough, *see* **Bebington and Bromborough.**
Bromley, *mun. bor.,* Kent, Eng.; residtl. sub. of London; p. (1951) *64,178.*
Bromsgrove, *urb. dist., old mkt. t.* Worcs., Eng.; 13 m. S.W. Birmingham; drop forging and rly. wagon wks., wrought ironwk., lt. engin.; p. (1951) *27,924.*
Bromyard, *urb. dist., mkt. t.,* Hereford, Eng.; hops, glove mkg., engin., floor-tiles; p. (1951) *7,206.*
Bron, *t.,* Rhône, France; p. (1954) *14,195.*
Bronx, one of the five boroughs of N.Y. City, U.S.A.; and connected by bridges with bor. of Manhattan; p. (1957) *1,422,410.*
Brookline, sub. of Boston, Mass., U.S.A.; residtl.; p. (1950) *57,589.*
Brooklyn, *bor.,* N.Y. City, connected with Manhattan Bor. by the Brooklyn, Manhattan and Williamsburgh Suspension Bridges across East R.; mainly residtl. with numerous mftg. and comm. interests; p. (1957) *2,594,871.*
Broom, *loch* on N.W. cst. of Ross and Cromarty, Scot.
Broome, *t.,* W. Australia; pearl fishing; p. *754.*
Brora, *t.,* Sutherland, Scot.; on E. cst., 12 m. N.E. of Dornoch Firth; ctr. of sm. coalfield; Harris Tweed ind.
Broseley, *mkt. t.,* Salop, Eng.
Brotton, *t.,* N.R. Yorks, Eng., nr. Guisborough.
Brough, *mkt. t.,* Westmorland, Eng.; in upper Vale of Eden, 4 m. N. of Kirkby-Stephen.
Broughshane, *vil.,* Antrim, N. Ireland.

Broughton, *par.*, Lancs, Eng.; iron- and copper-mines.

Broughty Ferry, *t.*, *wat. pl.* Angus, Scot., on Firth of Tay.

Brownhills, *urb. dist.*, Staffs, coal-mining; p. (1951) *21,482.*

Brownsville, *t.*, Texas, U.S.A.; livestock, sugar-cane; p. (1950) *36,066.*

Brown Willy, *mtn.*, Cornwall, Eng.; alt. 1,375 ft.

Brownwood, *t.*, Texas, U.S.A.; exp. cotton, grain, wool, poultry, dairy prod.; p. (1950) *20,181.*

Broxbourne, *t.*, Hertford, Eng.; on gravel terrace to W. of R. Lea about 20 m. N.E. of London; ctr. of very intensively cultivated district, mkt.-garden and glasshouse crops; light inds.; "dormitory" t. linked with London.

Bruay-en-Artois, *t.*, Pas de Calais, France; p. (1954) *31,923.*

Bruchsal, *t.*, Baden-Württemberg, Germany; tobacco, paper, machin.; p. (estd. 1954) *17,000.*

Bruck, *t.*, Austria; p. (1948) *14,467.*

Brue, *R.*, Somerset, Eng.

Bruges (Brugge), *t.*, *inland pt.*, Belgium; mkt.-hall with 13th-century belfry; univ.; impt. mkt. for grain, cattle, horses, engin., glass, textiles, lace; p. (estd. 1957) *52,278.*

Brühl, *t.*, N. Rhine-Westphalia, Germany; 8 m. S. of Cologne; cas.; lignite, iron, sugar refining; p. (estd. 1954) *31,100.*

Brunei, *Brit. protected state*, N. Borneo, intern. self-gov.; oilfields; cutch, rubber, sago; a. 2,226 sq. m.; p. (estd. 1956) *71,401*).

Brünn, *see* **Brno.**

Brunsbüttelkoog, *t.*, mouth of Elbe, canal opposite Cuxhaven, Germany; p. (estd. 1954) *10,100.*

Brunswick (Braunschweig), *c.*, Lower Saxony, Germany; on R. Oker; medieval bldgs.; printing, cars, machin., canning; p. (estd. 1954) *236,900.*

Brunswick, *t.*, Me., U.S.A.; p. (1946) *7,342.*

Brunswick, New, *see* **New Brunswick.**

Brussels, *c.*, *cap.* Belgium; town hall, palace, parliament houses, univ., museum; mnfs., lace, carpets, silk, cottons, rayon; p. (estd. 1957) *993,766* inc. subs.

Bryan, *t.*, Texas, U.S.A.; mkt. ctr.; cotton gins, compresses; oil mills; p. (1950) *18,102.*

Bryansk, *t.*, R.S.F.S.R.; sawmilling, engin. textiles chemicals, phosphates; p. (1959) *206,000.*

Brynmawr, *urb. dist.*, Brecon, Wales; iron, coal, steel, rubber goods; p. (1951) *6,524.*

Brzeg, (Brieg), *t.*, Silesia, Poland; German before 1945; on R. Oder; chemicals; p. (1946) *8,000.*

Brzezany, *t.*, Galicia, Ukraine, U.S.S.R.; leather.

Bua, *t.*, Fiji Islands, Pacific.

Bucaramanga, *t.*, Santander, Colombia; coffee, tobacco; p. (1951) *104,179.*

Buchan Ness, *C.*, nr. Peterhead, E. Scot.

Bucharest, *c.*, *cap.* Romania; cath.; palace, univ.; textiles, grain, chemicals, pharmaceutics, oil refinery, engin.; p. (1956) *1,236,906.*

Buckfast, S. Devon, Eng.; famous Abbey.

Buckfastleigh, *urb. dist.*, S. Devon, Eng.; wool, quarrying; p. (1951) *2,592.*

Buckhannon, *t.*, W. Va., U.S.A.; agr. and pastoral ctr.; coal, gas, lumber, leather; p. (1950) *6,016.*

Buckhaven, and Methil, *burgh*, Fife, Scot.; on N. side of Firth of Forth, 8 m. N.E. of Kirkcaldy; coal; p. (1951) *20,154.*

Buckie, *burgh*, Banff, Scot.; fisheries; p. (1951) *7,705.*

Buckingham, *co.*, England; wooded, beeches; includes Vale of Aylesbury; farming, dairy produce, ducks, sheep; mnfs., chairs, lace, paper; a. 743 sq. m.; p. (1951) *386,164.*

Buckingham, *mun. bor.*, Bucks, Eng.; on Ouse R.; agr. bricks; p. (1951) *3,944.*

Buckley, *urb. dist.*, Flint, Wales; small castings; p. (1951) *7,699.*

Bucyrus, *t.*, Ohio, U.S.A.; machine-mnfs.; p. (1950) *10,327.*

Buczacz, *t.*, Ukraine, U.S.S.R.; agr., horse breeding, distilling, tapestries; p. *11,120.*

Budafoc, *sub.* of Budapest, Hungary; p. *15,014.*

Budapest, *twin-cap.*, Hungary; Buda on right bank and Pest on left bank of Danube; parliament univ.; steel, textiles, chemicals, engin., oil refining; mineral springs; p. (estd. 1957) *1,850,000.*

Budaun, *t.*, Uttar Pradesh, India; sugar-cane, rice; ruins.

Bude, *see* **Stratton and Bude, Cornwall.**

Budejovice, *t.*, Czechoslovakia; pencils, beet, porcelain, anthracite; p. (1947) *38,194.*

Budge-Budge, *t.*, Bengal, India; hemp, rice; p. (1941) *24,183.*

Budleigh Salterton, *urb. dist.*, E. Devon; resort; p. (1951) *3,953.*

Buenaventura, *spt.*, Colombia, S. America; p. *14,515.*

Buenaventura, *t.*, Mexico; p. *2,122.*

Buenavista, *t.*, Mexico; on R. Yaqui; p. *140.*

Buenos Aires, *c.*, *cap.* Argentina; on R. La Plata, fine buildings, lgst. c. in S. hemisphere; univ.; tr. ctr.; carpets, cloth, cigars, boots and shoes, iron-ore; p. (estd. 1958) *3,771,500.*

Buenos Aires, *prov.*, Argentina; a. 118,467 sq. m.; treeless plain; sheep and cattle; cereals, fruit, tobacco; p. (estd. 1958) *5,292,800.*

Buffalo, *c.*, *pt.*, N.Y., U.S.A.; on L. Erie; iron, steel, oil refining, meat packing, brewing, shipbldg.; p. (1950) *580,132.*

Bug, *R.*, in Ukraine, flows into Black Sea; length 348 m.

Bug, *R.*, Poland; trib. of Vistula R.; since 1939 frontier between Poland and Ukraine S.S.R.

Buga, *c.*, Colombia, S. America; tr. ctr. for sugar, coffee, cacao; p. *19,595.*

Buganda, *prov.*, Uganda Protectorate, Brit. E. Africa; located W. of L. Victoria largely at alt. between 4,500 and 6,000 ft.; recognised as a native kingdom subject to indirect Brit. rule; intensive cultivation, cotton (ch. comm. crop), plantains, millets; cap. Kampala.

Builth Wells, *urb. dist.*, N. Brecknock, Wales; on upper course, R. Wye; medicinal springs; p. (1951) *1,708.*

Buitenzorg, *see* **Bogor.**

Bujalance, *c.*, Spain; 25 m. E. of Cordova; p. *15,728.*

Bukhara (Bokhara), *t.*, Uzbek S.S.R., U.S.S.R.; in Amu Darya valley at W. foot of Tien Shan; mkt. for cotton, sunflower seed, wheat grown in irrigated Bukhara Oasis; impt. tr. ctr. at W. terminus of ancient caravan route from China; linked by Trans-Caspian rly. to Krasnovodsk, by Turk-Sib. rly. to Novo Sibivsk; textiles; p. (1959) *69,000.*

Bukoba, *t.*, *pt.*, Tanganyika Terr., Brit. E. Africa; located midway along W. shore of L. Victoria; exp. coffee, rice, plantains and other foodstuffs to L. pts. in Kenya and Uganda.

Bukovina, Northern, formerly Romania, ceded to U.S.S.R. in 1940; now part of Ukraine; a. about 6,000 sq. km.; ch. t. Chernovitsy; Carparthian Mtns., forested; farming, cereals; cattle.

Bulawayo, *t.*, S. Rhodesia; impt. rly. and indus. ctr.; airpt.; agr. mnfs., tyre factory; p. *222,800* (incl. *38,000* Europeans).

Bulgaria, *rep.*, Eastern Europe; mountainous; Balkan Mtns., R. Danube N. boundary; climate: hot summer, cold winter, milder in S.; heavy summer rainfall; 5 lge. dams inc. Vassil Kolarov (1951), Stalin (1956); religion: Greek Orthodox; communications: main rail from Central Europe passes through to Istanbul; grain, wines, rose-oil, pigs, iron, manganese, copper, lead, zinc, pyrites, salt, chemicals, oil; a. 42,796 sq. m.; p. (1956) *7,629,254.*

Bulla, *t.*, Bourke, Victoria, Australia.

Bullawarra, *t.*, Queensland, Australia.

Bulle, *t.*, Switzerland; p. *4,644.*

Bulli, *t.*, N.S.W. Australia; on E. cst., 40 m. S. of Sydney; impt. coal-mining ctr.

Bulls, *bor.*, N.I., New Zealand; p. (1951) *693.*

Bultfontein, *t.*, C. of Good Hope, S. Africa; diamonds; p. *2,000.*

Bunbury, *t.*, *spt.*, W. Australia; on cst. 112 m. S. of Fremantle; pt. and comm. ctr. of lge. pastoral, agr., fruit growing and timber dist., lge. co-op. butter factory; p. (1957) *11,176.*

Buncrana, *urb. dist.*, Donegal, Ireland; salmon; p. (1951) *3,039.*

Bundaberg, *t.*, Queensland, Australia; on Burnett R.; sugar factories, timber, dairying, mining; p. (1957) *21,600.*

Bungay, *urb. dist.*, Suffolk, Eng.; on R. Waveney; printing, malting; p. (1951) *3,531.*

Bunker Hill, Charlestown, now part of Boston, Mass., U.S.A.; battle between Americans and British, 1775.

Buntingford, *mkt. t.*, Herts, Eng.; on E. Anglian Heights, 10 m. N.W. of Bishop's Stortford.

Bunzlau, *see* **Boleslawiec.**

Buraida, *t.*, Nejd, Saudi Arabia; p. *30,000.*

Burbank, *c.*, Cal., U.S.A.; airport, aeroplanes; p. (1950) *78,577.*
Burdur, *t.*, Turkey; p. (1950) *14,901.*
Bure, *R.*, Norfolk, Eng.
Burg, *t.*, Saxony–Anhalt, Germany; on Ihle Canal; leather goods, iron, furniture, machin.; p. (estd. 1954) *27,400.*
Burgas, *spt.*, Bulgaria; on Black Sea; copper, engin., chemicals, textiles; p. (1956) *72,795.*
Burgenland, *prov.*, Austria; a. 1,526 sq. m.; p. (1951) *276,136.*
Burgess Hill, *urb. dist.*, Sussex, Eng.; bricks, tiles; p. (1951) *8,524.*
Burghead, *burgh*, Moray, Scot.; on Moray Firth, 7 m. N.W. of Elgin; fisheries; p. (1951) *1,367.*
Burgh-le-Marsh, *mkt. t.*, Lincs, Eng.
Burglen, *vil.*, Altdorf, Uri, Switzerland; birthplace of William Tell.
Burgos, *t.*, Spain; cath.; hosiery, leather cloth; p. (1950) *74,677.*
Burgos, *prov.*, Old Castile, Spain; ch. t., Burgos; a. 5,425 sq. m.; p. (1950) *397,048.*
Burgstädt, *t.*, Saxony, Germany; N.W. of Chemnitz; textiles, machin.; p. (estd. 1954) *21,000.*
Burgundy, *old prov.*, N.E. France; composed largely of upper valley of R. Saône; famous vineyards; strategic position on route leading between plateau of Vosges and Jura Mtns. from Rhône valley to Rhine valley.
Burhanpur, *t.*, Madhya Pradesh, India; ancient walled Mogul city; textiles, brocades; p.*53,987.*
Burlington, *c.*, Iowa, U.S.A.; on bluffs of Mississippi R.; machin., furniture; p. (1950) *30,613.*
Burlington, *pt.*, Vt., U.S.A.; E. side of L. Champlain; state univ.; timber; p. (1950) *33,155.*
Burma (Union of), *rep.* 1948; ch. mtns.: Arakan Yoma, Pegu Yoma; chief rivers: Irrawaddy, Salween; forested; agr.: rice, fruit, tobacco; timber, teak; minerals; petroleum, precious stones, rubies, sapphires; inds.: carving, lacquer; cap. Rangoon; a. 261,789 sq. m., p. (estd 1954) *19,242,000.*
Burnham, *par.*, nr. Maidenhead, Berks, Eng.; public woodland, "Burnham Beeches."
Burnham, *t.*, *urb. dist.*, Somerset, Eng.; on Bridgwater Bay, 10 m. S. of Weston-super-Mare; resort; p. (1951) *9,136.*
Burnham-on-Crouch, *urb. dist.*, Essex, Eng.; yacht sailing, oysters, boat bldg.; p. (1951) *3,962.*
Burnie, *t.*, Tasmania, Australia; pastoral and agr., paper pulp mftg.; p. (1947) *7,235.*
Burnley, *industl. t.*, *co. bor.*, Lancs, Eng.; cotton, weaving, coal; p. (1951) *84,950.*
Burntisland, *royal burgh*, East Fife, Scot.; on F. of Forth, nr. Kirkcaldy; p. (1951) *5,668.*
Burra, E. and W., two Shetland Is., Scot.
Burray, one of the Orkney Is., Scot.
Burriana, *t.*, *spt.*, Spain; oranges, wine; p. *18,437.*
Burrinjuck, *t.*, N.S.W. Australia; on Murrumbidgee R., N. of Canberra; site of impt. dam providing irrigation in Riverina dist.
Burry Port, *urb. dist.*, Carmarthen, Wales; p. (1951) *5,927.*
Bursa, *c.*, Turkey; 60 m. S. Istanbul; fruits, carpets, tapestry; cap. of Bithynia prior to the Christian Era, and later of the Ottoman Empire; p. (1955) *131,336.*
Burslem, *t.*, part of Stoke-on-Trent, Staffs.
Burton-on-Trent, *industl. t.*, *co. bor.*, Staffs, Eng.; brewing, malting, rubber goods, engin., steel, footwear, chemicals; p. (1951) *49,169.*
Buru, *I.*, Indonesia; W. of Serang.
Burujird, *t.*, Persia; cotton, carpets; p. (1956) *49,228.*
Bury, *industl. t.*, *co. bor.*, S.E. Lancs.; on R. Irwell to S. of Rossendale Fells; cotton, textiles, engin., paper mkg.; p. (1951) *58,829.*
Bury St. Edmunds, *mun. bor.*, W. Suffolk; monastic remains; farm implements, brewing, sugar-beet processing; p. (1951) *20,045.*
Buryat-Mongolia, *rep.*, R.S.F.S.R., U.S.S.R.; ch. t. Ulan Ude; a. 150,192 sq. m.; p. (1939) *542,000.*
Busa, *t.*, Nigeria, W. Africa; on Niger R.; p. *1,000.*
Bushire, *spt.*, Iran; on Persian G.; exp. carpets, hides, tobacco, fruit, nuts, drugs, cotton; p. (estd. 1949) *25,000.*
Buskerud, *co.*, Norway; a. 5,738 sq. m.; p. (1950) *156,200.*
Busselton, *t.*, *spt.*, W. Australia; 150 m. S. from Perth; pastoral, agr., and dairying dist.; p. *916.*
Buta, *t.*, N. Belgian Congo; p. (1948) *9,262.*
Bute, *I.*, *co.*, Firth of Clyde, Scotland; 16 m. long and 3–5 m. broad; ch. t., Rothesay; a. 218 sq. m.; p. (1951) *19,285.*
Bute, Kyles of, *strait*, 6 m. between isle of Bute and Argyll.
Buton, *I.*, off coast of Celebes I., Indonesia.
Butt of Lewis, *promontory* with lighthouse; Lewis, Hebrides, Scot.
Butte, *c.*, Montana, U.S.A.; copper, lead, silver; p. (1950) *33,251.*
Buttermere, *vil.*, Cumberland, Eng.; tourist resort.
Buttermere, *L.*, Cumberland, Eng.; 1¼ m. long, ¾ m. wide.
Butterworth, *t.*, C. of Good Hope, S. Africa.
Buxton, *mun. bor.*, Derby, Eng.; wat. pl. nr. High Peak dist.; spa t.; p. (1951) *19,556.*
Buzau, *t.*, Romania; rly. ctr.; cath.; wheat, timber, petroleum; p. (1948) *43,365.*
Bydgoszcz (former German **Bromberg**), *t.*, Poland; on R. Ruda; engin., textiles, chemicals, lignite; p. (1957) *216,000.*
Byelorussia (White Russia), *constituent rep.*, U.S.S.R.; cap. Minsk; a. 81,090 sq. m.; p. (1959) *8,060,000.*
Byron C., most easterly point of Australia, Pacific coast of N.S.W.
Bytom (Beuthen), *t.*, Upper Silesia, Poland; German before 1945; coal, zinc, lead and iron mining; iron inds.; p. (1957) *179,000.*

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Cabanatuan, *cap.*, Nueva Ecija prov., Luzon, Philippines; tr. ctr.; p. (1948) *54,668.*
Cabeza, *sm. t.*, Spain; 86 m. E.S.E. of Badajoz; p. *11,762.*
Cabo Juby, Spanish terr. on Atlantic coast, N. of Rio de Oro, N. Africa.
Cabot Strait, entrance of Gulf of St. Lawrence between C. Breton I. and Newfoundland.
Cabra, *t.*, Spain; 30 m. S.E. of Córdova; college; p. *20,779.*
Cabrera I., Balearic Is.; in Mediterranean, 9 m. S. of Majorca; a. 8 sq. m.; penal settlement.
Cáceres, *prov.*, W. Spain; pastoral; a. 7,705 sq. m.; p. (1950) *549,077.*
Cáceres, *t.*, Spain; largest bull-ring in Spain, ancient Castra Caecilia; p. (1949) *44,729.*
Cachan, *t.*, Seine, France; p. (1954) *16,965.*
Cachar, *dist.*, Assam, India; most flourishing ctr. of tea-growing in India; a. 3,654 sq. m.
Cachoeira, *t.*, nr. Salvador, Brazil; p. *10,431.*
Cader Idris, *mtn.*, Merioneth, Wales; alt. 2,929 ft.
Cadillac, *t.*, Mich., U.S.A.; rubber tyres, wood and metal prod.; p. (1950) *10,425.*
Cadiz, *maritime prov.*, S. Spain; cap. Cadiz; a. 2,827 sq. m.; p. (1950) *700,396.*
Cadiz, *t.*, *spt.*, Andalusia, S. Spain; exp. sherry, cork, fruit, olive oil, tunny fish; univ.; p. (1950) *100,249.*
Caen, *c. cap.*, Calvados, France; fine church and abbey, tomb of William the Conqueror; univ.; iron ore, lace, gloves exported; scene of fierce fighting in Second World War, when it was severely damaged; p. (1954) *67,851.*
Caerleon, *urb. dist.*, Monmouth, Eng.; on R. Usk, 3 m. N.E. of Newport; Roman remains; agr. machin. tools, bricks; p. (1951) *4,711.*
Caernarvon, *t.*, *mun. bor.*, *cap.*, Caernarvonshire, N. Wales; on S. shore of Menai Strait; cas. where first Prince of Wales (Edward II) was christened; slate, bricks, plastics; p. (1951) *9,255.*
Caernarvonshire, *mtnous. marit. co.*, N. Wales; slate and stone quarries, lead-mines; oats, barley, sheep, cattle; highest peak, Snowdon (3,560 ft.); a. 569 sq. m.; p. (1951) *124,074.*
Caerphilly, *t.*, *urb. dist.*, Glamorgan, S. Wales; cas.; coal, iron, light inds.; p. (1951) *35,194.*
Caesarea, *t.*, on coast of Israel; once the official residence of the Herods and Roman Governors of Palestine.
Caesarea Mazaca, Turkey; once residence of Kings of Cappadocia; now tr. ctr.
Caeté, *t.*, Minas Geraes st., Brazil; at foot of Serra do Espinhaço, 50 m. E. of Belo Horizonte; lge. iron and steel wks.
Cagayan, *prov.*, Luzon, Philippine Is.; p. (1948) *311,083.*

Cagli, *t.,* prov. of Pesaro and Urbino, Italy; p. *12,145.*
Cagliari, Italian *prov.,* comprising S. half of Sardinia; a. 5,179 sq. m.; p. (1951) *667,355.*
Cagliari, *spt., cap.,* Sardinia, S. end of I.; cath. and univ.; exp. lead, zinc; p. (1951) *137,032.*
Cagnes-sur-Mer, *t.,* Alpes-Maritimes dep., France; Riviera resort; p. (1954) *11,066.*
Caha, *mtns.,* on boundary of Cork and Kerry, Ireland; cas.; highest point 2,249 ft.
Caher, *t.,* Tipperary, Ireland; on R. Suir; ancient cas. and abbey; p. (1951) *1,589.*
Cahirciveen, *t.,* Kerry, Ireland; p. (1951) *1,687.*
Cahors, *t., cap.,* Lot, France; cath.; distilleries, shoe factories; p. (1954) *15,384.*
Caibarien, *t.,* Cuba; sugar-shipping pt.
Caicos Is., *see* **Turks and Caicos Is.**
Cairngorm, *mtn.,* Inverness and Banff, Scot.; alt. 4,084 ft.
Cairns, *spt.,* Queensland, Australia; on Trinity Bay; fine sugar, tropical fruit growing, dairying, mining; p. (1957) *22,940.*
Cairntoul, *mtn.,* Inverness and Aberdeen, Scot.; alt. 4,241 ft.
Cairo, *c., cap.* Egypt; on R. bank of Nile at head of Nile delta; univ.; tourist ctr.; mnfs. cotton, paper, silk; p. (1951) *2,373,000.*
Cairo, Ill., U.S.A.; confluence of Mississippi and Ohio; extensive traffic; p. (1950) *12,123.*
Caister, *vil.,* N. of Yarmouth, Norfolk, Eng.; ruined cas.; holiday resort.
Caithness, *co.,* Scot.; most N. part of mainland; mountainous; herring fishery; poor agr.; quarrying; ch. ts. Wick, Thurso; a. 686 sq. m.; p. (1951) *22,705.*
Caivano, *industl. t.,* Italy; N.E. of Naples.
Cajalco Reservoir, S. Cal., U.S.A.; hill-top location nr. Riverside, 55 m. S.E. of Los Angeles; stores water brought 242 m. by aqueduct from Parker Reservoir on R. Colorado, for distribution throughout Los Angeles plain.
Cajamarca, *dep.,* N. Peru; mining and agr.; a. 12,538 sq. m.; p. (1947) *639,942.*
Cajamarca, *t., cap.,* Cajamarca prov., Peru; cottons, woollens, silver; p. (1947) *18,324.*
Calabar, *spt.,* S.E. Nigeria, W. Africa; exp. palm oil, kernels, rubber, ivory; p. *16,653.*
Calabozo, *t.,* N. Venezuela, S. America; cattle, agr., tr. ctr.; p. *7,123.*
Calabria, *region,* extreme S.W. Italy; mountainous and fertile; highest point Mt. Pollino 7,325 ft.; ch. R. Crati; cereals, wine, olives, fruit; copper, marble; tunny fish; a. 5,830 sq. m.; p. (1951) *2,042,690.*
Calafat, *t.,* Romania; on Bulgarian frontier, opp. Vidin.
Calahorra, *t.,* Logrono, Spain; cath.; fruit, wine; on R. Ebro; p. *13,199.*
Calais, *spt.,* Pas de Calais, N.E. France; cross-channel ferry pt. opposite to and 21 m. distant from Dover; lace, fishing; p. (1954) *60,340.*
Calais Maine, *t.,* U.S.A.; sawmills and shipyards; p. (1950) *4,589.*
Calama, *oasis,* Autofagosta prov., N. Chile; in Atacama Desert at foot of Andean Cordillera, 130 m. N.E. of Autofagosta on main rly. to La Paz; water from R. Loa supplies Autofagosta and used for irrigation locally; cotton, wheat, vegetables; p. *4,967.*
Calamar, *t.,* Bolivar dep., Colombia; on R. Magdalena 60 m. from mouth, also connected by rail to spt. Cartagena; handles traffic between Cartagena and Magdalena valley.
Calamianes Is., Philippine Is.; between Mindoro and Palawan Is.
Calañas, *commune,* S. Spain; pyrites, olives; p. *11,285.*
Calarasi, *t.,* S.E. Romania; on the Danube; comm. ctr.; p. *17,890.*
Calasiao, *t.,* Luzon, Philippines; hats; p. (1948) *23,269.*
Calatafimi, *commune,* Sicily; Garibaldi defeated Neapolitans, May 1860; p. *11,484.*
Calatayud, *t.,* Spain; 55 m. S.W. Saragossa; cas.; p. *18,419.*
Calbayog, *t.,* Samar, Philippine Is.; hemp trade, fisheries; p. (1948) *79,503.*
Calcutta, *c., spt.,* W. Bengal, India; on R. Hooghli; vast tr. from Ganges plain; univ.; jute-mills; exp. jute, cotton, sugar-cane, rice, tea, silk, coal; p. (with suburbs) (1951) *2,548,677.*
Caldas, *dep.,* Colombia, S. America; cap. Manizales; a. 5,160 sq. m.; p. (1947) *1,006,390.*
Calder, *t.,* S.W. Midlothian; shale mines, oilwks.; p. *3,200.*
Calder, *R.,* Lancs, Eng.; joins the Ribble.
Calder, *R.,* W.R. Yorks, Eng.; trib. of Aire R.
Calder Hall, Cumberland; first full-scale nuclear power sta. in world (1956) owned and operated by U.K. Atomic Energy Authority; power and plutonium prod.
Caldera, *spt.,* Atacama, Chile; p. *1,525.*
Caldwell, *t.,* Idaho, U.S.A.; p. (1950) *10,487.*
Caldy I., off Pembroke coast, Wales; lighthouse; monastery.
Caledonian Canal, from Moray Firth to Loch Linnhe, Scot., connecting North Sea with Atlantic; 62½ m. long; opened in 1822.
Calera, *t.,* Chile; rly. junction; p. *8,426.*
Calf of Man, *sm. I.,* S.W. I. of Man, Eng.; a. 620 acres.
Calgary, *ch. t.,* Alberta, Canada; ctr. of ranching country; lumber-mills, tanneries; p. (estd. 1958) *206,831.*
Cali, *t., cap.,* Valle del Cauca, Colombia; on Cauca R.; coal, coffee, copper; p. (1951) *243,463.*
Calicut, *see* **Kozhikode.**
California, most impt. of Pacific States, U.S.A.; mountainous and forested but fertile valleys; salubrious climate; rich in minerals, oil, natural gas, gold, silver, copper, steel; oil refining; films; fruit; cap. Sacramento; ch. pt. San Francisco, lgst. c. Los Angeles; has 279 incorporated cities; a. 158,693 sq. m.; p. (1950) *10,586,223.*
California Current, E. Pac. Oc.; flows N. to S. along cst. of Ore., and Cal., U.S.A.; relatively cold water; reduces summer temperatures and causes fog in cst. areas especially nr. San Francisco.
California, G. of, Mexico; 700 m.l.; inlet of Pac. Oc.
California, Lower, *terr.,* Mexico; between Gulf of C. and Pacific; cap. La Paz; chiefly a sterile region; some mineral wealth; a. 55,654 sq. m.; p. (1950) *287,366.*
Calimere Point, most S. point of Coromandel Coast, India.
Calistoga, *t.,* Cal., U.S.A.; tr. ctr., wine, grapes; hot springs; p. *1,124.*
Callan, *rural dist., t.,* Kilkenny, Ireland; on the King's R.; p. (1951) *6,632.*
Callander, *mkt. t., burgh,* Perth, Scot.; on R. Teith, 15 m. N.W. of Stirling; "the gate of the Highlands," tourist resort; p. (1951) *1,727.*
Callao, *dep.,* Peru; cap. C.; a. 14 sq. m.; p. (1947) *87,553.*
Callao, *t., spt.,* cap. Callao dep., Peru; linked by rly. to Lima; exp. sugar, cotton; p. (estd. 1950) *87,587.*
Calne, *mkt. t., mun. bor.,* Wilts, Eng.; on Marlan R.; dairying, food processing; p. (1951) *5,552.*
Calonne-Ricouart, *commune,* Pas-de-Calais dep., France; coal; p. (1954) *10,897.*
Calota, gold-field dist., Colombia, S. America.
Calstock, *t.,* E. Cornwall, Eng.; on Tamar estuary.
Caltagirone, *c.,* Catania, Sicily; cath.; local mkt.; p. *38,178.*
Caltanissetta, *t., cap.,* Caltanissetta prov., Sicily, Italy; cath.; sulphur; p. (1951) *60,303.*
Caluire-et-Clare, *t.,* Rhône, France, on Saône R.; coal; p. (1954) *19,886.*
Calumet, *t.,* Mich., U.S.A.; on peninsula in L. Superior; copper-mining; p. *1,460.*
Calvados, *dep.,* N.W. France; cap. Caen; livestock, dairying, fisheries, textiles, liqueur brandy; a. 2,197 sq. m.; p. (1954) *442,991.*
Calvi, *spt.,* N.W. cst., Corsica; fishing; p. *2,035.*
Calvinia, *t.,* C. of Good Hope, S. Africa; p. *3,627.*
Cam, *R.,* Cambridge, Eng.; trib. of Ouse; length 40 m.
Camagüey, *prov.,* Cuba, W. Indies; a. 10,169 sq. m.; p. (1943) *487,076.*
Camagüey, *t., cap.,* Camagüey, Central Cuba; p. (1943) *80,509.*
Camagüey, *t.,* Peru; sugar-cane; p. (1947) *155,827.*
Camajore, *t.,* Central Italy; foot of Apuan Alps, in prov. of Lucca; old church.
Camana, *t.,* Peru; p. *2,253.*
Camargue, *delta dist.,* Bouches-du-Rhône, France; at mouth of R. Rhône; famous col. of flamingoes; a. 300 sq. m.
Camarihes Norte, *prov.,* Luzon, Philippine Is.; mtns. and fertile land; agr., minerals; cap. Daet; a. 829 sq. m.; p. *98,324.*

Camas, *t.,* Wash., U.S.A.; agr., pulp, paper, fruit canning; p. (1950) *4,725.*
Camberwell, *metropolitan bor.,* London, Eng.; p. (1951) *179,729.*
Cambodia, *ind. st.,* Indo-China, formerly within the French Union, contains the great Tonlesap L.; cap. Phnompenh on Mekong R.; agr., rice, rubber, maize, pepper, livestock, kapok, fisheries, car assembly, cigarette mkg.; a. 67,550 sq. m.; p. (estd. 1958) *5,040,000.*
Cambodia, C., extreme S. of Cambodia, Indo-China.
Camborne, *t.,* Cornwall, Eng.; 11 m. S.W. Truro; old tin- and copper-mines; engin., textiles and chemicals; p. (Camborne–Redruth urb. dist., 1951) *35,829.*
Cambrai, *t.,* Nord dep., France; on Schelde R.; linen, brewing, soap; p. (1954) *29,567.*
Cambridge, *co.,* Eng.; flat, Fens in N.; Rs. Ouse, Nen, Cam; wheat oats potatoes, fruit, dairying, light engin., light inds.; a. 877 sq. m.; p. (1951) *166,863.*
Cambridge, *mun. bor., univ. c., co. t.,* Cambridge, Eng.; on Cam R.; univ.; radio, scientific instruments, asphalt, boat bldg.; p. (1951) *81,463.*
Cambridge, *t.,* Md., U.S.A.; oysters; p. (1950) *10,351.*
Cambridge, *c.,* Mass., U.S.A., 3 m. from Boston; seat of Harvard Univ.; p. (1950) *120,740.*
Cambridge, *t.,* Ohio, U.S.A.; coal, iron, clay, oil; glassware, pottery; p. (1950) *14,739.*
Cambuslang, *par.,* Lanark, Scot.; turkey red dye-works, hosiery, engin.; on Clyde R.; p. (1951) *26,861.*
Camby, G., separates Kathiawar Peninsula from Bombay State, India.
Camden, *mftg. and residtl. c.* N.J., U.S.A.; on Delaware R., suburban and opposite Philadelphia; iron foundries, chemicals, glass, wireless sets, shipbldg.; p. (1950) *124,555.*
Camden Town, *industl. and residtl. dist.,* London, Eng.; N.E. of Regent's Park.
Camel, *R.,* E. Cornwall, Eng.; length 30 m.
Camerino, *c.,* Macerata, Central Italy, in Apennines; the ancient Camerium annexed to Papal States in 16th century; univ. cath.
Cameron, *c.,* Texas, U.S.A.; p. (1950) *5,052.*
Cameron Bay, *t.,* N.W. Terr., Canada; by Gr. Bear Lake; radium.
Cameroon, Rep. of the, W. Africa; formerly French Cameroons, granted independence 1 Jan. 1960; a. 166,489 sq. m.; cap. Yaoundé; timber, cocoa, palm kernels, palm oil, groundnuts, bananas, coffee; p. (est. 1950) *2,997,000.*
Cameroons, Northern, W. Africa; trust terr. adm. by Nigeria prior to independence (1960); pending plebiscite (1960–61) adm. by Britain; a. 34,081 sq. m.; palm prod., cocoa, bananas; Mt. Cameroon rises 13,250 ft.; p. (1956) *1,440,509.*
Camiguin, *I.,* Philippines; in Mindanao Sea; mtns.; sugar, rice, tobacco; a. 96 sq. m.; p. (1948) *60,099.*
Campagna, Italy; malarial coastal plain round Rome; now being drained; new commune of Latina founded 1932.
Campanha, *t.,* Minas Geraes, Brazil; industl.
Campania, *region,* S. Italy; ch. t. Naples; a. 5,250 sq. m.; p. (1951) *4,338,699.*
Campaspe, *R.,* Victoria, Australia; rises in Grampian Mtns., flows N. into R. Murray at Echuca; supplies water for irrigated area between Rochester and Echuca; length, 140 m.
Campbellford, *t.,* Ontario, Canada; lumber, flour, wool, leather goods; p. *3,018.*
Campbellton, *t., spt.,* New Brunswick, Canada; lumbering, fishing; p. *6,748.*
Campbelltown, *t.,* N.S.W., Australia; p. (1958) *12,440.*
Campbeltown, *burgh, spt.,* Argyll, Scot.; on Firth of Clyde cst. of peninsula of Kintyre; distilling, fishing; p. (1951) *7,169.*
Campeche, *st.,* Yucatan, Mexico; hot, flat and unhealthy; rice, cotton, logwood, chicle, sisal; a. 19,670 sq. m.; p. (1950) *122,093.*
Campeche, *cap. t. of st., spt.,* Mexico; on G. of Mexico; exp. logwood, sisal, hemp; p. (1950) *23,277.*
Camperdown, *t.,* Victoria, Australia; dairying dist.; p. *3,029.*
Camperdown, *vil.* on dunes, N. Holland, Netherlands; battle 1797.
Campinas, *t.,* Brazil; 55 m. N. of São Paulo; p. (1950) *101,746.*
Campine or **Kempenland,** *dist.,* provs. Limburg and Antwerp, Belgium; coalfield.
Campo Belo, *t.,* Minas Geraes st., Brazil; 200 m. by rail N.E. of Rio de Janeiro; impt. cattle ctr.
Campobasso, *prov.,* Abruzzi and Molise, Italy; among the Apennines; a. 1,692 sq. m.; p. (1951) *406,476.*
Campobasso, *fortfd. t.,* 50 m. N.E. Naples, Italy; famous for cutlery and arms; p. (1951) *28,538.*
Campobello di Licata, *t.,* Sicily; sulphur-mines.
Campobello di Massara, *t.,* Sicily; quarrying.
Campos, *c.,* Rio de Janeiro, Brazil; coffee, sugar; p. *52,677.*
Campsie Fells, *range of hills,* Stirling, Scot.; highest point, 1,894 ft.
Campton, *t.,* N.H., U.S.A.; resort; p. *1,130.*
Campulung, *t.,* Muscel, Romania; N.W. of Bucharest; first cap. of Wallachia; summer resort; p. (1948) *18,174.*
Canada, Dominion of, N. America; dominion founded 1867, and now inc. all Brit. N. American Federation of ten provinces; Nova Scotia, New Brunswick, Prince Edward I., Quebec, Ontario, Manitoba, Saskatchewan, Alberta, Brit. Columbia, Newfoundland with Labrador, and the terr. of Yukon and N.W. Territories (Franklin, Keewatin, Mackenzie); cap. Ottawa; Great Lakes; Rocky Mtns.; Great Plains; St. Lawrence, Saskatchewan, and Mackenzie Rs.; extreme climate, Pacific seaboard mild; coniferous forest belt except for Central grasslands, tundra in N.; agr.: wheat, oats, dairying; pulp, paper; coal, gold, copper, nickel; fisheries; furs; hydro-electric power; impt. mnfs.; a. 3,845,774 sq. m.; p. (1956) *16,080,791.*
Canadian Coast Range, *mtns.,* B.C., W. Canada; extend N.W. to S.E. along cst.; penetrated by deep inlets (fjords) with very little cst. plain; drained by short, swift Rs., crossed only by R. Skeena in N., R. Frazer in S., which give access to interior; marked climatic barrier, to W. equable climate with heavy all-year rain, to E. more extreme semi-arid climate, especially on valley floors.
Canadian R., trib. (flowing from New Mexico) of Arkansas R., U.S.A.; length 900 m.
Canajoharie, *t.,* N.Y., U.S.A.; agr., dairying; food packing; p. (1950) *2,761.*
Canal du Centre, *canal,* Saône-et-Loire dep., France; links Rhône–Saône valley at Chalon-sur-Saône with R. Loire at Digoin; serves Le Creusot Coalfield; length 60 m.
Canal Zone, Panama; strip of land leased to U.S.A. for Panama Canal; a. 648 sq. m. (276 sq. m. water); p. (1948) *47,462.*
Cañanea, *spt.,* Brazil; S. of Santos.
Cananea, *t.,* Mexico; cattle, copper, silver, lead, zinc; p. *11,006.*
Cañar, *prov.,* Ecuador; cap. Azoques; Inca remains; agr., Panama hats; a. 1,521 sq. m.; p. (1950) *97,681.*
Canaries Current, *ocean current;* flows S. along N.W. cst. of Africa from Casablanca to C. Verde; relatively cold and has very marked cooling effect on Saharan coastlands.
Canary Is., or **Canaries,** N. Atl. Oc.; group of 7 Is. belonging to Spain, 60 m. off cst. Africa and 700 m. S. of Gibraltar; compr. Tenerife I., the lgst. (cap. Santa Cruz), Gran Canaria (cap. Las Palmas), Palma, Gomera, Hierro, Fuerteventura, Lanzarote; tropical produce; ch. exp., bananas, oranges, tomatoes, vegetables and tobacco; wine, cochineal; a. 4,685 sq. m.; p. (1948) *790,897.*
Canastota, *t.,* N.Y., U.S.A.; engin., furniture, plastics; p. (1950) *4,458.*
Canberra, Australian Capital Territory, Australia; in Gr. Dividing Range (alt. *c.* 6,000 ft.) 200 m. S.W. of Sydney; *seat of govt.* of Commonwealth; 911 sq. m.; p. (of territory) (1955) *30,390.*
Cancale, *t.,* Ille-et-Vilaine dep., N. France; St. Michael's Bay; oysters; p. (1954) *5,463.*
Candia (Herakleion), *cap.,* Crete; midway along N. cst.; olive oil, raisins; p. (1951) *54,541.*
Candon, *t.,* Luzon, Philippines; p. (1948) *22,362.*
Canea, *see* Khania.
Canelones, *dep.,* Uruguay; wine; a. 1,834 sq. m.; p. (1953) *201,359.*
Cañete, *sm. spt.,* Lima dep., Peru, S. America; 75 m. S.E. of Callao; exp. cotton grown under irrigation in Canete valley.
Cangas de Onis, *commune,* Spain; agr., cattle; coal, copper, tanning; p. *9,936.*
Cangas de Tineo, *t.,* Oviedo, Spain; nr. N. cst., 35 m. E. of Oviedo; woollens, linens; p. *24,000.*
Canicatti, *t.,* Sicily; sulphur; in fruit-growing dist.; p. *27,860.*

Canna, *sm. I.*, Hebrides, Scot.; basaltic pillars.
Cannanore, *t.*, Madras, India; exp. timber, coconuts; p. (1941) *27,700*. [*11,601*.
Cannet (Le), *t.*, Alpes-Maritime, France; p. (1954)
Cannes, *spt.*, dep. Alpes-Maritimes, France; 20 m. S.W. Nice; famous winter resort; perfumes; p. (1954) *50,192*.
Cannock and Hednesford, *urb. dist.*, Staffs, Eng.; on S.W. flank of Cannock Chase, 7 m. N.E. of Wolverhampton; coal-mng., engin., bricks, tiles, tools, elec. goods, car parts; p. (1951) *40,927*.
Canonsburg, *bor.*, Penns., U.S.A.; coal, gas, oil; p. (1950) *12,072*.
Canopus, *anc. c.*, Lower Egypt; gr. temple to Serapis.
Canosa, *t.* Apulia, S. Italy; cath.; the Roman Canusium; ctr. of olive-growing dist.; p. *27,341*.
Cantabrians, *mtns.*, N. Spain, from Pyrenees to Cape Finisterre, hgst. pk. Peña Vieja (8,736 ft.).
Cantal, *mountainous dep.*, Central France; mineral springs, grain, dairying; coal, marble; cap. Aurillac; a. 2,229 sq. m.; p. (1954) *177,065*.
Canterbury, *c.*, *co. bor.*, Kent, Eng.; at foot of N. Downs on R. Stour; famous cath. founded A.D. 597 by St. Augustine; shrine of the murdered Thomas à Becket, a place of pilgrimage for centuries; fruit growing, tanning; p. (1951) *27,778*.
Canterbury, *prov. dist.*, S.I., N.Z.; cap. Christchurch; a. 13,940 sq. m.; p. (estd. 1958) *323,629*.
Canterbury Plains, rich grazing and wheat-growing dist. S.I., N.Z.; along E. cst., famous for "Canterbury Lamb"; ch. t. Canterbury; ch. pt. Lyttelton.
Cantho, *t.*, Indo-China; on Mekong R.; rice, fish; tr. ctr.; p. *27,000*.
Canton, **(Kuangchou)** *ch. c.*, former treaty pt., Kwangtung, S. China; 90 m. N.W. Hong Kong; exp. silk, tea, matting; impt. tr. ctr.; p. (estd. 1952) *1,496,000*.
Canton, *t.*, Ill., U.S.A.; mnfs.; p. (1950) *11,927*.
Canton, *industl. and agr. t.*, Ohio, U.S.A.; coal, farm machin., engin.; p. (1950) *116,912*.
Canton R., *see* **Chukiang**.
Canvey I., *urb. dist.*, Essex; fronting the Thames; bungalow resort; radio components, bookbinding, iron and wire wk., oil storage.
Cap Haitien, *spt.*, Rep. of Haiti; on N. cst.; bombarded by British 1865; est. p. *40,000*.
Capannori, *t.*, Lucca, Italy; silk ind.; p. *39,527*.
Cape Breton I., Nova Scotia, E. Canada; farming, timber, fishing; ch. t. Sydney; a. 3,120 sq. m.
Cape Canaveral, E. Fla., U.S.A., on Atl. Oc., seaward extremity of barrier is. sheltering Bahama R. Lagoon; mil. base for testing missiles.
Cape Chidley, *I.* off N. point of Labrador.
Cape Coast, *t.*, Ghana; on cst. 60 m. S.W. of Accra; palm oil; p. (1948) *23,061*.
Cape Giradeau, *t.*, Mo., U.S.A.; p. (1950) *21,578*.
C. of Good Hope, *prov.*, Union of S. Africa; physical features: Drakensberg Mtns., Orange and Caledon R., Gr. Karroo, Lit. Karroo; scanty rain except S. and E. cst.; maize, fruit; sheep, goats; minerals, diamonds; races: Dutch, British, Bantu; cap. Cape Town; p. of the Colony proper and E. Griqualand, Transkei, Tembuland, Pondoland, Bechuanaland; a. 277,137 sq. m. (inc. Walvis Bay); p. (1951) *4,417,330*, of whom *935,674* are whites.
C. of Good Hope, S. Africa; famous headland, S. of Cape Town, 1,000 ft. high.
Cape Town, *c.*, *spt.*, cap. of C. of Good Hope prov., and legislative cap. of Union of S. Africa; on Table Bay, 30 m. N. of C. of Good Hope; communication by rail direct with Rhodesia, Transvaal, Orange and Natal; docks; cath.; exp. wool, gold, diamonds; p. (1951) *571,638* (inc. approx. *250,000* whites).
C. Verde Islands, Portuguese Is., in Atlantic, 350 m. W. of C. Verde, Africa; divided into two groups, Barlavento (Windward) and Sotavento (Leeward); 15 Is. and islets; a. 1,557 sq. m.; agr., sugar, and fruit-growing; cap. Praia; São Vicente coaling sta. for all navigation to S. America; p. (1950) *147,328*.
Capernaum (Tell Hum), *ruins*, in time of Christ impt. place in Palestine, on the N. shore of the L. of Galilee.
Capis, *prov.*, Panay, Philippines, mnfs.; p. *466,000*.
Capo d'Istria, *spt.*, Jugoslavia; cath., old fort; Austro-Italian disputes over ownership since very early days; p. *11,995*.
Cappoquin, *t.*, Waterford, R.o.I. on Blackwater R.
Capraja, Italian I. in the Mediterranean, 16 m. E. Corsica; anciently called Capraria.
Caprera, Italian I. off N.E. Sardinia, where Garibaldi lived.
Caprese, *commune*, Tuscany, Italy; birthplace of Michelangelo; p. *3,195*.
Capri, *I.* and *t.*, in Bay of Naples; tourist resort; residence of Augustus and Tiberius; the ancient Caprae; famous Blue Grotto; fine wines; p. (*t.*) *4,500*; (*I.*) *8,050*.
Capua, *ancient fort. c.*, Campania, Italy; 20 m. N. of Naples; founded by the Etruscans, came under Roman rule, sacked by the Saracens; modern t. 2 m. N. of site of ancient Casilinum; fireworks-mkg.; cath.; p. *14,375*.
Carácas, *cap.*, Venezuela; 8 m. inland from its pt., La Guaira; alt. about 3,000 ft.; cath.; univ.; coffee, cacao, textiles, soaps, iron-ore, p. (1950) *487,903*.
Caravaca, *t.*, Murcia, Spain; iron, tanning; p. *21,560*.
Carballo, *t.*, Corunna, Spain; industl.; p. *18,159*.
Carbon County, N. Utah, U.S.A.; contains immense reserves of good coking coal suitable for blast furnaces; not yet developed.
Carbondale, *t.*, Penns., U.S.A.; anthracite; p. (1950) *16,296*.
Carbonia, *t.*, Sardinia; built 1937–38 nr. lignite and barite area; p. *12,000*.
Carcagente, *t.*, W. of Cullera, Valencia, Spain; oranges; p. (1955) *18,002*.
Carcar, *t.*, Cebu, Philippine Is.; sugar ind.; p. (1948) *32,818*.
Carcassonne, *t.*, Aude, France; on Aude R.; historic citadel guarding impt. routeway from Aquitaine to Rhône valley; farm implements; wines, cloth; p. (1954) *37,035*.
Carchi, *prov.*, Ecuador; cap. Tulcan; a. 1,495 sq. m.; p. (1950) *76,595*.
Cardamon Hills, Travancore, S. India; forms extreme S.W. edge of Deccan plateau; drained W. by R. Periyan, E. by R. Vaigai; rainfall less seasonal than over most of India; "China" tea plantations on middle slopes; rise to over 8,000 ft. alt.
Cardenas, *t.*, Matanzas, Cuba; sugar, tobacco; p. *37,144*.
Cardiff, *cap. c.*, *spt.*, *co. bor.*, Glamorgan, Wales; univ. coll.; docks, coal, iron, steel, engin., elect. goods, brewing, paper; p. (1951) *243,627*.
Cardigan, *mun. bor.*, *co. t.*, Cardigan, S. Wales; on Teifi R.; p. (1951) *3,497*.
Cardigan Bay, *lge. bay*, W. Wales, 70 m. extent N. and S.
Cardiganshire, *maritime co.*, S. Wales; mountainous; mainly agr., mines and quarries; a. 692 sq. m.; p. (1951) *53,267*.
Cardona, *t.*, Barcelona, Spain.
Cardross, *industl. vil.*, Dunbarton, Scot.; on R. Clyde; death of King Robert Bruce.
Cardwell, *t.*, Queensland, Australia; harbour; gold-mining dist.
Carey, *t.*, Ohio, U.S.A.; mkt. gardening; p. (1950) *3,260*.
Cargenbridge, *t.*, Kirkcudbright, Scot.; chemicals, plastics.
Caribbean Sea, between W. Indies and Central and S. America; a. 7,500 sq. m.
Caribou Range, *mtns.*, B.C., W. Canada; mass of ancient crystalline rocks inside the gr. bend of R. Frazer; widespread occurrence of lode and alluvial gold; mainly above 5,000 ft.
Caribou, *t.*, Maine, U.S.A.; p. (1950) *9,923*.
Caribrod, *t.*, Jugoslavia; on Nisava R.; p. *4,000*.
Carimata I., off S.W. Borneo, Indonesia.
Carinthia, *prov.*, Austria; cap. Klagenfurt; mountainous; mineral springs; rye, oats; lead, iron; a. 3,681 sq. m.; p. (1951) *474,764*.
Carisbrooke, *t.*, I. of Wight, Eng.; cas. prison of Charles I (1647–8); p. (1951) *5,232*.
Carlingford, *t.*, *spt.*, Louth, Ireland; on Carlingford Bay; oysters.
Carlingford, Lough, *inlet* of sea between Down and Louth, Ireland.
Carlinville, *t.*, Ill., U.S.A.; bricks and tiles, agr. machin.; p. (1950) *5,116*.
Carlisle, *c.*, *co. bor.*, Cumberland, Eng.; on Eden R.; 8 m. from Solway Firth; impt. route ctr.; ancient cas. and cath.; textiles, biscuits, metal boxes; p. (1951) *67,894*.
Carlisle, *bor.*, Penns., U.S.A.; boots and shoes; p. (1950) *16,812*.

Carloforte, *t.*, San Pietro I., Sardinia, Italy; tunny fishery; p. *7,825*.
Carlow, *co.*, Leinster, Ireland; co. t., Carlow; a. 346 sq. m.; p. (1956) *33,854*.
Carlow, *t.*, Ireland; brewing milling; p. (1951) *7,667*.
Carlsbad, *see* **Karlovy Vary.**
Carlsbad Cavern, N.M., U.S.A.; gr. cave in limestone through which flows R. Pecos; stalactites, stalagmites; tourist attraction; length 4,000 ft., width 600 ft., height of roof 300 ft.
Carlsruhe, *see* **Karlsruhe.**
Carlstadt, *bor.*, N.J., U.S.A.; brass, marble; p. (1950) *5,591*.
Carlton, *urb. dist.*, Notts, Eng.; 2 m. N.E. of Nottingham; lace, hosiery; p. (1951) *34,248*.
Carluke, *t.*, *par.*, Lanark, Scot.; engin.; p. (1951) *11,415*.
Carmagnola, *mftg. t.*, N. Italy; on Melba R.; p. *12,241*.
Carmarthen, *mun. bor.*, *co. t.*, Carmarthenshire, Wales; on Towy R.; anthracite, limestone quarrying; p. (1951) *12,121*.
Carmarthen Bay, Carmarthen, Wales; 18 m. across.
Carmarthenshire, *co.*, S. Wales; co. t., Carmarthen; mountainous; mining; mainly pastoral land; a. 920 sq. m.; p. (1951) *171,742*.
Carmaux, *t.*, Tarn, France; glass mftg.; p. (1954) *11,485*.
Carmel, Mt., Israel; alt. 1,932 ft.
Carmen de Bolivar, *spt.*, Campeche Bay, Mexico.
Carmona, *t.*, Spain; olives, wine, fruit; p. *24,876*.
Carnac, *vil.*, Morbihan, N.W. France; S.E. of Lorient; prehistoric stone monuments and circles.
Carnarvon, *t.*, W. Australia; on R. Gascoyne; p. *845*.
Carnatic, *dist.*, Madras, India; British conquest 1783.
Carnegie, *bor.*, Penns., U.S.A.; steel, iron; p. (1950) *12,105*.
Carnegie, *L.*, W. Australia.
Carnew, *t.*, Wicklow, Ireland; granite, slate.
Carnforth, *t.*, *urb. dist.*, Lancs, Eng.; rly. ctr.; p. (1951) *3,388*.
Carnoustie, *burgh*, Angus, Scot., on N. Sea; 6 m. S.W. of Arbroath; summer resort; p. (1951) *5,195*.
Carnsore Point, S. Wexford, Ireland.
Carntogher Mtns., *range of mtns.*, Londonderry, N. Ireland.
Carnwath, *vil.*, Lanark, Scot.; coal, shale, iron.
Caro, *t.*, Mich., U.S.A.; sugar-beet refining; p. (1950) *3,464*.
Carolina, *see* **N. and S. Carolina.**
Caroline Is., *archipelago* in W. Pac. Oc.; about 549 in number, lying between the Philippines and the Marshall Gr., former Japanese mandate now part of U.S. Pac. Trust Terr.; ch. exp. copra.
Caroni R., Venezuela, S. America; trib. of Orinoco; 400 m.
Carpathian Mtns., *range* separating Czechoslovakia and Hungary from Galicia, and Transylvania from Moldavia, 805 m. long; highest point, Tatra 8,740 ft.
Carpentaria, G. of, North Australia; between C. Arnhem and C. York.
Carpentras, *c.*, Vaucluse, France; on R. Auzon; many antiquities; p. (1954) *15,076*.
Carpi, *industl. t.*, Modena, Central Italy; cath.; p. *33,000*.
Carrantuohill Mtn., Kerry, Ireland; loftiest in Magillicuddy's Reeks and all Ireland, alt. 3,414 ft.
Carrara, *t.*, Massa-e-Carrara, Central Italy; famed for white marble; p. (1951) *50,192*.
Carreño, *commune*, Oviedo prov., Spain; cattle, fishing, sardine canning; p. *10,009*.
Carrickfergus, *spt.*, *mun. bor.*, Antrim, N. Ireland; on N. shore of Belfast Lough; salt mines, textiles; p. (1951) *8,650*.
Carrickmacross, *mkt. t.*, *urb. dist.*, Monaghan, Ireland; p. (1951) *2,045*.
Carrick-on-Shannon, *co. t.*, *rural dist.*, Leitrim, Ireland; p. (of dist.) (1951) *8,261*.
Carrick-on-Suir, *mkt. t.*, *urb. dist.*, Tipperary, Ireland; coal, timber; p. (1951) *4,757*.
Carrizal-Alto, *t.*, Atacama prov., Chile; copper-mines.
Carrizal-Bajo, *t.*, Atacama prov., Chile; port for Carrizal-Alto, 25 m. E.
Carrollton, *t.*, Ga., U.S.A.; textiles; p. (1950) *7,753*.
Carron, *vil.*, Stirling, Scot.; nr. Falkirk; famous ironwks.
Carron, Loch, *inlet*, W. cst., Ross and Cromarty, Scot.; followed by rly. from Dingwall to Kyle and Lochalsh.
Carse of Gowrie, Perth, Scot.; fertile cstl. dist. between Perth and Dundee, S. of Sidlaw Hills; sm. fruits, especially raspberries.
Carshalton, *urb. dist.*, Surrey, Eng.; nr. Croydon; chemicals; p. (1951) *62,804*.
Carson City, *st. cap.*, Nevada, U.S.A.; silver- and gold-mining dist.; p. (1950) *3,082*.
Carstairs, *vil.*, Lanark, Scot.; N.E. of Lanark t.
Cartagena, *spt.*, *cap.*, dep. Bolivar, Colombia, S. America; shares with Barranquilla tr. brought down Magdalena R.; exp. hides, gold; p. (1951) *110,504*.
Cartagena, *spt.*, Murcia, E. Spain; fine wharves and harbour; naval arsenal; cath.; exp. hides, gold; p. (1950) *113,160*.
Cartago, *t.*, Cauca, Colombia, S. America; p. *14,750*.
Cartago, *prov.*, Costa Rica, Central America; cap. C.; coffee, fruits; p. (1950) *100,725*.
Carteret, *bor.*, N.J., U.S.A.; metal and oil refining, chemicals, tobacco; p. (1950) *13,031*.
Carter Fell, *mtn.*, Northumberland, Eng., 1,815 ft.
Carterton, *bor.*, Wellington, N.I., New Zealand.
Carthage, *c.*, N.E. Tunis, N. Africa; with ruins of ancient Carthage, destroyed by the Romans 146 B.C.
Carthage, *t.*, Mo., U.S.A.; coal; p. (1950) *11,188*.
Cartmel, *par.*, Lancs, Eng.; near Ulverston.
Carupano, *spt.*, Venezuela, S. America; nr. Cumana; p. *16,548*.
Carvine, *t.*, Pas-de-Calais, France; p. (1954) *15,780*.
Casablanca, autonomous c., Morocco, N. Africa; p. (estd. 1947) *551,322*.
Casablanca, *t.*, Valparaiso, Chile.
Casa Branca, *t.*, S.E. of Lisbon, Portugal.
Casale, *t.*, Piedmont, Italy; cath.; cement; p. *37,703*.
Casalmaggiore, *t.*, Italy; on R. Po, near Parma; p. *15,012*.
Casas Grandes, *t.*, N.W. Chihuahua st., Mexico; Aztec ruins; p. *2,000*.
Cascade Range, N. America; extends N. and S. through Brit. Columbia, Washington and Oregon between Rocky Mtns. and Pacific cst. Highest peak, Mt. Rainier, 14,408 ft.
Cascade Tunnel, longest rly. tunnel in N. America, Wash., U.S.A.; carries trunk rly. from Spokane to Seattle through Cascade Mtns.; length 7¾ m.
Cascina, *t.*, Pisa, Italy; on R. Arno; silk mnfs.
Caserta, *t.*, Italy; on N. edge of Plain of Naples; royal palace; cath.; silks; p. (1951) *44,340*.
Cashel, *c.*, *urb. dist.*, Tipperary, Ireland; cath. (ruined) on Rock of Cashel; p. (1951) *2,829*.
Casino, *t.*, N.S.W., Australia; p. (1958) *8,360*.
Casiquiare, *R.*, Venezuela, joins Orinoco to the Rio Negro, a trib. of the Amazon.
Caspe, *t.*, Spain; on R. Guadalupe; p. *9,033*.
Casper, *t.*, Wyo., U.S.A.; petroleum; p. (1950) *23,673*.
Caspian Sea, U.S.S.R.; 760 m. long, 270 m. wide, 170,000 sq. m., between Asia and Europe; lgst. inland sea in the world; surface 85 ft. below ocean; fisheries; pts.: Astrakhan, Baku, Derbent.
Casquets, *dangerous rocks*, 7 m. W. of Alderney, Channel Is; lighthouse.
Cassaba (Kassaba), *see* **Turgutlu.**
Cassel, *t.*, *see* **Kassel.**
Cassilis, *t.*, N.S.W., Australia; 115 m. N.W. of Newcastle in impt. gap in Gr. Dividing Range between Hunter and Liverpool Ranges, giving access from Newcastle to interior.
Cassino, *t.*, Campania, Italy; formerly San Germano; the ancient Casinum nr. famous monastery.
Castelbuono, *t.*, Sicily; mineral springs.
Castelfiorentino, *t.*, Tuscany, nr. Florence, Italy.
Castelfranco, *t.*, Bologna, Italy; p. *2,925*.
Castelfranco, *t.*, Treviso, Italy; fine church and paintings; silk; p. *4,240*.
Castellamare, *dockyard t.*, Italy; on Bay of Naples at foot of Vesuvius; mineral springs; wat. pl.; p. *43,725*.
Castellamare del Golfo, *spt.*, N.W. Sicily; wat. pl., tuna fishing; p. *18,032*.
Castellón de la Plana, *prov.*, Spain; on Mediter-

ranean, part of ancient Valencia, mainly mtns.; a. 2,579 sq. m.; cap. Castellon; p. (1950) *325,091*.

Castellón de la Plana, *t.*, Spain; silk, porcelain; p. (1950) *53,331*.

Castelnaudary, *t.*, Aude, France, on Languedoc canal, burned by Black Prince, 1355; p. (1954) *8,760*.

Castelo Branco, *c.*, Portugal; *cap.* of dist. same name; p. *299,670*.

Castelvetrano, *t.*, Sicily, Italy; industl.; wine; p. *24,746*.

Castiglione, *t.*, Sicily, Italy; near Catania; sulphur refining.

Castiglione Fiorentino, *t.*, Italy; nr. Arezzo; sericulture.

Castile, formerly a kingdom of Spain; now div. into Old and New Castile.

Castine, *t.*, Me., U.S.A.; on Penobscot Bay; resort; fishing.

Castlebar, *urb. dist.*, *cap.*, Mayo, Ireland; "Race of Castlebar" battle fought here in Rebellion of 1798; p. (1951) *5,288*.

Castleblayney, *urb. dist.*, Monaghan, Ireland; nr. Dundalk; p. (1951) *2,173*.

Castle Cary, *mkt. t.*, Somerset, Eng.; N.E. of Yeovil: dairying and flax growing; p. (1951) *1,664*.

Castlecary, *vil.*, Stirlingshire, Scot.; sta. on Roman wall; silica, fire-clay deposits.

Castlecomer, *rural dist.*, N. Kilkenny, Ireland; p. *8,069*.

Castle Donington, *t.*, *rural dist.*, Leics, Eng.; p. (of dist. 1951) *9,273*.

Castle Douglas, *burgh*, Kirkcudbright, Scot.; 15 m. S.W. of Dumfries; cattle fairs; p. (1951) *3,322*.

Castleford, *urb. dist.*, W.R. Yorks, Eng.; 10 m. S.E. of Leeds at confluence of Rs. Aire and Calder; glass, chemicals, coal; p. (1951) *43,116*.

Castleisland, *t.*, Kerry, Ireland; agr. ctr.; p. (1951) *1,491*.

Castlemaine, *t.*, Victoria, Australia; at foot of Gr. Dividing Range, 25 m. S. of Bendigo; fruit, wine; p. (1958) *6,890*.

Castlereagh, *rural dist.*, Roscommon, Ireland; p. (of dist.) (1951) *21,897*.

Castletown, *t.*, Isle of Man; former cap.; p. (1956) *1,755*.

Castletown Berehaven, *spt.*, Cork, Ireland; on Bantry Bay.

Castres, *t.*, Tarn, France; on R. Agoût; former Huguenot stronghold; cath.; woollens, soap, earthenware; p. (1954) *34,126*.

Castries, *cap.*, *spt.*, St. Lucia, Windward Is.; T.W.I., greatly damaged by fire June 1948; fine harbour; p. (1957) *25,000*.

Castro del Rio, *t.*, Andalusia, Spain; on R. Guadjo; industl.

Castrogiovanni, *see* **Enna**.

Castrop-Rauxel or **Kastrop Rauxel**, *t.*, N. Rhine-Westphalia, Germany; industl.; coal, cement, tar prod., tiles, brandy; p. (estd. 1954) *73,700*.

Castro Urdiales, *spt.*, Santander, N. Spain; sardines, iron ore; p. *11,800*.

Castrovillari, *hill t.*, S. Italy; built on cliff above R. Coscile; mkt. ctr. for local cereals, wine, oil and silkworms; p. (estd.) *10,000*.

Cat I. (or **Guanahani**), Bahamas, W. Indies; a. 340 sq. m.; p. (1953) *3,201*.

Catacaos, *t.*, Piura dep., Peru; Panama hats.

Catalonia, *old prov.*, N.E. Spain; mountainous; wooded; cereals; mnfs.: cottons, woollens, silks; rich in minerals; cap. Barcelona; a. 12,427 sq. m.

Catamarca, *prov.*, N.W. Argentina; cap. C.; farming; gold, silver, copper mng.; a. 40,942 sq. m.; p. (estd. 1958) *179,100*.

Catamarca, *t.*, *cap.*, Catamarca prov., N.W. Argentina; located in Andean foot-hills 120 m. S. of Tucuman; ctr. of irrigated oasis producing vines, apricots, cherries.

Catanduanes, *I.*, off Luzon, Philippines; hilly, fertile; rice, corn, cotton, hemp, coconuts; a. 552 sq. m.; p. *63,530*.

Catania, *prov.*, Sicily; ch. t., Catania; a. 1907 sq. m.; p. (1951) *797,024*.

Catania, *c.*, Sicily; on E. cst. at foot of Mt. Etna; city several times rebuilt in consequence of earthquakes; cath.; univ.; textiles, dyeing; p. (1951) *297,531*.

Catanzaro, *c.*, S. Italy; univ.; silks, velvets; p. (1951) *59,969*.

Catasauqua, *bor.*, Penns., U.S.A.; industl.; flour, cement, textiles; p. (1950) *4,923*.

Catastrophe, C., S. extremity of Eyre Peninsula, S. Australia.

Catawba, *R.*, N.C., U.S.A.; rising in Blue Ridge Range; length 300 m.

Caterham and Warlingham, *urb. dist.*, Surrey, Eng.; on N. Downs; residtl.; p. (1951) *31,290*.

Cathay, ancient name for China and E. Tartary.

Catoche, C., N.E. point of Yucatan, Mexico.

Catrine, *t.*, Ayr, Scot.; mftg.

Catskill Mtns., N.Y., U.S.A.; gr. in Appalachians, W. of Hudson R.; holiday resort.

Cattaro, *see* **Kotor**.

Cauca, *R.*, Colombia; trib. of Magdalena; length 600 m.

Cauca, *dep.* Colombia Rep.; cap. Popayán; a. 11,657 sq. m.; p. (1947) *427,380*.

Caucasia, region between Black Sea and Caspian, divided by Caucasus Mtns. into N. or Cis-Caucasia and Trans-Caucasia.

Caucasus, *lofty mtn. range* between Caspian and Black Sea; highest summits Mt. Elbruz (18,463 ft.) and Kasbek (16,546 ft.); length of system about 950 m., greatest width 120 m.; many lofty passages and lge. glaciers.

Caudebec, *ancient t.*, Seine-Maritime, France; p. (1954) *9,429*.

Cauderan, *commune*, Gironde, France; sub. of Bordeaux; p. (1954) *26,548*.

Caudete, *t.*, Albacete, Spain; p. *7,442*.

Caudry, *t.*, Nord, France; lace and tulle; p. (1954) *12,173*.

Cauquenes, *t.*, Chile; cap. of Maule prov.; p. *12,987*.

Causses, Les, *limestone plateau*, Aveyron, Tarn deps., S. France; on S.W. flank of Central Plateau; caverns, gorges of Rs. Lot and Tarn; sheep provide milk for Roquefort cheese; alt. 3,000–6,000 ft.

Cauterets, *vil.*, dep. Hautes-Pyrénées, France; mineral springs.

Cautin, *prov.*, S. Chile; cap. Temuco; a. 6,705 sq. m.; p. (1957) *438,149*.

Cauvery, *R.*, S. India; rises in the W. Ghats, flows into Bay of Bengal through Mysore and Madras; length 400 m.

Cava or **La Cava**, *t.*, Salerno, Italy; summer resort; textiles; p. *26,700*.

Cavaillon, *commune*, Vaucluse, France; cath.; p. (1954) *14,831*.

Cavan, *inland co.*, Ulster, Ireland; a. 746 sq. m.; agr.; distilling; p. (1956) *61,723*.

Cavan, *urb. dist.*, *co. t.*, Cavan, Ireland; 72 m. S.W. Belfast; p. (1951) *3,555*.

Cavarzere, *t.*, Venice, N. Italy; on R. Adige; industl.; p. *22,821*.

Cavite, *spt.*, Luzon, Philippines; p. (1948) *35,052*.

Cavour Canal, *irrigation canal*, Piedmont and Lombardy regions, N. Italy; links R. Po nr. Chivassa with R. Ticino 10 m. N.E. of Novara; provides water for 250,000 acres of rice-fields and meadow-land; length 80 m.

Cawnpore (Kanpur), *cap.*, Cawnpore dist., Uttar Pradesh, India; on the Ganges; 130 m. N.W. of Allahabad; grain, cotton, woollens, aircraft mftg.; p. (1951) *705,383*.

Caxias, *t.*, Maranhão, Brazil; on Itapecuru R.; cotton, rice; p. *17,409*.

Cayambe, *mtn.*, Andes, Ecuador; alt. 19,535 ft.

Cayenne, *spt.*, *cap.*, Fr. Guiana, S. America; famous for pepper; p. (1954) *24,629*.

Cayey, *t.*, S.E. Puerto Rico; tobacco, coffee, sugar; p. *5,622*.

Cayman Is., West Indies Fed.; a. 100 sq. m.; p. (estd. 1957) *9,046*; consists of Grand Cayman, cap. Georgetown; Little Cayman; and Cayman Brac.; turtle and shark fishing.

Cazalla de la Sierra, S.W. Spain; iron and lead; p. *10,058*.

Ceará, *st.*, N. Brazil; sugar, cotton, coffee, rubber; cap. Fortaleza; a. 59,168 sq. m.; p. (1947) *2,433,027*.

Ceará, *see* **Fortaleza**.

Cebu, *I.*, Philippines; mountainous, forested; coal; a. 1,707 sq. m.; p. *1,183,000*.

Cebu, *ch. t.*, Cebu I., Philippines; exp. copra, tobacco, sugar; p. (1948) *167,503*.

Cedar or **Red Cedar** *R.*, Iowa, U.S.A.; trib. of Mississippi R., length 400 m.

Cedar Falls, *t.*, Iowa, U.S.A.; p. (1950) *14,334*.

Cedar Mountain, *hill*, Va., U.S.A.; here Stonewall Jackson defeated Banks 1862.

Cedar Rapids, *c.*, Iowa, U.S.A.; rly. ctr.; farm machin., lumber; p. (1950) *72,296*.
Cedartown, *t.*, Ga., U.S.A.; textiles, rubber tyres; cottonseed oil; p. (1950) *9,470*.
Cedros, *I.*, off W. coast, Lower Cal., Mexico.
Ceduna, *spt.*, S. Australia; 250 m. W. of Pt. Augusta; p. *499*.
Cefalu, *spt.*, Palermo, N. Sicily; sardine fishing; p. *10,625*.
Ceglie, *c.*, Lecce, S. Italy; olive oil, building stone; p. *20,707*.
Cehegin, *t.*, Murcia, Spain; on R. Quipar; p. *17,316*.
Celaya, *t.*, Guanajuato, Mexico; silver, carpets; p. *45,712*.
Celebes, *I.*, Indonesia; mountainous, forested; copra, spices, waxes; ch. ts. Menado and Macassar; a. 73,160 sq. m.; p. *4,231,806*.
Celina, *t.*, W. Ohio, U.S.A.; resort; furniture, canning; p. (1950) *5,703*.
Celje, *t.*, Slovenia, Jugoslavia; lignite, zinc smelting; p. (1953) *25,572*.
Celle, *t.*, Lower Saxony, Germany; on R. Aller; former residence of the Dukes of Brunswick-Lüneberg; cas.; metal, leather, paints, textiles; p. (estd. 1954) *60,500*.
Cenis, Mont, *see* **Mont Cenis**.
Cento, *t.*, Ferrara, Italy; industl.; p. *4,942*.
Central African Republic, *aut. rep.* within French Community, Equatorial Africa; cap. Bangui; a. 238,767 sq. m.; p. (estd. 1957) *1,128,500* African; *5,936* European.
Central America, between Mexico and S. America, from the Isthmus of Tehuantepec to that of Panama; includes Guatemala, Honduras, Nicaragua, Salvador, Costa Rica, Panama, Brit. Honduras; tropical climate; forests, savannahs.
Central Asia, usually applied to regions between 30° and 40° N. lat. and 55° and 85° E. long.; Russian C.A. is the land between China and Afghanistan and the Caspian, now consisting of various Soviet Reps.
Central Falls, *t.*, Rhode Is., U.S.A.; nr. Pawtucket; cotton goods; p. (1950) *23,550*.
Central Greece and Euboea, *geographical div.*, Greece; contains the cap. Athens; a. 9,704 sq. m.; p. (1940) *2,032,618*.
Central Provinces, *see* **Madhya Pradesh**.
Centralia, *t.*, Ill., U.S.A.; p. (1950) *13,863*.
Centuripe, *commune*, Enna, Sicily; sulphur, marble; p. *10,802*.
Cephalonia, *see* **Kephallenia**.
Ceram (Serang), *I.*, Moluccas, Indonesia; a. 6,621 sq. m.; tobacco, sago; p. *83,000*.
Ceres, *t.*, C. of Good Hope, S. Africa; on R. Hex; health resort.
Cerignola, *t.*, Foggia, Italy; Spanish victory over French 1503; p. *38,522*.
Cerigo, *see* **Kythera**.
Cernauti, *see* **Chernovtsy**.
Cernavoda, *t.*, Dobrogea, Romania; on R. Danube, 70 m. S. of Braila; p. *6,100*.
Cerro de Pasco, *t.*, dep. Junin, Peru; silver, coal, lead; copper smelting; p. (estd. 1950) *23,592*.
Cerro Rico, *mtn.*, Bolivia; in Andes, W. of Potosi; alt. 15,680 ft.; v. rich silver, tin, tungsten ores.
Certaldo, *commune*, Firenze, Italy; anc. cas.; home of Boccaccio; p. *12,094*.
Cesena, *old industl. t.*, Forli, Italy; cath.; antiquities; sulphur-mines, wines; p. *68,793*.
Ceská Lipa, *t.*, Czechoslovakia; on R., Ploucnice N. of Prague; industl; p. (1947) *11,991*.
Ceská Trebová, *old t.*, Czechoslovakia; W. of Pardubice; engin., textiles.
Ceské Budejovice, *t.*, Czechoslovakia; on R. Vltava 80 m. S. of Prague; pencils, porcelain, brewing, anthracite; p. (1957) *64,104*.
Cesky Tesin, (Teschen), Silesia, Czechoslovakia (divided between Poland and Czechoslovakia); coal and ironwks.; p. (1947) *22,062* inc. t. and commune.
Cessnock, *t.*, N.S.W., Australia; coal-mining; dairying and farming; p. (1958) *40,230*.
Cetinie, *see* **Titograd**.
Cette, *see* **Sète**.
Ceuta, *spt.*, Spanish Morocco; opposite to and 16 m. from Gibraltar; cath.; the ancient Abyia, one of the Pillars of Hercules; p. (1950) *59,936*.
Cévennes, *mtns.*, S. France; separating basins of Rhône, Loire and Tarn; highest point Mt. Mézenc, alt. 5,794 ft.
Ceylon, *I.*, in Indian Ocean, S.E. of India; self-gov. Dom. of Brit. Com. since 1948; fertile plains, mountainous interior; principal prod.: rice, rubber, tea, coconuts, fruits and spices; cap. and ch. spt. Colombo; a. 25,332 sq. m.; p. (1955) *8,589,000*
Chacaburo, *t.*, E. Argentina; agr. ctr.; p. *15,000*.
Chachapoyas, *t.*, cap. of Amazonas dep., N. Peru; agr., forest prod.; p. (1946) *5,494*.
Chaco, *terr.*, N. of Argentina; part of Gran Chaco; farming and prairie land; cap. Resistencia; a. 38,468 sq. m.; p. (estd. 1958) *661,000*.
Chad, *L.*, lge sheet of water of N. Central Africa; a. 50,000 sq. m. when in flood, varies in extent with season, and is drying up, shallow, many Is., lies between the wooded region of the Sudan and the steppes leading to the Sahara desert.
Chad, *aut. rep.* within French Community, Equatorial Africa; cap. Fort Lamy; a. 461,202 sq. m.; p. (European) *1,061*; (African) *2,010,000*.
Chadderton, *urb. dist.*, Lancs, Eng.; cotton and chemical mftg.; p. (1951) *31,114*.
Chagford, *par.*, Devon, Eng.; stone circles.
Chagos, Is., Indian Ocean; administered from Mauritius; fine harbour in Diego Garcia.
Chagres, *spt.*, Panama, S. America; on N. side of Isthmus of Panama; p. *1,300*.
Chaguaramas, *site* in Trinidad of new fed. cap. of The West Indies, at present part of naval base leased to U.S.A. in 1941.
Chahar, *prov.*, Mongolia, China; cap. Changchiakow; a. 107,705 sq. m.; p. *2,034,000*.
Chalcidice, *see* **Khalkidhiki**.
Chalcis, *see* **Khalkis**.
Chaleur Bay, Canada; between N. Brunswick and Gaspé Peninsula, Quebec.
Chalfont St. Giles, *vil.*, Bucks., Eng.; residtl.; p. [*2,100*.
Chalon-sur-Saône, *ancient industl. c.*, Saône-et-Loire, E. France; glass, iron; p. (1954) *37,399*.
Chalons-sur-Marne, *c.*, Marne, N.E. France; 20 m. E. of Epernay; cath.; military ctr.; brewery ind.; p. (1954) *36,834*.
Chamalières, *t.*, Puy-de-Dôme, France; p. (1954) *11,473*.
Chaman, *t.*, Baluchistan, Pakistan; on Afghan frontier; terminus of rly. through Quetta.
Chamba, *t.*, Himachal Pradesh, India; 100 m. N.E. of Amritsar.
Chambal, *R.*, trib. of R. Jumna rising in Vindhya hills; length 650 m.
Chambersburg, *bor.*, Penns., U.S.A.; foundries, brewing; p. (1950) *17,212*
Chambéry, *t.*, *cap.*, Savoie, S.E. France; silk, leather; p. (1954) *32,139*.
Chambolle-Musigny, *commune*, Côte d'Or, France; wines.
Chambon-Feugerolles, *t.*, Loire, France; coal, iron, steel mftg.; p. (1954) *17,695*.
Chamonix, *t.*, Haute-Savoie, France; at foot of Mont Blanc, in valley of R. Arve; winter sports ctr.; p. (1954) *5,699*.
Champagne, *old prov.*, N.E. France; famous for its wine; wheat, sheep, impt. tr. fairs in Middle Ages.
Champagne Humide, *national division* ("*pays*"), Central France; clay vale, runs 100 m. N.E. from Auxerre to Bar-le-Duc; drained by Seine, Aube, Marne, Aisne and many tribs.; heavily wooded, marshy; where cleared and drained, grain cultivation.
Champagne Pouilleuse, *natural division* ("*pays*"), Central France; barren chalk plateau, extends 80 m. N.E. from Sens to Reims; drained by Aisne, Vesle, Seine, Aube, Marne; dusty down-land pastures; sheep; vine growing on S.-facing valley sides and S.E.-facing escarpment of Falaise de l'Ile de France favours production of Champagne wines, ch. producing ctrs.: Châlons-sur-Marne, Reims, Epernay.
Champaign, *t.*, Ill., U.S.A.; foundries; p. (1950) *39,563*.
Champerico, *spt.*, S.W. Guatemala; coffee; p. *2,000*.
Champigny-sur-Marne, *dep.*, Seine, France; embroidery; piano keys; p. (1954) *36,903*.
Champlain, *L.*, U.S.A.; N. frontier of N.Y., state; discharges by Richelieu R. into St. Lawrence; flanked by trunk route from New York to Montreal; a. 600 sq. m.
Champlain Canal, N.Y., U.S.A.; follows gap between Adirondack Mtns. and Green Mtns. occupied by Hudson R.; links Albany with *L.* Champlain and allows through barge traffic between New York and St. Lawrence valley.
Chanaral, *spt.*, N. Atacama, Chile; p. *2,980*.
Chancelade, *commune*, Dordogne, France; arch. type-site of Chancelade culture (late paleolithic).

Chanda, *t.*, Nagpur, Madhya Pradesh, India; ancient temples; p. *25,000*.

Chanda, *dist.*, Madhya Pradesh, India; teak forests, coal, iron.

Chandausi, *t.*, Uttar Pradesh, India; cotton, hemp; rly. ctr.; p. *25,000*.

Chandernagore, *t.*, W. Bengal, India; on Hooghly R.; French 1816-1949; cotton; p. (1948) *44,786*.

Chandigarh, new cap. E. Punjab, India; situated on plateau at foot of Himalaya, S.W. of Simla; commenced 1951, inaugurated Oct. 1953, planned by Le Corbusier and others.

Changchow (Wuchin), *c.*, Kiangsu, China; in Yangtze Kiang Valley, on Grand Canal 70 m. S.E. of Nanking; mkt. for intensively agr. dist.; silk; p. (estd. 1938) *125,000*.

Changchun, *t.*, *cap.*, Manchuria, China; rly. ctr.; p. (estd. 1946) *605,279*.

Changnacheri, *t.*, Kerala, S. India; tea, cotton spinning, silk; p. *24,201*.

Changpai Shan, *mtns.*, form bdy. between China and N. Korea; drained by Rs. Yalu, Ertao, Tumen; highest point, Peiktusan, alt. 8,005 ft.

Changsha, *t.*, *cap.*, Hunan prov., China; tea, rice, antimony; p. (1947) *396,465*.

Changshu, *c.*, Kiangsu, China; in Yangtze Kiang valley 65 m. N.W. of Shanghai; mkt. for local agr. produce; p. (estd. 1935) *102,734*.

Channel Islands, gr. of self-governing Is. belonging to the British Crown off N.W. cst. France, of which the lgst. are Jersey, Guernsey, Alderney and Sark; part of the old Duchy of Normandy; fruit, vegetables, flowers; famous cattle herds; tourist resort; German occupation, 1940–45; ch. t. St. Helier, Jersey; total a. 75 sq. m.; p. (1951) *102,776*.

Chantaburi, *t.*, *spt.*, Siam; rubies and other precious stones.

Chantada, *commune*, N.W. Spain; cattle, leather, soap, bricks, linen; p. *15,127*.

Chantilly, *t.*, Oise, France; famous race-course; p. (1946) *5,105*.

Chanute, *mkt. t.*, Kan., U.S.A.; oil, gas; refineries, cement; p. (1950) *10,109*.

Chao-an (Chaochow), *c.*, Kwangtung, S. China; on Han R. 20 m. N. of Swatow; ctr. of intensively cultivated plain; rice, sugar, tea; linked to Swatow by rly.; p. (estd. 1935) *179,068*.

Chaoyang, *c.*, *fishing pt.*, Kwangtung, S. China; on cst. 15 m. S.W. of Swatow; oyster fisheries; p. (estd. 1935) *127,714*.

Chapada Diamantina, *t.*, Matoo Grosso, Brazil; diamond dist.

Chapala, *L.*, Mexico; chiefly in Jalisco st.; a. 1,300 sq. m.

Chapayev, *see* **Gurev**.

Chapayevsk, *t.* Kuibyshev Region, R.S.F.S.R.; chemicals; p. (1959) *83,000*.

Chapelcross, nr. Annan, Dumfriesshire, Scot.; nuclear reactor sta.; power and plutonium prod.

Chapel-en-le-Frith, *mkt. t.*, *rural dist.*, Derby, Eng.; p. (1951, rural dist.) *18,990*.

Chapelizod, *t.*, nr. Dublin, Ireland; on R. Liffey.

Chapra, *t.*, Bihar; on Ganges R.; ctr. of saltpetre and indigo tr.; p. *55,142*.

Chard, *mun. bor.*, Somerset, Eng.; lace, iron, engin., shirt and cotton mftg.; p. (1951) *5,218*.

Chardzhou, *t.*, Turkmen S.S.R.; on the Central Asia Rly.; textiles, chemicals; p. (1959) *66,000*

Charente, *dep.*, W. France; cap. Angoulême; ctr. of distilling tr., cognac; a. 2,305 sq. m.; p. (1954) *[illegible]3,535*

Charente, *R.* W. France; flows into Bay of Biscay below Rochefort.

Charente-Maritime, *dep.*, S.W. France; cap. La Rochelle; wine, wheat; oysters, pilchards; a. 2,791 sq. m.; p. (1954) *447,973*.

Charenton-le-Pont, *commune*, Seine dep., France; N.E. sub. of Paris; boats, pottery, rubber; p. (1954) *22,079*.

Charleroi, *t.*, Hainaut, Belgium; on R. Sambre; coal-mng.; glass; p. (estd. 1957) *26,433*.

Charleroi, *t.*, Penns., U.S.A.; steel glass; p. (1950) *9,872*.

Charles City, *c.*, Iowa, U.S.A.; on Cedar R.; p. (1950) *10,309*.

Charleston, *t.*, Ill., U.S.A.; dairy produce, flour, shoes; p. (1950) *9,164*.

Charleston, *c.*, *spt.*, S. Carolina, U.S.A.; exp. cotton; p. (1950) *70,174*.

Charleston, *t.*, *cap.*, W. Virginia, U.S.A.; on Kanawha R.; in bituminous coal dist.; salt, hardware; p. (1950) *73,501*.

Charlestown, *ch. t.*, Nevis I., Leeward Group; p. (1957) *15,446*.

Charleville, *see* **Rathluirc**.

Charleville, *t.*, Ardennes dep., N.E. France; on Meuse R. opposite Mézières; iron, bricks; p. (1954) *22,536*.

Charleville, *t.*, Queensland, Australia; on Warrego R., 400 m. W. of Brisbane; pastoral dist.; p. (1947) *3,548*.

Charlevoix, *pt.*, *t.*, L. Michigan, U.S.A.; p. *2,299*.

Charlotte, *c.*, N.C., U.S.A.; key rly. junction; cotton, machin., tobacco; p. (1950) *134,042*.

Charlotte, *t.*, S. Mich., U.S.A.; furniture, car parts; p. (1950) *6,606*.

Charlottenburg, *t.*, Germany; on R. Spree; sub. of Berlin; palace; china, beer, machin.

Charlottesville, *t.*, Va., U.S.A.; on Rivanna R.; univ.; Monticello—home of Thomas Jefferson; p. (1950) *25,969*.

Charlottetown, *spt.*, *cap.*, Prince Edward I., Canada; Parliament buildings; iron foundry, shipyards, fisheries; p. (1951) *15,689*.

Charlton Kings, *urb. dist.*, Gloucester, Eng.; at foot of Cotswolds nr. Cheltenham; p. (1951) *5,836*.

Charnwood Forest, *upland district*, Leicester, Eng.; to W. of Soar valley, 12 m. N.W. of Leicester; composed of ancient rocks; stone-crushing; largely forests; used for recreation by industl. ts. of E. Midlands; alt. 600–900 ft.

Charters Towers, *t.*, N. Queensland, Australia; 925 m. by rail from Brisbane; p. (1947) *7,567*.

Chartres, *c.*, *cap.*, dep. Eure-et-Loir, France; fine Gothic cath.; milling, brewing, distilling; p. (1954) *28,750*.

Chartreuse, La Grande, France, famous monastery near Grenoble.

Châteaubriant, *t.*, Loire-Inférieure, France; rly. ctr.; p. (1946) *7,965*.

Château Thierry, *t.*, Aisne, France; on R. Marne; p. (1946) *7,283*.

Châteauroux, *t.*, Indre, France; 60 m. S.E. of Tours on R. Indre; woollens, machin.; p. (1954) *36,420*.

Châtelet, *t.*, Hainaut, Belgium; on R. Sambre; coal, pottery.

Châtellerault, *t.*, Vienne, France; 40 m. S. of Tours; cutlery, small arms; p. (1954) *23,583*.

Châtenay-Malabry, *t.*, Seine, France; p. (1954) *14,269*.

Chatham, *mun. bor.*, *spt.*, *naval arsenal*, Kent, Eng.; on estuary of R. Medway; bricks, lime; p. (1951) *46,940*.

Chatham, *t.*, *spt.*, New Brunswick, Canada; lumbering, fish exporting; p. *4,082*.

Chatham, *t.*, Ontario, Canada; farming, fruit, machin.; p. (1941) *17,369*.

Chatham Is., New Zealand dependency; a. 372 sq. m.; lgst. I., Wharekauri; p. *503*.

Châtillon-sur-Seine, *t.*, Côte d'Or, France; on R. Seine, 45 m. S.E of Troyes; p. (1954) *12,526*.

Chatou, *t.*, Seine-et-Oise, France; p. (1954) *15,338*.

Chatsworth, *par.*, Derby, Eng.; on R. Derwent; seat of Duke of Devonshire.

Chattanooga, *c.*, Tenn., U.S.A.; on Tennessee R.; seat of Grant Univ.; rly. ctr.; cottons; iron, steel, chemicals; p. (1950) *131,041*.

Chatteris, *urb. dist.*, Isle of Ely, Cambridge, Eng.; mkt. t.; p. (1951) *5,528*.

Chaudière Falls, on Ottawa R., above Ottawa, Canada; hydro-electric power-sta.

Chaumont, *t.*, Haute-Marne, France; gloves, leather; p. (1954) *19,346*.

Chauny, *t.*, Aisne, France; on R. Oise; chemicals, glass; p. (1954) *10,544*.

Chautauqua, *L.*, N.Y. st., U.S.A.; summer resort.

Chaux-de-Fonds, La, *t.*, *can.*, Neuchâtel, Switzerland; ctr. of watchmkg. ind.; p. (1950) *33,300*.

Chaves, *commune*, N. Portugal; cath.; hot salt springs; linen, silk; p. *6,482*.

Chaville, *t.*, Seine-et-Oise, France, p. (1954) *14,508*.

Cheadle, *rural dist.*, Staffs, Eng.; coal pits, metal mnfs.; p. (1951) *32,839*.

Cheadle and Gatley, *urb. dist.*, Cheshire, Eng.; textile finishing and bleaching; p. (1951) *31,508*.

Cheb, *t.*, Czechoslovakia; nr. Bavarian frontier; industl. ctr.; motor cycles, machin., textiles; p. (1947) *14,533*.

Cheboksary, *t.*, *cap.* R.S.F.S.R.; textiles, hydro-elec.; p. (1959) *83,000*.

Cheboygan, *t.*, Mich., U.S.A.; on L. Huron; sawmills; p. (1950) *5,687*.
Checotah, *t.*, E. Okla., U.S.A.; agr., cattle, coal, clay; p. *2,126*.
Cheddar, *vil.*, Somerset, Eng.; famous limestone caves in Mendips; cheese, strawberries.
Cheduba I., Bay of Bengal, Burma; fertile, well-wooded; a. 240 sq. m.
Chefoo (Yentai), *former treaty pt.*, Shantung, China; on N. cst. of peninsula; p. (estd. 1934) *139,512*.
Chekiang, *maritime prov.*, China; cap. Hangchow; exp. silk, cotton, etc.; a. 39,486 sq. m.; p. (1953) *22,865,747*.
Cheling Pass, on bdy. between Kwangtung, Hunan, S. China; historic route across Nanling mtns., now followed by Hankow to Canton trunk rly.; alt. 984 ft.
Chelles, *t.*, Seine-et-Marne, France; p. (1954) *19,539*.
Chelm, *t.*, E. Poland; nr. Lublin; cath.; 1944 Manifesto of Poland's Liberation issued here; p. (1946) *23,329*.
Chelmer, *R.*, Essex, Eng.; joins R. Blackwater at Maldon.
Chelmno (Kulm), t., Pomerania, Poland; on R. Vistula; ancient wells; large oil mills, engin., impt. tr.; p. (1946) *11,634*.
Chelmsford, *co. t.*, *mun. bor.*, Essex, Eng.; 30 m. N.E. London; cath.; agr. mkt.; radio, elec. engin., brewing; p. (1951) *37,888*.
Chelmza (Kulmsee), *t.*, Pomerania, Poland; N. of Torun; p. (1946) *10,764*.
Chelsea, *metropolitan bor.*, London, Eng.; p. (1951) *50,912*.
Chelsea, *t.*, Mass., U.S.A.; rubber goods, shoes, paper; p. (1950) *38,912*.
Cheltenham, *t.*, *mun. bor.*, Gloucester Eng.; spa; educational ctr.; aircraft mftg. and repair, precision instruments; p. (1951) *62,823*.
Chelyabinsk, *t.*, R.S.F.S.R.; on Mijas R. W. Siberian lowlands; metallurgy and machin.; a. 33,900 sq. m.; p. (1959) *688,000*.
Chelyuskin C., most N. point of Asia.
Chemnitz (Karl-Marx-Stadt), *t.*, Saxony, Germany; "the Manchester of Saxony"; cottons, woollens, machin., cars, furniture, chemicals; p. (1957) *286,016*.
Chemulpo, *see* **Inchon**.
Chenab, *R.*, W. Punjab, Pakistan; one of "five rivers" of Punjab; rises in Himalayas, flows S.W. into R. Sutlej; dams at Merala and Khanki provide water for Upper and Lower Chenab Irrigation Canal Systems; length approx. 900 m.
Chenghsien, *t.*, Honan, China; 15 m. S. of Hwang-Ho, where it emerges on to N. China Plain; impt. route ctr. and rly. junction where Pekin (Peiping) to Hankow rly. crosses Changan to Tungnai rly.
Chengtu, *c.*, *cap.*, Szechwan prov., China; silk, rice; p. (estd. 1946) *620,302*.
Chepstow, *mkt. t.*, *urb. dist.*, Monmouth, Eng.; on R. Wye 2 m. above confluence with R. Severn; fine ruined cas.; light engin., brush mkg., asphalt, limestone; p. (1951) *5,285*.
Chequers, *seat*, Bucks, Eng.; official residence of Prime Minister.
Cher, *central dep.*, France; cap. Bourges; grain, wines, iron, porcelain; a. 2,819 sq. m.; p (1954) *284,376*.
Cher, *R.*, France, trib. of R. Loire, flowing from Auvergne Mtns.
Cherbourg, *spt.*, Manche, France; N. cst. of Contentin Peninsula; opposite to and 80 m. dist. from Portsmouth; naval arsenal, ship-bldg.; ropes, fishing; p. (1954) *38,262*.
Cheremkhovo, *t.*, R.S.F.S.R.; N W. of Irkutsk; coal, engin., chemicals; p. (1959) *123,000*
Cherepovets, *c.*, R.S.F.S.R.; steel, engin., saw-mills; p. (1959) *92,000*.
Cheribon, *spt.*, Java, Indonesia; N. cst., 120 m. E. of Jakarta; rice, tea, coffee; p. *54,079*.
Cherkassy, *t* Ukrainian S.S.R.; nr. Kiev, on Dnieper R.; tobacco, sugar; p. (1959) *83,000*.
Chernigov, *t.*, Ukrainian S.S.R.; on Desna R.; caths.; flour, textiles, chemicals; p. (1959) *89,000*.
Chernovtsy, *t.*, Ukrainian S.S.R.; univ.; Greek cath.; wheat, dairy produce, textiles, engin., chemicals; p. (1959) *145,000*.
Chernyakovsk (Insterburg), *t.*, Lithuanian S.S.R.; chemicals, textiles; p. *41,230*.
Cherokee, *t.*, Iowa, U.S.A.; p. (1950) *7,705*.
Cherrapunji, *t.*, Assam, India; in Khasi Hills; reputed wettest place in world, av. annual rainfall 500 in.
Chertsey, *urb. dist.*, Surrey, Eng.; on S. bank of R. Thames, 4 m. below Staines; residtl.; aircraft components, cement; p. (1951) *31,029*.
Cherwell, *R.*, trib. of Thames, nr. Oxford; length 30 m.
Chesapeake Bay, *inlet* on Atlantic coast U.S.A.; extending 200 m. from mouth of Susquehanna R. to C. Charles.
Chesham, *residtl. t.*, *urb. dist.*, Bucks, Eng.; in heart of Chiltern Hills; printing, textiles, light engin.; p. (1951) *11,428*.
Cheshire, *co.*, Eng.; cap. Chester; plain; Rs. Mersey and Dee; dairying, mkt. gardening; salt, coal; mnfs.; textiles, chemicals, ship-bldg.; a. 1,056 sq. m.; p. (1951) *1,258,050*.
Cheshire, *t.*, Conn., U.S.A.; agr., formerly copper and barytes mined; p. (1950) *4,286*.
Cheshunt, *urb. dist.*, Herts, Eng.; in Lea valley, 7 m. S. of Hertford; bricks, mkt. gardening, horticulture; p. (1951) *23,016*.
Chesil Bank, Dorset, Eng.; shingle ridge from Portland to Bridport.
Chester, *c.*, *co. bor.*, Cheshire, Eng.; at head of estuary of R. Dee; cath., ancient walls and old timbered houses; engin., metal goods; p. (1951) *48,229*.
Chester, *t.*, S.C., U.S.A.; cotton mnfs.; flour; granite; p. (1950) *6,893*.
Chester, *t.*, Penns., U.S.A.; large inds., textiles; p. (1950) *66,039*.
Chesterfield, *mkt. t.*, *mun. bor.*, colly. dist., Derby, Eng.; on Rother R.; 8 m. S. of Sheffield; iron, steel, engin., coal-mng., glass, elec. lamps, galvanised goods, chemicals; p. (1951) *68,540*.
Chesterfield Inlet, arm of Hudson Bay, Canada; 250 m. by 25 m.
Chesterfield Is., *dep.*, New Caledonia, Pac. Oc.; French; about 342 m. W. of N.C.
Chester-le-Street, *urb. dist.*, Durham, Eng.; on R. Wear; clothing, confectionery; p. (1951) *18,539*.
Chesterton, *sub.* of Cambridge, Eng.; p. *35,950*.
Cheviot, *t.*, S.W. Ohio, U.S.A.; clothes, leather goods; flour; p. (1950) *9,944*.
Cheviot Hills, between Scot. and Northumberland, Britain; highest point The Cheviot, 2,676 ft.
Cheyenne, *R.*, S.D., U.S.A.; trib. of Missouri; length 500 m.
Cheyenne, *cap.*, Wyo., U.S.A.; cattle-ranching dist.; rly. ctr.; p. *22,474*.
Chiana, Val de, *valley*, central Italy; longitudinal depression separating Tuscan Hills from Central Apennines; occupied by upper course of R. Arno, middle course of R. Tiber; followed by main route from Florence to Rome.
Chiangmai, *prov.*, N.W. Siam; cap. Chiangmai; a. 8,839 sq. m.; p. (estd.) *544,000*.
Chiangmai, *t.*, Chiangmai prov., N.W. Siam; on Ping R.; tr. ctr., teak; p. *50,000*.
Chiangtu, *see* **Yangchow**.
Chiapas, *Pacific st.*, Mexico; cap. Tuxtla-Gutierrez; mountainous, forested; coffee, tobacco, sugar and cocoa, cattle; a. 28,729 sq. m.; p. (1950) *903,200*.
Chiatura, *t.*, Georgian S.S.R.; manganese.
Chiavari, *t.*, Liguria, Italy; on the Riviera; shrine of the Madonna; p. *17,586*.
Chiavenna, *t.*, Lombardy, Italy; nr. L. of Como; famous for beer, wine, pottery; p. *5,150*.
Chiba, *cap.* of Chiba prefecture, Japan; on E. Tokyo Bay; impt. tr. ctr.; p. (1950) *133,844*.
Chicago, *c.*, Ill., U.S.A.; at S.W. corner of L. Michigan; second c. in America; immense tr. by rail and Great Lakes, flourishing univ.; grain mkt., pork, beef canning, tanneries, agr. implements, iron and steel, tinplate, machin., clothing, furs; p. (1950) *3,620,962*.
Chichester, *c.*, *mun. bor.*, W. Sussex, Eng.; on S. cst. plain, 10 m. W. of Arundel; fine cath.; agr.; p. (1951) *19,110*.
Chickamauga Creek, U.S.A.; branch of the Tennessee R. above Chattanooga; Civil War battles; site of National Park.
Chickasha, *t.*, Okla., U.S.A.; maize, cotton; p. (1950) *15,842*.
Chiclana, *mftg. t.*, Spain; nr. Cadiz; p. *17,047*.
Chiclayo, *ch. t.*, Lambayeque dep., Peru; p *38,140*.
Chico, *t.*, N. Cal., U.S.A.; food processing, lumber, cement; p. (1950) *12,272*.

Chicopee, *t.,* Mass., U.S.A; on Connecticut R.; hardware, carpets, cars; p. (1950) *49,211.*
Chicoutimi, *t.,* Quebec, Canada; on Chicoutimi R. (trib. of Saguenay R.); hydro-electric power-sta.; lumber, pulp, paper; p. *16,040.*
Chidambaram, *t.,* Madras, India; nr. Cuddalore; p. over *25,000.*
Chidley C., most N. point of Labrador, Hudson Strait, Canada.
Chiem, *L.,* large lake nr. Munich, Germany, 1,500 ft. above sea-level.
Chieri, *t.,* Piedmont, Italy; nr. Turin; was mediæval republic; Gothic church; silks, cottons; p. *14,747.*
Chieti, *prov.,* S. Italy; a. 1,142 sq. m.; p. (1951) *400,366.*
Chieti, *t., cap.,* prov. Chieti, S. Italy; the ancient Teate Marrucinorum; p. (1951) *40,688.*
Chignecto Bay, inlet of Bay of Fundy, Canada.
Chigwell, *urb. dist.,* Essex, Eng.; on borders of Epping Forest; residtl.; p. (1951) *51,775.*
Chihli, *see* **Hopei.**
Chihli, G. of, *see* **Pohai, Gulf of.**
Chihuahua, *st.,* Mexico; adjoining the U.S.A.; mining, stock-raising and agr.; a. 94,822 sq. m.; p. (1950) *845,846.*
Chihuahua, *c., cap.,* Chihuahua st., Mexico; fine cath.; on Mexican Central Rly.; silver, cottons, woollens; p. (1950) *110,779.*
Chikuho, *t.,* N. Kyushu, Japan; largest coal-mines in the country.
Chilcoot, *R., pass,* Alaska, leading into Yukon Valley.
Chile, *rep.,* S. America, independent of Spain since 1818; Pacific coastal strip rising sharply to Andes; Atacama Desert in N., fertile valleys in ctr., heavy rains in S.; Spanish language; Roman Catholic; forested in S.; dairying, sheep, wool; gr. nitrate output, copper, iron ore, coal, iodine, paper, petroleum; cap. Santiago; ch. pt. Valparaiso; length 2,660 m., breadth 69–270 m., a. 285,133 sq. m.; p. (estd. 1957) *7,120,614.*
Chilka, *L., inlet,* E. coast, Orissa, India.
Chillan, *cap.,* Nuble prov., Chile; fine squares and prosperous inds.; destroyed by earthquake 1939; cattle, wheat; p. (1952) *52,576.*
Chillicothe, *t.,* Mo., U.S.A.; p. (1950) *8,694.*
Chillicothe, *c.,* Ohio, U.S.A.; on Scioto R., mftg.; furniture, leather; p. (1950) *20,133.*
Chilliwack, *t.,* B.C., Canada; on Fraser R.; dairy produce, fruit, lumber; p. *3,675.*
Chiloe, *I.* and *S. prov.* Chile; cap. San Carlos, destroyed by earthquake 1939, a. 9,058 sq. m.; p. (1957) *120,844.*
Chilpancingo, *c., cap.,* Guerrero st., Mexico; p. *31,360.*
Chiltern Hills, *chalk hills,* Oxon., Bucks., Beds, and Herts., Eng.; highest point 904 ft. nr. Wendover.
Chimborazo, *mtn.,* Ecuador, Andes; extinct volcano, alt. 20,610 ft.
Chimborazo, *prov.,* Ecuador; cap. Riobamba; a. 2,089 sq. m.; p. (1950) *218,130.*
Chimbote, *spt.,* Peru; coal, iron, cotton; p. *4,243.*
Chimkent, *t.,* Kazakh S.S.R.; chemicals, engin. textiles, lead smelting; p. (1959) *153,000.*
China, *rep.,* Asia, consists of 21 provs. (inc. Taiwan), the autonomous regions of Inner Mongolia, Sinkiang-Vighen, Kwangsi-Chuang, Ningsia-Hin, Tibet and 3 muns. Peking, Tientsin and Shanghai. Total a. 3,380,692 sq. m.; mountainous in N. and W., fertile valleys and plains in E.; Rs.: Hwang-ho, Yangtzekiang, Sikiang; climate, extreme in N.; monsoon in S.; religions: Confucianism, Buddhism, Taoism; poor communications; rice, silk, tea, soya-beans, wheat, millet, cotton, bamboo; enormous reserves of coal, iron, antimony, oil; densely populated; mnfs.: cotton, spinning, ironwks.; p. (estd. 1959) *640,000,000.*
China Sea, part of W. Pacific between Korea and Philippines; divided by the narrow Formosa Strait into two areas; N. China Sea, including Yellow Sea, and S. China Sea.
Chinameca, *t.,* San Miguel dep., Salvador, Central America; coffee, sisal, p. *6,502.*
Chinandega, *t.,* Nicaragua, Central America; cotton, sugar, bananas; p. (1947) *25,538.*
Chincha Is., group off cst. of Peru; p. (of ch. t.) *14,763.*
Chinchilla, *t.,* Albacete prov., Central Spain; p. *7,616.*
Chincoteague, *t.,* and *I.,* E. Va., U.S.A.; fisheries, poultry; p. *2,142.*
Chindwin, *R.,* Burma; ch. trib. of Irrawaddy; rising in Patkoi Hills, navigable in rainy season.
Chindwin, Upper and Lower, *provs.,* Burma; fertile plains and extensive teak forests, rice.
Chingford, *mun. bor.,* Essex, Eng.; on S. fringe of Epping Forest; residtl.; p. (1951) *48,330.*
Chinghai, *prov.,* China; between Nan Shan and Kunlun mtns., cap. Si-ning; a. 269,187 sq. m.; p. (1953) *11,676,534.*
Chingleput, *t.,* India; S. of Madras; cotton weaving, salt mnfs.
Chinju or **Shinshu,** *t.,* S. Korea; cotton; p *30,269.*
Chinkiang (Chen-chiang), *t., pt.,* Anhwei, China; former treaty pt. Yangtse-kiang, 48 m. below Nanking; tr. ctr.; p. (1948) *179,059.*
Chinon, *t.,* Indre-et-Loire, Central France; on R. Vienne, industl.; ruined cas., once a royal residency; p. (1954) *6,743.*
Chinook, *t.,* Mont., U.S.A.; cattle, sugar-beet; p. *2,051.*
Chinquinquira, *t.,* Boyaca, Colombia; emeralds; pilgrimage ctr.; p. *6,998.*
Chinwangtao, *spt., former treaty pt.,* Hopeh, N. China; on Yellow Sea (Hwang Hai) cst., 150 m. N.E. of Tientsin; only good natural harbour on N. China cst.; exp. coal from Kailan mines (Kaiping); p. (estd. 1947) *100,000.*
Chioggia, *spt., cath. c.,* N. Italy; on I. in G. of Venice; fishing; p. *38,925.*
Chios, *see* **Khios.**
Chippenham, *t., mun. bor.,* Wilts, Eng.; mkt. t. on R. Avon; rly. signal and brake equipment, bacon curing, tanning; p. (1951) *11,850.*
Chippewa Falls, *c.,* Wis., U.S.A.; flour, lumber; p. (1950) *11,088.*
Chipping Campden, *vil.,* Gloucester, Eng.; in Cotswold Hills, on R. Stour; formerly impt for woollens.
Chipping Norton, *mun. bor., mkt. t.,* Oxford, Eng., nr. Banbury; p. (1951) *3,879.*
Chipping Sodbury, *mkt. t.,* Gloucester, Eng.; 8 m. N.E. of Bristol.
Chiriqui, *prov.,* Panama; cap. David; p. (1950) *138,136.*
Chirk, *t.,* Denbigh, Wales; on R. Cleriog, S. of Wrexham; slate, coal.
Chisinau, *see* **Kishinev.**
Chislehurst and Sidcup, *urb. dist.,* W. Kent, Eng.; residtl. sub. of London; p. (1951) *83,837.*
Chistyakovo, *t.,* Ukrainian S.S.R.; p. (1959) *92,000.*
Chiswick, *see* **Brentford and Chiswick.**
Chita, *t., rly. junct.* Siberia, R.S.F.S.R.; on upper Amur R., 400 m. E. of L. Baikal; coal, engin., chemicals, sawmilling; p. (1959) *171,000.*
Chitral, *t.,* N.W. Frontier Prov., Pakistan; on the Kashkar R.; p. *1,000.*
Chitral, *st.,* Pakistan; N.W. Frontier Provs.
Chittagong, *div.,* E. Bengal, Pakistan; ch. t., Chittagong; p. (estd. 1951) *11,783,000.*
Chittagong, *c., spt.,* E. Bengal, Pakistan; on E. cst. of Bay of Bengal; exp. jute, tea; imports foodstuffs (from W. Pakistan), clothing, machin.; p. (1951) *294,000.*
Chivilcoy, *t.,* Argentina; wheat, maize, cattle; p. *29,600.*
Chkalov (renamed **Orenburg,** 1957), *c.* on Ural R., U.S.S.R.; p. (1959) *260,000.*
Chobrum, *see* **Godwin-Austen Mt.**
Choctawhatchee, *R.,* Ala. and Fla., U.S.A.; length 180 m.
Choisy-le-Roi, *t.,* Seine, France; cloth factories; p. (1954) *31,789.*
Cholet, *t.,* Maine-et-Loire, France; cotton, linen, flannel mnfs.; p. (1954) *29,358.*
Cholon, *t.,* S. Viet-Nam; 10 m. S.W. of Saigon; rice; p. (estd. 1948) *480,000.*
Cholula, *ancient c.* of Puebla, prov., Mexico; Aztec temple, pyramid of Cholula, and other remains.
Chomutov, *mftg. t.,* Czechoslovakia; p. (1957) *32,752.*
Chonos Archipelago, Chile, about 120 in number, on W. coast of Patagonia.
Chorley, *industl. t., mun. bor.,* N. Lancs, Eng.; on W. flank of Rossendale Fells, 7 m. S.E. of Preston; cotton spinning, engin.; p. (1951) *32,636.*
Chorley Wood, *urb. dist.,* Herts, Eng.; p. (1951) *4,432.*
Chorrilos Pass, Argentina; in E. cordillera of Andes at alt. 14,655 ft.; used by rly. from Tucuman to Antofagasta.

Chortkov, *t.*, Ukrainian S.S.R.; agr., tobacco, brandy; p. (1939) *19,038*.
Chorzow (Królewska Huta), *t.*, Upper Silesia, Poland; coal, iron and steel, chemicals, engin.; p. (1957) *144,000*.
Chota Nagpur, *dist.*, Madhya Pradesh, Bihar; mountainous, forested; rice, coal.
Chota Udaipur, *dist.*, Bombay state, India; a. 1,018 sq. m.; p. (1941) *175,412*.
Chouchiakou (Hwaiyang), *c.*, Honan, China; 70 m. S.E. of Kaifeng on N. China Plain; p. (estd. 1922) *200,000*.
Choukoutien, *vil.*, Hopeh prov., N.E. China; site of discovery of bones of extinct Pekin man.
Chowtsun, *t.*, *treaty pt.*, Shantung, N.E. China; silk; rly.; p. *46,200*.
Christchurch, *t.*, *mun. bor.*, Hants, Eng.; on S. cst. 5 m. E. of Bournemouth; holiday resort, aircraft, light inds.; p. (1951) *20,506*.
Christchurch, *cap.*, Canterbury, S.I., N.Z.; cath., mus.; boots, farm implements; agr. dist.; p. (estd. 1958) *205,500*.
Christiansand, *see* **Kristiansand.**
Christianshaab, Danish settlement on Disco Bay, W. Greenland; meteorological sta.
Christianstad, *see* **Kristianstad.**
Christiansund, *see* **Kristiansund.**
Christmas I., in Indian Oc., Australian terr. since Oct. 1, 1958; a. 62 sq. m., healthy climate, phosphate deposits; p. (1957) *2,619*.
Christmas I., large coral atoll in Pacific, one of the Line Is.; discovered by Cook 1777; over 100 m. in circum.; guano; site for U.K. nuclear tests.
Chrudim, *t.*, Czechoslovakia; horse mkt., mnfs.; p. (1947) *13,217*.
Chrzanow, *commune*, S. Poland; 27 m. from Krakow; coal, locomotives, leather, bricks; p. (1947) *12,121*.
Chu, *R.*, Kazakh S.S.R., U.S.S.R.; rises in Tien Shan, flows N.W. for 500 m. into inland drainage basin; Chumysh Dam provides hydro-electricity and water for intensive cultivation under irrigation of cotton, sugar-beet, citrus fruits.
Chu Kiang (Canton R. or Pearl R.), Kwangtung, S. China; drowned estuary of Si-Kiang below Canton; entrance controlled by Hong Kong (Brit.), Macao (Portuguese); length 80 m.; maximum width 23 m.
Chubut, *terr.*, Argentine; cap. Rawson; a. 87,152 sq. m.; agr.; p. (estd. 1958) *133,200*.
Chudleigh, *mkt. t.*, Devon, Eng.; on R. Teign; stone quarrying; p. (1951) *1,944*.
Chulucanas, *t.*, Piura dep., Peru; p. (1940) *12,622*.
Chungking, *t.*, *former treaty pt.*, Szechwan, China; on R. Yangtze-Kiang; comm. ctr., S.W. China; exp. silk, soya-beans, sugar; p. (1953) *1,620,000*.
Chuquibamba, *t.*, Peru; nr. Arequipa; p. *2,480*.
Chuquibamba Mtns. (alt. 21,000 ft.), Peru.
Chuquicamata, *part* of Calama *commune*, N. Chile; lgst. copper-mines in the world; p. *19,202*.
Chuquisaca, *dep.*, Boliva; cap. Sucre; a. 36,132 sq. m.; p. (1950) *282,980*.
Chur (Coire), *t.*, *cap.* Grisons can., Switzerland; Upper Rhine Valley; cath. and hist. bldgs.; p. (1950) *19,256*.
Church, *urb. dist.*, sub. to Accrington, Lancs, Eng.; cotton weaving and engin.; p. (1951) *5,199*.
Church Stretton, *urb. dist.*, Salop, Eng.; p. (1951) *2,580*.
Churchill, *R.*, Canada; enters Hudson Bay at Churchill; 925 m.; fine harbour.
Churchill, *t.*, Manitoba, Canada; terminus of Hudson Bay rly.; summer wheat route from prairie provs.; p. *160*.
Chusan I., off E. cst. of China; cap. Tinghai; tea, rice.
Chuvash, *rep.*, A.S.S.R., U.S.S.R.; a. 7,107 sq. m.; p. (1939) *1,077,614*.
Cibao, *lowland area*, Dominican Republic, Central America; extends along N. side of Cordillera de Cibao for approx. 100 m.; cacao, tobacco, maize; densely populated, ch. t. Santiago.
Cicero, *t.*, Ill., U.S.A.; p. (1950) *67,544*.
Ciechanów, *commune*, Poland; 49 m. N.W. of Warsaw; agr. inds.; p. (1947) *11,831*.
Cienaga, *spt.*, N. Colombia; exp. cotton, bananas, cacao; p. *22,783*.
Cienfuegos, *t.*, *spt.*, Cuba; sugar, tobacco; p. (1943) *94,810*.
Cieza, *t.*, Murcia, Spain; in fertile raisin and orange-growing dist.; p. *23,499*.
Cilicia, *ancient prov.*, S.E. Anatolia, Turkey.
Cincinnati, *c.*, Ohio, U.S.A.; on Ohio R.; "the Queen City"; pork-packing, machin., furniture, clothing; p. (1950) *503,988*.
Cinderford, *lge. vil.*, Gloucester, Eng.; in Forest of Dean, 12 m. S.W. of Gloucester; ch. mining ctr. on sm. F. of D. coalfield.
Cinque Ports, five ancient English pts. on cst. of Kent and Sussex; Sandwich, Dover, Hythe, Romney and Hastings.
Cinto, *mtn.* Corsica.
Cintra, *see* **Sintra.**
Circleville, *t.*, Ohio, U.S.A.; agr. ctr., maize, wheat; p. (1950) *8,723*.
Cirencester, *t.*, *urb. dist.*, Gloucester, Eng.; the Roman Corineum; p. (1951) *11,188*.
Citlaltépetl, (Aztec name for **Orizaba**), *mtn.*, volcanic peak, Veracruz st., Mexico, highest point in Mexico; 18,701 ft.
Cittadella, *t.*, Venetia, Italy; nr. Padua; mediæval walls and towers; p. *12,679*.
Cittanova, *t.*, Reggio, Italy; built on ruins of Casalnuovo; olive-oil ind.
Citta Vecchia, *c.*, Central Malta; former cap.
Ciudad Bolivar, *spt.*, Bolivar st., Venezuela; on R. Orinoco, in ctr. of Llanos plains; (formerly called Angostura), great comm. ctr., coffee, cattle; p. (1950) *31,009*.
Ciudad Juarez, *t.*, Mexico; p. (1950) *128,782*.
Ciudad Real, *prov.*, S. Central Spain; grazing grounds, forest and quicksilver mines; cap. Ciudad Real; a. 7,622 sq. m.; p. (1950) *567,027*.
Ciudad Rodrigo, *c.*, Salamanca, Spain; captured by French 1707 and 1710, by the English 1706, stormed by Wellington in 1812; fine cath.; p. *12,082*.
Ciudad Trujillo, *spt.*, *cap.*, Santo Domingo; cath., pal.; p. (1948) *147,372*.
Civitavecchia, *spt.*, Latium, Italy; on W. cst., 30 m. N. of mouth of R. Tiber; sulphur springs; p. *34,400*.
Clackmannan, *smallest co.*, Scot.; flat in Carse, and hilly elsewhere; coal, textiles (esp. woollens), metal work, brewing, distilling, agr.; a. 54½ sq. m.; p. (1951) *37,528*.
Clackmannan, *co. t.*, Clackmannan, Scot.; coal.
Clacton-on-Sea, *t.*, *urb. dist.*, Essex, Eng.; on E. cst., 12 m. S.E. of Colchester; seaside resort, residtl.; p. (1951) *24,065*.
Clairton, *t.*, S.W. Penns., U.S.A.; coal, iron, steel, chemicals; p. (1950) *19,652*.
Clairvaux, *vil.*, Aube, France; famous Cistercian Abbey.
Clanwilliam, *t.*, C. of Good Hope, Un. of S. Africa, on Oliphant R.; p. *1,468*.
Clare, *co.*, Munster, Ireland; co. t. Ennis; oats, potatoes; sheep, cattle; oysters, salmon; a. 1,294 sq. m.; p. (1956) *77,107*.
Clare, *t.*, S. Australia; on W. flank of Flinders Mtns., 70 m. N.E. of Adelaide; ctr. of wine-producing dist.
Clare I., Clew Bay, Mayo, Ireland.
Clarence Strait, between Melville I. and P. Darwin, N. Terr., Australia.
Clarence, *R.*, N.S.W., Australia; length 240 m.
Clarksburg, *t.*, W. Virginia, U.S.A., machin., glass, pottery; p. (1950) *32,014*.
Clarksdale, *t.*, Mississippi, U.S.A.; p. (1950) *16,539*.
Clarksville, *t.*, Tenn., U.S.A.; on Cumberland R.; tobacco mkt.; p. (1950) *16,246*.
Clausthal-Zellerfeld, *t.*, Lower Saxony, Hanover, Germany; iron, lead, copper, silver, zinc; tourist ctr.; p. (estd. 1954) *17,200*.
Clay Cross, *urb. dist.*, Derby, Eng.; coal and iron; p. (1951) *8,552*.
Clayton-le-Moors, *urb. dist.*, Lancs, Eng.; nr. Blackburn; textile machin., cotton and blanket weaving, bristles, soap; p. (1951) *6,823*.
Clear, C. (southernmost point of Ireland), Clear I., off S.W. cst.
Clearwater, *t.*, Fla., U.S.A.; citrus fruit, flowers, fish; resort; p. (1950) *15,581*.
Cleator Moor, *colly. t.*, Cumberland, Eng.; p. *8,291*.
Cleburne, *t.*, Texas, U.S.A.; rly. wks., flour; p. (1950) *12,905*.
Cleckheaton, *mftg. t.*, Yorks, Eng.; nr. Bradford; woollens, blankets.

Clee Hills, Salop, Eng.; between Rs. Severn and Teme; alt. 1,800 ft.
Cleethorpes, *t., mun. bor.*, Lindsey, Lincs, Eng.; on E. cst. 3 m. S. of Grimsby; resort; p. (1951) *29,558*.
Clent, *hills*, N.E. Worcester, Eng.; about 10 m. S.W. of Birmingham, on S. edge of S. Staffordshire coalfield, overlooking valley of R. Stour; well wooded; used for recreation by industl. ts. around Birmingham; maximum alt. 1,036 ft.
Clerkenwell, *industl. dist.*, London, Eng.; immediately N. of the City.
Clermont, *t.*, Queensland, Australia; in pastoral dist.; p. *1,861*.
Clermont-Ferrand, *t.*, Puy-de-Dôme, France; fine Gothic cath.; former cap. of Auvergne; rubber; chemicals; food ind.; p. (1954) *113,391*.
Clevedon, *urb. dist.*, Somerset, Eng.; at mouth of R. Severn; seaside resort; quarrying, bricks, footwear; p. (1951) *9,467*.
Cleveland, *hilly ironstone and agr. dist.*, N.R. Yorks, Eng.; between R. Tees and Whitby.
Cleveland, *c., port*, Ohio, U.S.A.; on L. Erie; rly. ctr.; steamboat mnfs.; machin., iron foundries, lumber, coal, oil-refining, meat canning; p. (1950) *914,808*.
Clew Bay, Mayo, Ireland; 10 m. by 7 m.
Clichy, *t.*, Seine, France; p. (1954) *55,591*.
Clifton, *sub.*, Bristol, Eng.; on R. Avon; mineral springs; famous suspension bridge.
Clifton, *t.*, New Jersey, U.S.A.; nr. Passaic; p. (1950) *64,511*.
Clinton, *c.*, Iowa, U.S.A.; on Mississippi R.; iron and steel; p. (1950) *30,379*.
Clinton, *t.*, Mass., U.S.A.; on Nashua R.; machin., carpets; p. (1950) *12,287*.
Clinton Golden Lake, *L.*, Mackenzie, N.W. Terr., Canada.
Clitheroe, *t., mun. bor.*, Lancs, Eng.; on R. Ribble; cotton weaving, limestone quarrying; p. (1951) *12,057*.
Clonakilty, *urb. dist.*, Cork, Ireland; nr. Bandon; corn, farming; p. (1951) *2,742*.
Cloncurry, *t.*, Queensland, Australia; in pastoral and lge. copper-producing dist. S. of the G. of Carpentaria; p. (1948) *1,584*.
Clones, *mkt. t., urb. dist.*, nr. Dundalk, Monaghan, Ireland; rly. ctr.; p. (1951) *2,455*.
Clonfert, *c.*, Galway, Ireland; famous monastery with seven altars.
Clonmel, *urb. dist.*, Tipperary, Ireland; on R. Suir; agr. ctr.; fairs; p. (1951) *10,471*.
Clovelly, *par.*, Devon, Eng.; seaside resort, picturesque fishing vil.
Clovis, *t.*, N.M., U.S.A.; rly. junction, tr. ctr., wheat, cattle; p. (1950) *17,318*.
Cloyne, *mkt. t.*, nr. Middleton, Cork, Ireland.
Cluj, *c.*, Romania; textiles, uranium, engin.; p. (1956) *154,752*.
Clunes, *gold-mining t.*, Victoria, Australia, nr. Ballarat.
Clutha R., S.I., New Zealand.
Clwyd, *R.*, Denbigh, N. Wales; flows into Irish Sea at Rhyl; length 30 m.
Clydach, *t.*, Glamorgan, Wales; on R. Tawe, 5 m. N.E. of Swansea; steel wks., nickel refineries.
Clyde, *R.*, Lanark, S.W. Scot.; navigable to Glasgow; greatest shipbldg. ctr. in world; length 96 m.
Clyde, Firth of, Scot.
Clydebank, *burgh*, Dunbarton, Scot.; on the Clyde adjoining Glasgow; shipbldg., sewing machin., tyres, biscuits; p. (1951) *44,625*.
Clydesdale, *valley* of R. Clyde, S.W. Scot., agr.; fine horses.
Coachella Valley, Cal., U.S.A.; part of old bottom of G. of Cal. which lies N.W. of Salton Sea; arid; dates and citrus fruits under irrigation from Imperial Valley irrigation system.
Coahuila, *st.*, Mexico; cap. Saltillo; maize, cotton; silver, copper, coal, gold; a. 55,062 sq. m.; p. (1950) *719,828*.
Coalbrookdale, *vil.*, Salop, Eng.; old coal- and iron-mines.
Coalville, *t., urb. dist.*, Leics, Eng.; nr. Ashby-de-la-Zouch; coal-mng.; p. (1951) *25,739*.
Coanza, *R.*, Angola; length 660 m.
Coast Range, *mtns.*, U.S.A.; along Pacific cst.
Coatbridge, *burgh*, Lanark, Scot.; 10 m. E. of Glasgow; coal, iron and steel, prefabricated houses, tubes, engin.; p. (1951) *47,538*.
Coatesville, *t.*, Penns., U.S.A.; iron, steel, brass, textiles; p. (1950) *13,826*.
Coats I., S. of Southampton I., Hudson Bay, Canada.
Coatzacoalcos (Puerto México), *spt.*, Mexico; on G. of Campeche; oil refinery; p. *13,740*.
Cobalt, *t.*, Ontario, Canada; silver, cobalt, arsenic, nickel; p. *2,376*.
Coban, *t.*, Guatemala, Central America; coffee and Peruvian bark tr.; p. (1950) *6,854*.
Cobar, *t.*, N.S.W., Australia; copper; p. (1947) *2,044*.
Cobh (Queenstown), *spt., urb. dist.*, Cork, Ireland; fine harbour and docks; p. (1951) *5,711*.
Cobija, *cap.* of Pando dep., N.W. Bolivia; rubber; p. (1957) *2,160*.
Coblenz, *see* **Koblenz**.
Cobourg, *t.*, Ontario, Canada; on L. Ontario; dairying, fruit, woollens; p. *5,973*.
Coburg, *t.*, Bavaria, Germany; old cas.; wicker-work, furniture, metal, machines, toy inds.; p. (estd. 1954) *46,000*.
Cochabamba, *dep.*, Bolivia; a. 25,288 sq. m.; p. (1950) *490,475*.
Cochabamba, *t., cap.*, dep. Cochabamba, Bolivia; fine cath.; cottons, woollens; p. (1957) *87,159*.
Cochin, *spt.*, Kerala, India; Malabar cst.; exp. coconut oil, tea; p. (1941) *25,000*.
Cochin China, name formerly applied to the whole E. part of Indo-China, now limited to S.E. of the peninsula; since 1946 aut. rep. within Fr. Ass. State of Viet-Nam; rice, silk, coffee, rubber, maize, cotton; cap. Saigon; a. 26,476 sq. m.; p. *5,600,000*.
Cochrane, *t.*, Ontario, Canada; on Abitibi R.; p. *2,844*.
Cockburn Land, N. of Baffin I., Arctic Canada.
Cockenzie and Port Seton, *burgh*, East Lothian, Scot.; on Firth of Forth, 9 m. E. of Edinburgh; p. (1951) *3,180*.
Cockermouth, *t., urb. dist.*, Cumberland, Eng.; coal; p. (1951) *5,234*.
Cocle, *prov.*, Panama, Central America; cap. Penonomé; p. (1950) *73,103*.
Coconada, *t., spt.*, Madras, India; rice-cleaning mills; exp. cotton, oil seeds; p. (1941) *75,140*.
Cocos or **Keeling Is.**, *2 coral atolls*, Indian Ocean; since 1955 terr. of Australia; ch. prod. coconuts; strategic psn. S.E. of Ceylon, 530 m. W. of Christmas I., N.E. of Mauritius; radio and cable sta.; civil aviation marine base; German raider beached and destroyed on N. Keeling I. in 1914; a. 5 sq. m.; p. (estd. 1958) *600*.
Cod, C., S.E. point of Mass. Bay, U.S.A.
Coesfeld, *t.*, N. Rhine–Westphalia, Germany; textiles, machin.; p. (estd. 1954) *15,600*.
Coeur d'Alene, *t.*, Idaho, U.S.A.; lead, silver, lumber; p. (1950) *12,198*.
Coffeyville, *t.*, Kan., U.S.A.; p. (1950) *17,133*.
Coggeshall, *t.*, Essex, Eng.; on Blackwater R.; silk; isinglass.
Cognac, *t.*, Charente, France; cognac, bottles; p. (1954) *19,026*.
Cohoes, *c.*, N.Y., U.S.A.; on Hudson R. N. of Albany; hosiery, paper, foundries; p. (1950) *21,272*.
Coimbatore, *t.*, Madras, India; coffee, sugar, cotton spinning; p. (1951) *197,755*.
Coimbra, *c., cap.*, Beira Litoral prov., Portugal; cath., univ.; wine-growing, earthenware mnfs.; p. (1950) *98,883*.
Coin, *commune*, Malaga, Spain; soap, paper, textiles, oil, wine, marble; p. *17,348*.
Colac, *t.*, Victoria, Australia; nr. Melbourne; farming and dairying dist.; p. (1958) *8,730*.
Colchagua, *prov.*, Chile; cap. San Fernando; stock raising; a. 3,422 sq. m.; p. (1957) *167,459*.
Colchester, *mun. bor.*, Essex, Eng.; on R. Colne; light inds., engin., oyster fisheries; p. (1951) *57,436*.
Cold Harbour, *vil.*, Va., U.S.A.; battles between Grant and Lee, 1864.
Coldstream, *burgh.*, Berwick, Scot.; on R. Tweed; agr. engin., and knitwear; p. (1951) *1,294*.
Coldwater, *t.*, Mich. U.S.A.; engin.; flour, cement, leather goods; p. (1950) *8,594*.
Coleford, *t.*, Gloucester, Eng.; in Forest of Dean; ctr. of sm. coal-mining dist.; p. *2,800*.

Colenso, *t.*, Natal. S. Africa; on R. Tugela; battle 1899; p. *2,145*.
Coleraine, *urb. dist.*, *spt.*, Londonderry, N. Ireland; on R. Bann, 4 m. from sea; linen, acrilan mftg., distilling; p. (1951) *10,748*.
Colesberg, *t.*, C. of Good Hope, S. Africa; nr. Orange R.; stock-raising; p. *3,133*.
Coleshill, *t.*, Warwick, Eng.; lurgi gasification plant projected; p. *3,177*.
Colima, *volcano* (30 m. N.E. of c.), Mexico, alt. 12,685 ft.
Colima, *st.*, Mexico; on Pacific cst.; cap. Colima; a. 2,009 sq. m.; p. (1950) *112,292*.
Colima, *c.*, Mexico; on Colima R. in fertile valley; p. (1940) *28,514*.
Coll, *I.*, off coast of Mull, Argyll, Scot.
Colle di Val d'Elsa, *commune*, Siena, Italy; cath.; metal mftg.; p. *11,052*.
Collie, *t.* Western Australia; p. (1957) *9,400*.
Collingswood, *t.*, N.J., U.S.A.; p. (1950) *15,800*.
Collingwood, *t.*, Ontario, Canada; on L. Huron; shipbldg., steel; p. *6,270*.
Collinsville, *t.*, Ill., U.S.A.; coal, zinc smelting, canning; women's clothes; p. (1950) *11,862*.
Colmar, *t.*, cap. Haut-Rhin dep., France; vines, textiles, rayon, brewing; p. (1954) *47,305*.
Colmenar, *t.*, Spain; nr. Madrid; mnfs.; p. *7,951*.
Colne, *t.*, *mun. bor.*, E. Lancs, Eng.; cotton mnfs.; p. (1951) *20,674*.
Colne, *R.*, Essex, Eng.; oysters.
Colne Valley, *urb. dist.*, W.R. Yorks; woollens; p. (1951) *22,184*.
Cologne, (Köln), *c.*, *Land*, N. Rhine–Westphalia, Germany; on R. Rhine at N. end of Rhine gorge; cath.; univ.; cottons, woollens, eau-de-Cologne, electro-technical ind., machin., metallurgy, paper, wood, chemicals; impt. R. pt. and route ctr.; p. (estd. 1954) *670,300*.
Colomb-Bechar, *t.*, N.W. Algeria; terminus of rly. through Oran dep.; p. *23,008*.
Colombes, *t.*, Seine, France; mftg. sub. of Paris; p. (1954) *67,909*.
Colombia, *rep.*, S. America, mountainous in W. (Cordilleras), swampy, llanos in E.; climate mainly tropical. Rs.: Magdalena, Canea and tribs. of Amazon; Spanish language; Roman Catholic; coffee, tobacco, cocoa, cattle; gold, platinum, oil, emeralds; cap. Bogotá; a. 439,997 sq. m.; p. (1951) *11,266,075*.
Colombo, *cap.*, *pt*, Ceylon; exp. tea, rubber coconuts; p. (1953) *423,481*.
Colon, *prov.*, Panama; p. (1950) *90,144*.
Colon, *spt.*, Panama, Central America; at Atlantic end of Panama Canal; p. (1950) *52,035*.
Colonia, *dep.* Uruguay; cap. Colonia; a. 2,193 sq. m.; p. (1953) *135,038*.
Colonia, *t.*, Uruguay; on La Plata R.
Colonsay, *I.*, the Inner Hebrides, Scot.; 8 m. long; ecclesiastical antiquities; p. (inc. Oronsay) *238*.
Colorado, *st.*, U.S.A.; in Rocky Mtns.; agr. with irrigation; pastoral; gold, copper, silver, coal, petroleum, uranium; cap. Denver (*q.v.*); a. 104,247 sq. m.; p. (1950) *1,325,089*.
Colorado, *R.*, W. of N. America, formed by union of Grand and Green Rs. (2,000 m. long, navigable for 600 m.), with cañon (6,000 ft. deep).
Colorado, *R.*, Texas, U.S.A.; length 900 m.
Colorado, *R.*, flows into Blanca Bay, Argentina.
Colorado Springs, *wat. pl.*, *health resort*, Col., U.S.A.; 64 m. S. Denver; smelting; p. (1950) *45,472*.
Colton, *t.*, S.E. Cal., U.S.A.; fruit and vegetable canning; mkt. gardening; p. (1950) *14,465*.
Columbia, *c.*, Mo., U.S.A.; St. Univ.; flour, lumber; p. (1950) *31,994*.
Columbia, *t.*, Penns., U.S.A.; mnfs.; p. (1950) *11,993*.
Columbia, *cap.*, S.C., U.S.A.; burned 1865; univ.; cotton mills; ironwks.; p. (1950) *86,914*.
Columbia, *t.*, Tenn., U.S.A.; mftg.; livestock mkt.; p. (1950) *10,911*.
Columbia, *R.*, on Pacific slope of N. America; rises in Brit. Columbia, flows through Wash., U.S.A.; salmon fishing; length 1,400 m.
Columbia, Dist. of, U.S.A.; on left bank of Potomac R.; contains Washington, the federal cap. of U.S.A.; a. 69 sq. m.; p. (1950) *802,178*.
Columbia, Mt., Alberta, Canada (alt. 12,294 ft.).
Columbus, *st. cap.*, Ohio, U.S.A.; rly. ctr.; St. Univ.; machin., shoes, soap; p. (1950) *375,901*.
Columbus, *t.*, Ga., U.S.A.; cotton goods, machin.; p. (1950) *79,611*.
Columbus, *t.*, Ind., U.S.A.; engin.; leather goods; p. (1950) *18,370*.
Columbus, *t.*, Miss., U.S.A.; cotton, dairying; p. (1950) *17,172*.
Colwyn Bay, *t.*, *mun. bor.*, on cst., 6 m. E. of Llandudno; Denbigh, N. Wales; seaside resort; p. (1951) *22,276*.
Comacchio, *c.*, Italy; nr. the Adriatic, 20 m. N. Ravenna; p. *12,609*.
Comayagua, *cap.*, Honduras Rep., Central America; formerly called Valledolid; p. *12,703*.
Combe Capelle, *rock shelter*, nr. Dordogne, France; discovery of race type of Aurignacian period, 1909.
Combe Martin, *vil.*, Devon, Eng.; 5 m. E. of Ilfracombe; popular seaside resort; p. (1951) *1,920*.
Comber, *t.*, Down, N. Ireland; distilleries, linen; p. (1951) *2,507*.
Comiso, *t.*, Sicily, Italy; medicinal spring, porcelain mnfs.; p. *29,555*.
Commentary, *t.*, Allier, France; nr. Moulins; mining; p. (1954) *9,259*.
Como, *c.*, N. Italy; at foot of the Alps, on L. Como; silk ind.; oranges, olives; p. (1951) *70,782*.
Como, *L.*, N. Italy (35 m. long), tourist resort.
Comodoro Rivadavia, *spt.*, Chubut prov. Argentina; situated on San Jorge Gulf, 550 m. S.W. of Bahia Blanca; exp. petroleum; p. (estd. 1947) *25,210*.
Comorin, C., most S. point of India.
Comoro Is., unit of French Community, Mozambique channel, midway between Africa and Madagascar; cap. Dzaoudzi on Mayotte I.; total a. about 650 sq. m.; turtle fishing; sugar-cane, vanilla, copra, sisal, timber; p. (1958) *175,552*.
Compiègne, *t.*, Oise, France; sugar-mills, rope; Armistice signed between Allies and Germany 1918; French surrendered to Hitler in 1940; p. (1954) *22,325*.
Conakry, *cap.*, Guinea; experimental fruit gardens; airfields; p. (1957) *49,200*.
Concarneau, *t.*, Finistère, France; on I. nr. Quimper; salted fish and preserve tr.; p. (1954) *10,341*.
Concepción, *prov.*, Chile; cap. Concepción; a. 2,201 sq. m.; p. (1957) *493,950*.
Concepción, *t.*, Chile; flour, distilling, brewing; damaged in earthquake; p. (1952) *134,000*.
Concepción, *t.*, Paraguay; p. (1945) *16,487*.
Concepción C., on cst. of California, U.S.A.
Conception Bay, Newfoundland, Canada; N.W. of St. Johns.
Conchos, *R.*, Chihuahua prov., Mexico, Central America; flows N.E. from Sierra Tarahumare to Rio Grande; cotton under irrigation in upper valley.
Concord, *t.*, Mass., U.S.A.; literary ctr.; textiles; p. (1950) *8,623*.
Concord, *t.*, N.C., U.S.A.; cotton, textiles; p. (1950) *16,486*.
Concord, *t.*, *cap.*, N.H., U.S.A.; on Merrimore R.; granite, machin., textiles; p. (1950) *27,988*.
Concordia, *t.*, Argentina; on Uruguay R.; p. (1947) *42,303*.
Concordia, *t.*, N. Kan., U.S.A.; agr., dairying, bricks; p. (1950) *7,175*.
Condamine, *R.*, Queensland, Australia; trib. of R. Darling.
Conde, *t.*, Normandy, France; nr. Caen; p. *4,937*.
Condé-sur-Noireau, *commune*, Calvados dep., N. France; cotton spinning, weaving; p. (1946) *2,650*.
Condobolin, *t.*, N.S.W., Australia; in pastoral and agr. dist.; p. *2,622*.
Conegliano, *commune*, N. Italy; silks, wines, light mftg.; p. *15,434*.
Coney I., *t.*, N.Y., U.S.A.; on Long I., 5 m. long, comprises Manhattan Beach, Brighton Beach, W. Brighton and W. End; seaside resort.
Congleton, *t.*, *mun. bor.*, E. Cheshire, Eng.; on S. W. margin of Pennines; agr., salt, clothing, textiles; p. (1951) *15,492*.
Congo, The, *see* **The Congo, Republic of.**
Congo, *R.*, Belg. Congo, greatest R. in Africa, numerous tribs.; estd. length 3,000 m.; drains 1,500,000 sq. m., navigable from sea to Matadi for ocean steamers, from Matadi to Stanley Pool interrupted by rapids and falls, again navigable to Stanley Falls; estuary, 7–10 m. wide.
Conisborough, *t.*, *urb. dist.*, W.R., Eng.; limestone, bricks, tiles; p. (1951) *16,412*.

Coniston, *t.*, Ontario, Canada; on rly. 8 m. E. of Sudbury; nickel smelting; town built by and for nickel-mining company.
Coniston Old Man, *mtn.*, nr. L. Coniston, Lancs, Eng. (alt. 2,575 ft.).
Coniston Water, *L.*, N. Lancs, Eng.; length 5½ m.; tourist resort.
Conjeeveram (Kanchiverum), *t.*, Madras, S. India; pilgrimage ctr.; silk, cotton, weaving; p. *61,400.*
Connacht, *prov.*, Ireland; (includes cos. Galway, Mayo, Sligo, Leitrim, Roscommon); a kingdom till reign of Henry I; mountainous in W.; farming, fishing; a. 6,863 sq. m.; p. (1956) *446,008.*
Connah's Quay, *urb. dist.*, Flint, Wales; p. (1951) *7,365.*
Connaught, *see* Connacht.
Connaught Tunnel, B.C., W. Canada; carries Canadian Pacific Rly. under Selkirk Mtns. from Golden in upper Columbia valley to Revelstoke in middle Columbia valley; length 5 m.
Connecticut, *st.*, New England, U.S.A.; cereals, tobacco, dairying; fishing, iron ore, tungsten, mnfs.: textiles, machin., rubber goods, watches; cap. Hartford; lgst. c. New Haven; a. 5,009 sq. m.; p. (1950) *2,007,280.*
Connecticut, *R.*, flows S. to Long I. Sound, U.S.A.; length 450 m.
Connellsville, *t.*, Penns., U.S.A.; coke, machin., motor cars; p. (1950) *13,293.*
Connemara, *mtns., dist.*, W. of Ireland, Galway; many lakes and bogs; tourist resort.
Conowingo Dam, Penns., U.S.A.; situated on lower Susquehanna R.; hydro-electric power-sta. supplies power to inds. in Philadelphia.
Conroe, *t.*, Texas, U.S.A.; oil, timber; p. (1950) *7,298.*
Consett, *urb. dist.*, Durham, Eng.; on edge of Pennines, 10 m. S.W. of Newcastle; iron, steel, coke, coal; p. (1951) *39,456.*
Conshohocken, *bor.*, Penns., U.S.A.; iron, steel, surgical instruments, textiles; p. (1950) *10,922.*
Constance (Konstanz), *c.*, Baden-Württemberg, Germany; on L. Constance; cath.; textiles, machin., chemicals, elect. inds.; route ctr.; p. (estd. 1954) *45,100.*
Constance, L., or Bodensee, between Switzerland and Germany; 45 m. long, 9 m. broad; a. 207 sq. m.; R. Rhine flows through.
Constanta, *spt.*, Romania; on the Black Sea; exp. petroleum, wheat; p. (1948) *78,586.*
Constantina, *t.*, Andalusia, Spain; p. *14,433.*
Constantine, *dep.*, N. Algeria; cap. Constantine; p. (1948) *3,108,165.*
Constantine, *t.*, N. Algeria; wheat, woollens, leather; stands 2,130 ft. high upon a rock; p. (1948) *118,774.*
Constantinople, *see* Istanbul.
Conversano, *c.*, Bari, S. Italy; cath.; olives, citrus fruits; mnfs.
Conway, *t.*, S.C., U.S.A.; river pt.; cotton, tobacco, lumber; p. (1950) *6,073.*
Conway, *mun. bor., spt.*, Caernarvon, N. Wales; at mouth of R. Conway; sm. seaside resort; cas.; quarrying, light engin.; p. (1951) *10,237.*
Cooch Behar, *dist.*, India; former st.; a. 1,318 sq. m.; rice, jute, tobacco; p. (1941) *665,000.*
Cooch Behar, *t.*, Cooch Behar, India; on Torsha R.; suffered severely from earthquake 1897; p. (1941) *25,000.*
Cook, *mtn.*, alt. 12,349 ft.; highest point in S. Alps, New Zealand.
Cook Inlet, S. Cst., Alaska; U.S.A. (200 m. long).
Cook Is., British group (Rarotonga, lgst.) in S. Pacific, annexed to New Zealand, 1901; bananas, oranges, copra; p. (estd. 1958) *16,925.*
Cook Strait, *channel* between N. and S. Is. of N.Z.; 15–18 m. wide.
Cookham, *t.*, Berks, Eng.; on R. Thames nr. Maidenhead; p. *12,980.*
Cookstown, *mkt. t.*, Tyrone, Ireland; linen; p. *3,793.*
Cooktown, *spt.*, Queensland, Australia; at mouth of Endeavour R.; pearl fishery and mining dist.
Coolgardie, *gold mining t.*, W. Australia; p. *650.*
Coolin Mtns., *see* Cuillin Hills.
Coonoor, *t.*, Madras, India; sanatorium 6,000 ft. above sea-level; p. *18,783.*
Coopers Creek (Barcoo), *R.*, Central Australia; rises in Warrego Range, Gr. Dividing Range, flows S.W. into marshes of L. Eyre; flow is intermittent and seasonal, but provides water for livestock in this semi-arid region; length approx. 900 m.
Coorg, *former st.*, now inc. in Mysore, India; mountainous, forests; coffee, rice, rubber, tea; cap. Mercara; a. 1,593 sq. m.; p. (1951) *229,405.*
Coorong, The, S. Australia; lagoon and long tongue of land on cst.
Coosa, *R.*, Ala., U.S.A.; length 350 m.
Cootamundra, *t.*, N.S.W., Australia; agr. and mftg.; p. (1947) *5,252.*
Cootehill, *mkt. t., urb. dist.*, Cavan, Ireland; Bellamont forest; p. (1951) *1,489.*
Copeland Is., gr. off N.W. coast of Down, N. Ireland, at entrance to Belfast Lough.
Copenhagen, *ch. spt., cap.*, Denmark; on E. cst. of Zealand I.; royal palace, univ., library; naval sta.; shipbldg., textiles, chemicals, breweries, machin., foodstuffs, porcelain, gloves; airport; p. (1955) *960,319.*
Copiapo, *spt.*, Atacama, Chile; several times overwhelmed by earthquakes; copper smelting; p. *21,731.*
Copiapo, *t.*, Chile; in Andes range, alt. 17,000 ft.; gold, silver, copper.
Copparo, *commune*, Ferrara, N. Italy; drained agr. land, in R. Po delta; p. *23,777.*
Coppercliff, *t.*, E. Ontario, Canada; mining, nickel–copper smelting; p. *3,732.*
Coppermine, *R.*, N.W. Terr., Canada; flows N. into Arctic Ocean; length 300 m.
Coquet I., off cst. Northumberland, Eng.
Coquilhatville, *t.*, Belg. Congo; at confluence of Rs. Congo and Ruki; p. *10,435.*
Coquimbo, *prov.*, Chile, on Argentine border; copper-mining dist.; cap. Coquimbo; a. 15,397 sq. m.; p. (1957) *314,647.*
Coquimbo, *spt.*, Chile; cath.; copper; p. (1940) *18,863.*
Coracora, *t.*, S. Peru; mining; pt. Chala; p. *8,000.*
Coral Sea, Pacific Ocean, extending from the New Hebrides to Australia.
Coraopolis, *bor.*, S.W. Penns., U.S.A.; iron, steel, glass; p. (1950) *10,498.*
Corato, *t.*, Apulia, Italy; farming ctr., olive oil, wine; p. *44,139.*
Corbeil-Essonnes, *t.*, Seine-et-Oise, France; on R. Seine, 12 m. S.E. of Paris; flour mills, printing, paper; p. (1954) *22,891.*
Corbridge, *t.*, Northumberland, Eng.; on R. Tyne, nr. Hexham; p. *2,415.*
Corby, *urb. dist.*, Northants, Eng.; 7 m. N. of Kettering; steel wks.; one of "New Towns," designated 1950; p. (estd. 1959) *31,200.*
Cordeli, *t.*, S.W. Ga., U.S.A.; tr. ctr.; peanuts, cotton mills, sawmills; p. (1950) *9,462.*
Cordell, *t.*, W. Okla., U.S.A.; gas, oil, cotton, maize, cattle; p. (1950) *2,920.*
Córdoba, *agr. prov.*, Argentina; cap. Córdoba; a. 65,195 sq. m.; p. (estd. 1958) *1,895,300.*
Córdoba, *c.*, Argentina; univ.; wheat, flour, wool, shoes; p. (estd. 1953) *510,739.*
Córdoba, *t.*, Veracruz, Mexico; cottons, woollens; p. *17,865.*
Córdova, *prov.*, Andalusia, Spain; cap. Córdova; agr., olives, vines, livestock; a. 5,299 sq. m.; p. (1950) *781,908.*
Córdova, *t.*, Andalusia, Spain; cap. of C. prov.; on Guadalquivir R.; cath.—formerly a sacred mosque of Mohammedans; textiles, leather, distilling; p. (1950) *165,403.*
Corentyne, *R.*, forms bdy. between Brit. and Netherland Guiana; length 400 m.
Corfe Castle, *par.*, Dorset, Eng.; cas. ruins; mkt., potter's clay.
Corfu, *see* Kerkyra.
Corigliano, *t.*, S. Italy; 4 m. from E. cst. of Calabria; agr. and wire-producing cty.; p. *15,926.*
Coringa, *t.*, Madras, India; at mouth of Godavari R.
Corinth, *see* Corinto.
Corinth, Isthmus of, divides the Saronic G. from G. of Corinth, Greece; cut across by Ship Canal.
Corinth Canal, *ship canal*, S. Greece; traverses Isthmus of Corinth, links G. of Corinth and Ionian Sea with Saronic G. and Ægean Sea; opened 1893; length 3½ m., depth 26 ft.
Corinto, *t.*, Brazil; p. *5,142.*
Corinto (Corinth), *c.*, Greece; at W. end of Isth. of Corinth; occupies a site 3 m. distant from

the ancient classic c. destroyed by an earthquake in 1858; currants, olive oil, silk; p. (1951) *17,699*.
Corinto, *ch. spt.*, N.W. Nicaragua; exp. hides, sugar, coffee; p. *2,500*.
Cork, *co.*, S. Ireland; lgst. and most S.; mtns.; dairying, brewing, agr., fisheries; cap. Cork; a. 2,890 sq. m.; p. (1956) *256,742*.
Cork, *spt., co. bor.*, Cork, Ireland; at mouth of R. Lee; woollens, butter, cattle; p. (1956) *79,945*.
Cork Harbour, pt. of call (Cobh) for Atlantic steamers.
Corleone, *t.*, Palermo, Sicily, Italy; mineral springs; p. *13,704*.
Corlu, *t.*, Turkey in Europe; grain mkt.: p. (1950) *10,956*.
Cormeilles-en-Parisis, Seine-et-Oise, France; p. (1954) *10,638*.
Corner Brook, *t.*, W. Newfoundland: gd. harbour; pulp, paper; p. of E. and W. (1956) *23,225*.
Corning, *t.*, N.Y., U.S.A.; dairying, tobacco; p. (1950) *17,684*.
Cornwall, *co.*, S.W. Eng.; mkt. gardening, oats, cattle, fishing, minerals, kaolin, granite, tin, lt. engin.; extreme point Land's End; co. to. Bodmin; a. 1,357 sq. m.; p. (1951) *345,612*.
Cornwall, *t.*, Ontario, Canada; on St. Lawrence R.; textiles, pulp, paper, flour; p. *14,117*.
Cornwallis Is., Arctic Ocean, Brit. N. America.
Coro, *t.*, Venezuela; oil; p. (1950) *28,307*.
Corocoro, *sm. t.*, La Paz dep., Bolivia; at alt. 13,000 ft. in Central Andes, 50 m. S. of La Paz; impt. copper-mining ctr.; p. (1946) *4,500*.
Coromandel Cst., cst. of S.E. Madras, India.
Coronado, Cal., U.S.A.; fashionable seaside resort; p. (1950) *12,700*.
Coronation Gulf, arm of Arctic Ocean; extreme point N. Canada; discovered by Franklin.
Coronel, *spt.*, Chile; p. *28,027*.
Coronel Bogado, *t.*, S.E. Paraguay; cotton, cattle; p. (1945) *11,159*.
Coronel Oviedo, *t.*, Paraguay; p. (1945) *33,098*.
Corowa, *t.*, N.S.W., Australia; on R. Murray, 40 m. downstream from Albury; collecting ctr. for Riverina dist., vines, fruit, wheat, red-gum timber; valuable new coal deposits.
Corpus Christi, *t.*, Texas, U.S.A.; cotton; p. (1950) *108,287*.
Corrèze, *mountainous dep.*, S. Central France; cap. Tulle; cereals, wines, cattle rearing, timber, coal, granite, iron; a. 2,272 sq. m.; p. (1954) *242,798*.
Corrib, Lough, *L.*, Galway and Mayo, R.o.I.; a. 68 sq. m.; R. Corrib flows from it into Atl.
Corrientes, *prov.*, Argentina; cap. Corrientes; a. 34,325 sq. m.; p. (estd. 1958) *650,400*.
Corrientes, *t.*, Argentina; on Parana R.; exp. cattle, sugar, rice, cotton; cap. of prov. of C.
Corrientes, C., Mozambique, Port. E. Africa.
Corry, *t.*, Penns., U.S.A.; oil, engin., metal wks., furniture; p. (1950) *7,911*.
Corsham, *mkt. t.*, Wilts, Eng.
Corsica (Corse), French I. and dep. in Mediterranean; forested, mtns.; agr., olives, lemons, chestnuts, vine growing; cap. Ajaccio; a. 3,367 sq. m.; p. (1954) *204,266*, excluding Bastia.
Corsicana, *t.*, Texas, U.S.A.; p. (1950) *19,211*.
Corso, C., N. point of Corsica.
Cortland, *t.*, N.Y., U.S.A.; stoves, wine; p. (1950) *18,152*.
Cortona, *t.*, Tuscany, Italy; nr. Perugia; silk factories; p. *30,222*.
Coruh, *prov.*, N.E. Turkey, a. 3,408 sq. m.; p. (1950) *174,511*, *spt.*, the *cap.* p. *13,861*.
Corum, *prov.*, N. Central Turkey in Asia, a. 4,339 sq. m.; p. (1950) *342,290*, *t.* its *cap.* p. (1950) *22,835*.
Corumba, *port*, Mata Grosso, Brazil; on R. Paraguay; p. *15,000*.
Coruña, *prov.*, N.W. Spain; cap. La Coruña (Corunna); a. 3,051 sq. m.; p. (1950) *955,772*.
Corunna, *see* **La Coruña**.
Corvallis, Ore., U.S.A.; rich farming section, canning, lumber; p. (1950) *16,207*.
Coryton, *t.*, Essex, Eng.; on Thames, oil refining.
Coseley, *t.*, Staffs., Eng.; W. edge of Black Country; heavy iron steel wks.; p. (estd. 1958) *34,000*.
Cosenza, *c.*, S. Italy; ctr. for figs, oranges, olive oil, wine, silk; cath., cas.; p. (estd.) *30,000*.
Cosenza, *prov.*, Calabria, Italy; a. 2,566 sq. m.; p. (1951) *685,572*.
Coshocton, *t.*, Ohio, U.S.A.; coal, gas, oil; pottery, enamelware; p. (1950) *11,675*.
Cosne, *t.*, Nièvre, France; on R. Loire; pottery; p. (1946) *7,035*.
Costa Rica, *rep.*, Central America; cap. San José; volcanic mtns.; agr., coffee, bananas, rubber, gold; a. 19,656 sq. m.; p. (1950) *800,875*.
Côte d'Or Mtns., N.E. part of Central Massif; max. alt. 1,968 ft.
Côte d'Or, *dep.*, E. France; traversed by R. Saône; cap. Dijon; wines, live-stock, iron and steel; a. 3,391 sq. m.; p. (1954) *356,839*.
Cotentin, *peninsula*, N. France; 50 m. long; Cherbourg, at its extremity, 80 m. from Portsmouth.
Côtes-du-Nord, *agr. dep.*, Brittany, W. France; cap. St. Brieuc; wheat, flax, iron, slate, fishing, linen-mkg.; a. 2,787 sq. m.; p. (1954) *503,178*.
Cotopaxi, *vol.*, (alt. 19,613 ft.) in the Andes of Ecuador, nr. Quito; loftiest active volcano in the world; recent eruptions have caused great damage to Ecuador.
Cotopaxi, *prov.*, Ecuador, S. America; cap. Latacunga; a. 2,595 sq. m.; p. (1950) *165,602*.
Cotrone, *spt.*, Catanzaro, S. Italy; good tr. in wine, olive oil, etc.; p. *21,496*.
Cotswold Hills, W. Eng., between Lower Severn and Upper Thames; highest point, Cleeve Cloud, 1,031 ft.; fine sheep pastures.
Cottbus, *t.*, Brandenburg, Germany; on R. Spree; textiles, metallurgy; rly. ctr.; p. (estd. 1954) *50,000*.
Coudekerque-Branche, S.E. sub. of Dunkerque, Nord dep., France; tar and lubricant refinery, textiles; p. (1954) *15,334*.
Coueron, *t.*, Loire Atlantique, France; p. (1954) *11,092*.
Coulsdon and Purley, *urb. dist.*, Surrey, Eng.; in dry valley of N. Downs, 4 m. S. of Croydon; residtl.; chalkstone quarrying; p. (1951) *63,770*.
Council Bluffs, *c.*, Iowa, U.S.A.; on Missouri R.; rly. ctr., farm implements, paper, machin.; p. (1950) *45,429*.
Coupar Angus, *mkt. burgh*, Perth, Scot.; in Strathmore, 16 m. S.W. of Forfar; p. (1951) *2,175*.
Courbevoie, *t.*, industl. sub. of Paris, France; on R. Seine; p. (1954) *59,730*.
Courcelles, *t.*, Hainaut, Belgium; coal, linen, factories; p. (estd. 1948) *4,275*.
Courneuve (La), *t.*, Seine, France; p. (1954) *18,349*.
Courtrai, *see* **Kortrijk**.
Cove and Kilcreggan, *burgh*, Dunbarton, Scot.; at junction of Loch Long and R. Clyde; p. (1951) *887*.
Coventry, *mftg. c., co. bor.*, N. Warwick, Eng.; 16 m. S.E. of Birmingham; ctr. of cycle, motor-cycle, motor-car ind.; aircraft, tools, projectiles, textiles; cath.; p. (1951) *258,211*.
Covilha, *t.*, Beira Baixa, Portugal; cloth factories; p. *19,213*.
Covington, *industl. c.*, Ky., U.S.A.; on R. Ohio, opp. Cincinnati; machin., leather, furniture; p. (1950) *64,452*.
Covington, *t.*, Va., U.S.A.; X-ray equipment, paper, rayon, textiles; p. (1950) *5,860*.
Cowbridge, *mun. bor.*, Glamorgan, S. Wales; nr. Cardiff; p. (1951) *1,005*.
Cowdenbeath, *burgh*, Fife, Scot.; 5 m. N.E. of Dunfermline; coal; p. (1951) *13,153*.
Cowes, *t.*, *urb. dist.*, I. of Wight, Eng.; on both sides of estuary of R. Medina; home of the Royal Yacht Squadron; regattas and yacht bldg.; aircraft, p. (1951) *17,154*.
Cowley, *sub.*, Oxford, Oxfordshire, Eng.; 3 m. S.E. of Oxford; mnfs. motor vehicles.
Cowpen, *t.*, Northumberland, Eng.; nr. Morpeth; coal.
Cowra, *t.*, N.S.W., Australia; famous wheat dist. and site of st. experimental farm; p. (1958) *6,150*.
Cozenza, *t.*, *cap.*, prov. Cozenza, Italy; iron and steel; p. *40,032*.
Cozumel I., E. of Yucatan Peninsula; Mexico.
Craców, *see* **Kraków**.
Cradle, Mt., *mtn.*, Tasmania, alt. 5,069 ft.
Cradock, *t.*, C. of Good Hope; wool tr.; p. *13,400*
Crail, *burgh*, Fife, Scot.; p. (1951) *1,139*.
Craiova, *see* **Krajova**.
Cranborne, *t.*, N.E. Dorset, Eng.
Cranbrook, *rural dist.*, *mkt. t.*, Kent, Eng.; hops and grain; p. (of dist. 1951) *13,788*.

Cranford, *t.*, N.J., U.S.A.; iron, chemicals; p. (1950) *18,602*.
Cranston, *t.*, Rhode I., U.S.A.; mnfs.; p. (1950) *55,060*.
Crater L., Ore., U.S.A.; in National Park, is a gr. body of water 2,000 ft. deep and 6 m. across, set in a crater of an extinct gigantic volcano, 8,000 ft. high.
Crathie and Braemar, *pars.*, Aberdeenshire, Scot.; adjoining Balmoral Cas. and Abergeldie Cas. estates; p. (1951) *1,291*.
Crato, *t.*, Ceara st., Brazil; at foot of Chapados de Araripe, approx. 300 m. by rail S. of Fortaleza; ctr. of irrigated area producing cotton, sugar, rice; p. (1947) *11,233*.
Crau, La, *region*, Bouches-du-Rhône dep., S.E. France; dry, pebbly area E. of Rhône delta; winter pasture for sheep.
Craven, *dist.*, Central Pennines, Eng.; relatively low limestone plateau, alt. mainly below 800 ft. except where capped by grits in N. Craven; typical limestone features, caves, stalactites and stalagmites, steep-sided valleys (dales); drained by R. Ribble to S.W., R. Aire to S.E.; largely moorland, sheep rearing in valleys, rearing of cattle for fattening elsewhere, cultivation of root and fodder crops; R. valleys give the only easy routes across Central Pennines, Leeds to Preston, Leeds to Carlisle; ch. mkt. ts. and route ctrs., Skipton, Settle.
Crawley, *t.*, Sussex, Eng.; on N.W. flank of the Weald 9 m. S. of Reigate; one of "New Towns" designated 1947 to relieve population congestion in London; extends from vil. of Crawley N. towards Horley; p. (estd. 1959) *49,000*.
Crayford, *urb. dist.*, Kent, Eng.; engin., fabric printing, oil and resin ref.; p. (1951) *27,951*.
Crediton, *mkt. t.*, *urb. dist.*, Devon, Eng.; p. (1951) *3,992*.
Crefeld, *see* **Krefeld-Uerdingen**.
Creil, *t.*, Oise, France; on R. Oise, 30 m. N. of Paris; machin. mnf.; p. (1954) *13,500*.
Crema, *commune*, Cremona, N. Italy; cath.; wine. silk, linen, lace, hats; p. *25,163*.
Cremona, *c.*, N. Italy; on R. Po; silk, cotton, musical instruments; p. (1951) *69,100*.
Crest, *commune*, Drôme dep., S.E. France; silks, woollens, paper; p. *5,379*.
Crete (Krete), *I.*, E. Mediterranean; since the Balkan War part of Greece; 60 m. from nearest point in Greece; cap. Candia; exp. fruit, oil, etc.; a. 3,235 sq. m.; p. (1951) *463,459*.
Créteil, *t.*, Seine, France; p. (1954) *13,793*.
Creus, C., juts out into Mediterranean Sea, Spain, nr. French border.
Creuse, *dep.*, Central France; agr., etc.; cap. Gueret; a. 2,164 sq. m.; p. (1954) *172,702*.
Creusot, Le, *t.*, Saône-et-Loire, France; lge. ordnance works; p. (1954) *28,663*.
Creutzwald-la-Croix, *t.*, Moselle dep., N.E. France; coal, iron foundries; p. (1954) *10,183*.
Crevillente, *t.*, Spain; wine, wheat and fruit; p. *11,403*.
Crewe, *t.*, *mun. bor.*, Cheshire, Eng.; 20 m. S.E. of Chester; lge. rly. wks.; impt. rly. junction; aircraft and refrigerator wks., clothing, engin., motor vehicles; p. (1951) *52,415*.
Crewkerne, *mkt. t.*, *urb. dist.*, Somerset, Eng.; 8 m. S.W. of Yeovil; sailcloth, twine, webbing, gloves, concrete prod.; p. (1951) *3,838*.
Criccieth, *t.*, *urb. dist.*, Caernarvon, N. Wales; on N. shore of Cardigan Bay; sm. seaside resort; p. (1951) *1,651*.
Crickhowell, *rural dist.*, *mkt. t.*, Brecon, S. Wales; on R. Usk; paper; p. (rural dist. 1951) *7,681*.
Cricklade, *t.*, *rural dist.*, N. Wilts, Eng.; on R. Thames, 8 m. N.W. of Swindon; p. (rural dist.) (1951) *15,693*.
Crieff, *burgh*, *summer resort*, Perth, Scot.; on R. Earn, 15 m. W. of Perth; egg hatchery, preserve wks.; p. (1951) *5,473*.
Crimea Peninsula, jutting into Black Sea, U.S.S.R.; wheat, tobacco, fruit; campaign 1854–55 between Russia and the Allied Force of Turkey, Britain, France and Sardinia was chiefly fought out here (Alma, Balaclava and Sevastopol).
Crimmitschau, *t.*, Saxony, Germany, nr. Zwickau; woollen-cloth factories, machin.; p. (estd. 1954) *31,000*.
Crinan Canal, across peninsula of Kintyre, S.W. Scot.; connecting Loch Gilp with the Atlantic; length 6 m.
Crisfield, *t.*, Md., U.S.A.; shipping point for oysters, crabs, fish; p. (1950) *3,688*.
Cristóbal, *c.*, Panama Canal Zone, Central America; adjoins Colón at N. entrance to Panama Canal.
Croaghpatrick, *mtns.*, Mayo, Ireland, 2,510 ft.
Croatia, *fed. unit*, Jugoslavia; formerly part of Austria; mtns.; cereals, potatoes, tobacco, timber, pigs, sheep, cattle; cap. Zagreb; a. 16,418 sq. m.; p. (1948) *3,749,039*.
Crockett, *t.*, E. Texas, U.S.A.; lumber, cotton-seed oil, pecan nuts; p. (1950) *5,932*.
Crocodile R., *see* **Limpopo**.
Croix, *t.*, Nord, France; p. (1954) *18,702*.
Cromarty, *burgh*, Ross and Cromarty, Scot.; on N.E. cst. of Black Isle; p. (1951) *726*.
Cromer, *t.*, *urb. dist.*, Norfolk, Eng.; on N. cst. of E. Anglia; seaside resort; p. (1951) *4,658*.
Crompton, *mftg. t.*, *urb. dist.*, Lancs, Eng.; 2 m. S. of Rochdale; cotton, engin., elec. lamps; p. (1951) *12,558*.
Cronenberg, *t.*, Rhineland, Germany; iron, silk weaving; p. *14,051*.
Cronstadt, *see* **Kronstadt**.
Crooked I., Bahama Is., W. Indies; p. (1953) *836*.
Crosby or **Great Crosby**, *mun. bor.*, S. Lancs., Eng.; on Liverpool Bay, 3 m. N. of Bootle; residtl.; seaside resort; p. (1951) *58,362*.
Cross, *R.*, S.E. Nigeria; rises in Cameroon Highlands, flows W. and S. into G. of Guinea at Calabar; useful inland waterway; length approx. 400 m.
Cross Fell, *mtn.*, Cumberland, Eng.; on E. border of co.; alt. 2,930 ft.
Crow Head, *C.*, Kerry, Ireland.
Crowle, *mkt. t.*, Lincoln, Eng.; nr. confluence of Rs. Don and Trent; p. *3,010*.
Crowley, *t.*, S. La., U.S.A.; rice mills, rice experiment sta.; p. (1950) *12,784*.
Crows Nest Pass, B.C., Alberta, Canada; southernmost pass across Canadian Rocky Mtns.; used by rly. from Medicine Hat to Spokane (U.S.A.); alt. summit 4,459 ft.
Croydon, *residtl. t.*, *co. bor.*, Surrey, Eng.; lt. inds.; fmr. airpt. (closed 1959); p. (1951) *249,592*.
Crozet Is., mountainous uninhabited group in S. Indian Ocean; French.
Cruzeiro, *t.*, S. Brazil, on trib. of Uruguay R.; coffee, tobacco; p. *11,863*.
Csongrad, *mkt. t.*, *agr. dist.*, Hungary; at junction of Rs. Theiss and Koros; p. *25,594*.
Cuba, *I.*, W. Indies; taken from Spain by the U.S.A., but later constituted an independent rep.; climate, insular tropical, plentiful rainfall; tropical forest; agr., sugar-cane, tobacco, maize, fruits, mahogany and cedar, hardwoods, iron, copper, rayon, cement; cap. Havana; a. 44,206 sq. m.; p. (1953) *5,829,029*.
Cubango, *R.*, S. Africa, enters L. Ngami.
Cuckfield, *mkt. t.*, *urb. dist.*, Sussex, Eng.; p. (1951) *16,481*.
Cuckmere, *R.*, Sussex, Eng.; rises in High Weald and flows S. into English Channel 4 m. W. of Beachy Head; passes through S. Downs in very beautiful gap; length 23 m.
Cudahy, *t.*, Wis., U.S.A.; p. (1950) *12,182*.
Cuddalore, *spt.*, on E. cst., India; nr. Pondicherry; exp. oil-seeds, cottons; p. *60,632*.
Cuddapah, *t.*, Madras, India; cotton, cloth factories, millet, rice; p. *10,000*.
Cudillero, *commune*, Oviedo, N.W. Spain; manganese; p. *10,630*.
Cudworth, *urb. dist.*, W.R. Yorks, Eng.; p. (1951) *8,757*.
Cuenca, *c.*, Cuenca, Spain; on R. Jucar; p. (1949) *25,215*.
Cuenca, *agr. and mining prov.*, Central Spain; furniture, leather, paper; a. 6,588 sq. m.; p. (1950) *335,719*.
Cuenca, *cap.*, Azuay, Ecuador; univ.; sugar, pottery; p. (1950) *46,428*.
Cuernavaca, *cap.*, Morelos St., Mexico; ancient Indian t. captured by Cortes; p. (1940) *25,600*.
Cuesmes, *coal mining t.*, adjoining Mons, Belgium.
Cuiabá, *industl. c.*, *cap.*, Mato Grosso, Brazil; p. (1947) *62,104*.
Cuidadela, *t.*, Balearic Is., Spain; W. cst. of Minorca; cath.; ancient ruins; cheese mnfs.; p. *10,716*.
Cuillin Hills, I. of Skye, Scot.; highest peak Sgurr Alasdair; alt. 3,251 ft.
Culebra, *valley and mtns.*, N. New Mexico.

Culebra, *spt. and I.*, Puerto Rico; W. Indies.
Culgoa, *R.*, trib. of Darling R., Queensland and N.S.W., Australia.
Culiacau, *cap.*, Sinaloa, Mexico; p. (1950) *144,550.*
Cullen, *burgh*, Banff, Scot.; between Buckie and Portsoy; p. (1951) *1,555.*
Cullera, *spt.*, Valencia, Spain; on R. Jucar; p. *15,005.*
Cullinan, *t.*, Transvaal, S. Africa; ctr. of diamond-mining ind.
Culloden Moor, 6 m. E. of Inverness, Scot.; defeat of Bonnie Prince Charlie, 1746.
Cullompton (Cullumpton), *mkt. t.*, Devon, Eng.; paper, mftg., leather; p. *2,737.* [*578.*
Culross, *burgh*, F. of Forth, Fife, Scot.; p. (1951)
Culver City, Cal., U.S.A.; large motion-picture plant; p. (1950) *19,720.*
Cumaná, *spt.*, *c.*, Sucre, Venezuela; coffee, sugar, tobacco; p. (1950) *46,416.*
Cumaná, *G.*, N. cst., Venezuela.
Cumberland, *co.*, Eng.; S.E. part of Lake Dist., ch. mtns.; Scafell, Helvellyn, Skiddaw; ch. Ls.: Ullswater, Derwentwater, Thirlmere; oats, sheep rearing, dairying, fishing, coal, iron ore, iron and steel, shipbldg.; a. 1,516 sq. m.; p. (1951) *285,347.*
Cumberland, *industl. t.*, Md., U.S.A.; on Potomac R.; iron and steel; p. (1950) *37,679.*
Cumberland, *t.*, R.I., U.S.A.; iron, cotton, silk, granite; p. (1950) *12,842.*
Cumberland, *R.*, Ky., U.S.A.; trib. of Ohio; length 700 m.
Cumberland Gap, Ky., U.S.A.; ch. break in high E. wall of Cumberland Plateau; gives access from upper Tennessee valley to Cumberland and Ohio valleys; very impt. routeway in colonisation of Ky.
Cumberland Is., off coast of Queensland, Australia.
Cumberland Plateau, *mtn. region*, Ky., Tenn., Ala., U.S.A.; forms S.W. zone of Appalachian mtn. system terminating abruptly towards Tennessee valley to E., Cumberland valley to W.; drained W. by tribs. of Cumberland and Ohio Rs.; composed of horizontal sandstones overlying coal; thinly populated by backward farming communities except where mining ts. occur in valleys cut down to coal; mainly between 1,200 and 3,000 ft.
Cumbernauld, Dunbarton, Scot.: designated "New Town" July 1955; to accommodate 50,000 "overspill" from Glasgow; adding machines; p. (estd. 1959) *3,500.*
Cumbrae, *Is.*, in F. of Clyde, off cst. of Ayr, Scot.
Cumbrian Mtns., Lake District, Cumberland, Westmorland and Lancashire, Eng.
Cumnock and Holmhead, *burgh*, *mining dist.*, Ayr, Scot.; p. *4,586.*
Cumra, *t.*, Turkey; p. *5,190.*
Cundinamarca, *dep.*, Colombia, S. America; contains the fed. cap. Bogotá; a. 9,106 sq. m.; p. (1947) *1,390,200.*
Cunene, see **Kunene, R.**
Cuneo, *prov.*, Italy; a. 2,870 sq. m.; p. (1951) *580,424.*
Cuneo, *cap.*, Cuneo prov., Italy; cath.; cotton, paper; p. (1951) *39,730.*
Cunnamulla, *t.*, Queensland, Australia; on Warrego R.; p. *2,189.*
Cupar, *burgh*, Fife, Scot.; on R. Eden, 8 m. E. of St. Andrews; linen mkg.; p. (1951) *5,530.*
Curaçao I. (Netherlands Antilles), in the Caribbean, off N. cst. of Venezuela; oil refining, shipping, phosphates, salt, orange growing for liqueur; a. 210 sq. m.; p. (1957) *124,340.*
Curanilahua, *commune*, Aranco, Chile; coal-mining; p. *13,026.*
Curepipe, *t.*, Central Mauritius; health resort; p. *19,421.* [*107,333.*
Curico, *prov.*, Chile; a. 2,214 sq. m.; p. (1957)
Curitiba, *cap.*, Paraná st., Brazil; matches, porcelain, yerba maté; p. (1950) *183,863.*
Curtea de Arges, *t.*, Romania; on S. slopes of the Transylvanian Alps.
Curwensville, *bor.*, Penns., U.S.A.; firebrick, leather, clay, clothing; p. (1950) *3,332.*
Curzola or Korcula, I., *t.*, Dalmatia, Jugoslavia; in the Adriatic; fishing, seafaring, agr.
Cushing, *t.*, Okla., U.S.A.; oil, gas, refineries, industl. ctr.; p. (1950) *8,414.*
Cutch, *see* **Kutch.**
Cuthbert, *t.*, Ga., U.S.A.; cotton, lumber, canning; p. (1950) *4,025.*
Cuttack, *cap.*, Orissa st., India; on Mahanadi R.; rice, gold and silver filigree; p. (1951) *102,505.*
Cuxhaven, *spt.*, Lower Saxony, Germany; outport of Hamburg at the mouth of R. Elbe; fine harbour, docks, fishing; p. (estd. 1954) *47,200.*
Cuyahoga, *R.*, in N. Ohio, U.S.A., flowing into L. Erie at Cleveland; length 85 m.
Cuyahoga Falls, *t.*, Ohio, U.S.A.; p. (1950) *29,195.*
Cuyapo, *mun.*, Luzon, Philippines; rice, sugar, tobacco, hemp; p. *24,570.*
Cuyuri, *R.*, rises in Venezuela, enters sea in Brit. Guiana.
Cuzco, *ancient t.*, Peru; in the Andes at alt. 11,400 ft. in valley of Urubamba R.; once cap. of the Incas; temple and fortress; besieged and sacked by Manco Inca in 1536; cath.; cottons, woollens; p. (estd. 1950) *55,634.*
Cuzco, *dep.*, Peru; a. 55,716 sq. m.; p. (1947) *638,643.*
Cwmamman, *urb. dist.*, Carmarthen, Wales; on R. Loughor, 12 m. N.E. of Llanelly; p. (1951) *4,593.*
Cwmbran, *t.*, Monmouth, Eng.; in valley of Avon-Lwyd, 5 m. N. of Newport; one of "New Towns" designated 1949 comprises bulk of Cwmbran urb. dist. and extends N. towards Pontypool; iron, motor accessories, wire, elec. goods, bricks, tiles, pipes; p. (estd. 1959) *24,500.*
Cyclades, group of about 220 Is. Grecian arch.; ch. t. Hermoupolis (Syra.); a. 1,023 sq. m.; p. (1951) *121,256.*
Cyprus, *I.*, Brit. col. (proposed ind. 1960), E. Mediterranean; 40 m. from Anatolia, 60 m. from Syria; cap. Nicosia; salt, iron, copper, agr., sponge fishing; a 3,572 sq. m.; p. (estd. 1959) *550,000.*
Cyrenaica, *see* **Libya.**
Czechoslovakia, *cty.*, Central Europe; rep. comprising Bohemia, Moravia, Slovakia, Silesia; by decree 21 Dec. 1948, these provinces have been abolished; country divided into 19 regions; mtns.; fertile valleys; agr.: potatoes, sugar-beet, cereals, lumbering; coal, iron, granite, beer distilling, sugar, textiles, glass, stoneware, machin., chemicals; cap. Praha (Prague); a. 49,381 sq. m.; p. (1957) *13,296,243.*
Czeladz, *t.*, S.W. Poland; coal; p. *21,035.*
Czernowitz, *see* **Chernovtsy.**
Czestochowa, *industl. t.*, Kielce, S. Poland; on Warta R.; old pilgrimage monastery; iron and steel, textiles; p. (1957) *158,000.*
Czirknitzer (Zirknitzer), *L.*, with I. in Carniola, Jugoslavia, S. of Ljubljana, 6 m. long; extraordinary variations in depth.
Czortkow, *see* **Chortkov.**

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Daanbantayan, *mun.*, N. Cebu, Philippine Is.; rice, sugar; p. *24,198.*
Dabhoi, *t.*, Madras st., India; architectural remains; p. *18,156.*
Dabrowa, *t.*, Poland; 38 m. N.W. of Kraków; coal, zinc, iron ore; p. (1946) *28,070.*
Dacca, *c.*, *cap.* E. Bengal, Pakistan; on Buriganga R., an old channel of the Ganges; jute, muslin; p. (1957) *500,000.*
Dachau, *t.*, Bavaria, Germany; paper, elec. goods, brewing; p. (estd. 1954) *23,700.*
Dachstein, *mtn.*, Salzkammergut, Austria; alt. 9,830 ft.
Dade City, *t.*, Fla., U.S.A.; ctr. of mkt. gardening and citrus region; kaolin; p. (1950) *3,806.*
Dagenham, *t.*, *mun. bor.*, Essex, Eng.; on N. bank of R. Thames, 10 m. E. of London; motor cars, drugs, chemicals; p. (1951) *114,588.*
Dagestan, Caucasian prov. of R.S.F.S.R., U.S.S.R.; one of the most mountainous dists. in the world; cap. Makhachkala; cotton, orchards and vineyards; machin., engin.; a. 13,124 sq. m.; p. (1950) *977,800.*
Dago (Hiiumaa), *I.*, Estonia, at entrance G. of Finland.
Dagupan, *t.*, Pangasiman, Luzon, Philippines; on Lingayen Bay; p. (1948) *43,838.*
Dahlak Archipelago, gr. of Is. in Red Sea, nr. Massawa; pearl fishing.
Dahomey, *aut. rep.* within French Community, W. Africa; forests, palm-oil; cap. Porto Novo; a. *47,144* sq. m.; p. (1957) *1,713,000.*
Daimiel, *t.*, Ciudad Real, Spain; p. *18,412.*
Dairen, *c.*, on Liaotung Peninsula, China; former treaty pt.; built by Russia; p. (1947) *543,690*; *see* **Lüta.**

Dakar, *spt., air and naval base*, Senegal, W. Africa, S.E. of Cape Verde behind Gorée I., impt. adm. ctr.; airpt. for S. America; groundnuts; p (1957) *234,500*.
Dakhla, *oasis*, Libyan Desert, Egypt; 170 m. S.W. of Asyut; dates, olives; stage on caravan route from Cyrenaica to Upper Egypt.
Dakota, *R.*, trib. of Missouri R., U.S.A.
Dakovica, *t.*, Jugoslavia; 80 m. E. of Cetinje; p. (1948) *14,497*.
Dal, *R.*, S. Central Sweden; length 325 m.
Dalaguete, *t.*, Cebu, Philippines; sugar, maize; p. *30,000*.
Dalbeattie, *burgh*, Kircudbright, Scot.; granite, dairy prod., gloves; p. (1951) *3,288*.
Dalby, *t.*, Queensland, Australia; pastoral, agr., dairying, cotton-growing and timber dist.; p. *4,383*.
Dalhousie, *health resort*, Chamba, Himachal Pradesh, India; 7,687 ft. above sea-level.
Dalhousie, *spt.*, N.B., Canada; lumber, lobsters, salmon; resort; p. *4,508*.
Dalkeith, *burgh*, Midlothian, Scot.; 6 m. S.E. of Edinburgh; coal; ironwks.; p. (1951) *8,786*.
Dalkey, *t.*, Wicklow, Ireland; on E. cst., 5 m. S.E. of Dublin; seaside resort; residtl.; p. (1946) *4,135*.
Dallas, *c.*, Texas, U.S.A.; in cotton and grain-growing region; machin., aeroplanes; p. (1950) *434,462*.
Dalmatia, *dist.*, N.E. Adriatic cst., Jugoslavia; limestone (Karst) plateau; olive oil, wine; a. 4,916 sq. m.; p. *622,000*.
Dalmellington, *par.*, Ayr, Scot.; iron, coal; p. (1951) *7,094*.
Dalmeny, *par.*, W. Lothian, Scot.; oil shale; p. (1951) *3,691*.
Dalry, *par.*, Ayr, Scot.; 6 m. N.E. of Ardrossan; iron, woollens; p. (1951) *6,764*.
Dalton, *t.*, N. Ga., U.S.A.; cotton and sawmills; p. (1950) *15,968*.
Dalton-in-Furness, *t.*, *urb. dist.*, N. Lancs, Eng.; limestone quarrying, woollens, felt mftg.; abbey ruins; p. (1951) *10,394*.
Daly, *R.*, N. Terr., Australia; flowing into Anson Bay.
Daman, or **Damão**, *spt.* and *terr.*, W. India; 100 m. N. of Bombay; Portuguese; fishing, shipbldg., cotton; p. *60,000*.
Damanhur, *t.*, Egypt; on E. margin of Nile delta, 25 m. S.E. of Alexandria; mkt. for local agr. produce; p. (1947) *84,983*.
Damaraland, formerly part of German S.W. Africa now administered by Union of S. Africa; only pt., Walvis Bay; cattle rearing.
Damascus (Arabic **Esh-Sham**), *cap.*, Syria; 57 m. S.E. of its pt. Beirut; claims to be oldest continuously inhabited c. in world; metal-wk.; p. (estd. 1950) *335,060*.
Dambovitta, *R.*, Romania; rises in Mt. Omul (Transylvanian Alps), flows S. through Bucharest to R. Danube; flows through impt. oilfields; length 150 m.
Damghan, *t.*, N. Persia; nr. Caspian Sea; p. *16,500*.
Damietta, *t.*, Nile Delta, Egypt; cotton; p. (1947) *53,620*.
Damoh, *t.*, N. Madhya Pradesh, India; agr. ctr. and mkt.; p. (1941) *20 728*.
Dampier, *spt.*, W. Australia; mouth of Fitzroy R.
Dampier Archipelago, *gr. of sm. Is.*, off N.W. Australia.
Dampier Strait, *channel* between N.W. of New Guinea and Waigeu I.
Dampier Strait, Bismarck archipelago, between Umboi and New Britain.
Dampremy, *commune*, Hainaut, Belgium; coal; p. *13,373*.
Danakil or **Dankali Country**, Eritrea; cst. land between Red Sea and Ethiopia (Abyssinia).
Danao, *t.*, Cebu, Philippines; rice and sugar dist.; p. (1948) *26,461*.
Danbury, *t.*, Conn., U.S.A.; hat-mkg. ind. since 1780; p. (1950) *22,067*.
Dandenong, *t.*, Victoria, Australia; 18 m. from Melbourne; ctr. of dairy and mkt.-gardening dist.; veg. dehydration; p. *6,000*.
Dannemora, *t.*, Sweden; 25 m. N.E. of Uppsala; iron ore worked since 1579; p. *1,062*.
Dannevirke, *t.*, N.I., N.Z.; p. (1951) *4,649*.
Dansalan, *chartered c.*, cap. of Lanao prov., Philippine Is.; summer resort; p. (1948) *19,657*.
Danube, *R.*, second longest R. in Europe; rises in Black Forest, Germany, and flows E. into Black Sea; navigation for steamers from Ulm to the sea; Vienna, Budapest, Belgrade and other large cs. on its banks; length 1,750 m.
Danville, *c.*, Ill., U.S.A.; coal; p. (1950) *37,864*.
Danville, *t.*, Ky., U.S.A.; mkt. for tobacco, hemp; horses; p. (1950) *8,686*.
Danville, *c.*, Va.; cotton, tobacco; p. *38,000*.
Danzig, *see* **Gdansk**.
Darbhanga, *t.*, Bihar, India; rice, oil-seeds, grain, sugar; p. (1941) *69,003*.
Dardanelles, *strait* between Europe and Turkey, connecting Ægean Sea with Sea of Marmara; (the ancient Hellespont), 40 m. long.
Dar-es-Salaam, *spt.*, *cap.*, Tanganyika Trust Terr., E. Africa; p. (1957) *128,732*, incl. *4,478* Europeans, *93,363* Africans
Darfur, *prov.*, Sudan N.E. Africa; between Kordofan and Wadai; inhabited by Arabs and Negroes; cap. El Fasher; a. 138,150 sq. m.; p. (1947) *882,800*.
Darien, *region*, Panama; tortoiseshell, pearls, gold.
Darjeeling, *hill t.*, Bengal, India; tea, quinine; has suffered from earthquake and landslips; p. *25,873*.
Darlaston, *urb. dist.*, Staffs, Eng.; nuts, bolts, fabricated steel mnfs., drop forgings, car components, pot and tile mkg.; p. (1951) *22,024*.
Darling, *R.*, N.S.W., Australia; rises in Gr. Dividing Range, flows S.W. into Murray R. at Wentworth; length 1,702 m.
Darling Downs, *plateau*, S.E. Queensland, Australia; grazing cty.; ch. t. Toowomba.
Darling Range, *mtns.*; granite range; gt. grazing cty. of W. Australia; parallel with cst, highest peak, 3,500 ft.
Darlington, *t.*, *co. bor.*, Durham, Eng.; locomotive, wagon and bridge bldg., woollen yarn mnf.; engin.; p. (1951) *84,861*.
Darlington, *t.*, S.C., U.S.A.; tr. ctr., agr., cotton goods, tobacco; p. (1950) *6,619*.
Darmstadt, *t.*, Hessen, Germany; on Darm R.; cas.; metallurgy, paper, machin., radio, chemicals; p. (estd. 1954) *113,800*.
Dart, *R.*, Devon, Eng.; rises in Dartmoor, flows S. into English Channel at Dartmouth; l. 46 m.
Dartford, *mkt. t.*, *mun. bor.*, Kent, Eng.; nr. S. cst. of Thames estuary 15 m. E. of London; chemical wks., engin., quarrying, paper mills; p. (1951) *40,544*.
Dartmoor, *high stony plateau*, S.W. Devon, Eng.; granite; kaolin mines; pasture for sheep and ponies; convict prison; a. 220 sq. m.; highest point, Yes Tor, 2,028 ft.
Dartmouth, *spt.*, *mun. bor.*, S. Devon, Eng.; on W. of estuary of R. Dart; Royal Naval College; shipbldg.; p. (1951) *5,842*.
Dartmouth, *t.*, Nova Scotia; p. (1956) *21,093*.
Dartmouth, *t.*, Mass., U.S.A.; p. (1950) *11,115*.
Dartmouth, *pt.*, Richmond Bay, Prince Edward I., Canada.
Darton, *urb. dist.*, W.R. York., Eng.; nr. Barnsley; coal; p. (1951) *14,400*.
Darvel, *burgh*, Ayr, Scot.; on R. Irvine, 8 m. E. Kilmarnock; curtains, carpets; p. (1951) *3,237*.
Darwen, *t.*, *mun. bor.*, N.E. Lancs, Eng.; on flank of Rossendale Fells, 3 m. S. of Blackburn; cottons, tile and glaze brick, paint and paper, mftg.; p. (1951) *30,827*.
Darwin, *t.*, *spt.*, N. Terr., Australia; landing place of world airlines—England to Australia; p. *2,538*.
Datchet, *t.*, Bucks, Eng.; adjoining Windsor, on R. Thames; p. *2,400*.
Datia, *t.*, Madhya-Pradesh, India; stone-walled, palaces; p. (1941) *13,232*.
Datteln, *t.*, N. Rhine-Westphalia, Germany; coal, leather, iron; p. (estd. 1954) *25,300*.
Daugavpils, *t.*, Latvian S.S.R., on Dvina R.; textiles, engin.; p. (1959) *65,000*.
Dauphiné, *old prov.*, S.E. France; now deps. Isère, Drôme and Hautes-Alpes.
Daura, *t.*, nr. Baghdad, Iraq; oil refining.
Davão, *t.*, Mindanao, Philippines; p. (1948) *111,263*.
Davenport, *c.*, Iowa, U.S.A.; at foot of Rock I.; rapids; on Mississippi R.; flour mills; p. (1950) *74,549*.
Daventry, *t.*, *urb. dist.*, Northampton, Eng.; on Northampton Heights, 9 m. S.E. of Rugby; boot-mkg., light engin.; wireless-transmission sta.; p. (1951) *4,078*.
Davis Strait, *channel* between Greenland and

Baffin Land, N.W. Terr., Canada; connects Atlantic with Baffin Bay.
Davos-Platz, *Alpine winter resort,* Grisons, Switzerland; alt. 4,845 ft.; p. *9,259.*
Dawley, *urb. dist.,* Shropshire, Eng.; on S.E. flank of The Wrekin; ironwks., pipe, cement, roadstone, asphalt and brick wks., engin.; p. (1951) *8,369.*
Dawlish, *t., urb. dist.,* S. Devon, Eng.; on S. cst. between estuaries of Rs. Exe and Teign; seaside resort; p. (1951) *7,512.*
Dawson, *t.,* Yukon Terr., Canada; on Yukon R., nr. the Klondyke goldfields; p. (1951) *851.*
Dax, *t.,* Landes, S.W. France; on Adour R.; hot sulphur spring; horse mart; p. (1954) *14,557.*
Daylesford, *t.,* Victoria, Australia; 75 m. from Melbourne; tourist resort, gold-mining, wheat; p. *3,100.*
Dayton, *t.,* Ohio, U.S.A.; on Great Miami R.; aeroplanes, elec. machin.; p. (1950) *243,872.*
Dayton, *t.,* Wash., U.S.A.; fruit and vegetable canning, sawmills; exp. wheat, apples; p (1950) *2,979.*
De Aar, *t., rly. junction,* C. of Good Hope, S. Africa; 500 m. from Cape Town; rlys. from N.W. (Luderitz, Walvis Bay) and S.E. (Pt. Elizabeth, E. London) join Cape Town to Johannesburg trunk rly.; p. *9,137.*
Dead Sea, *salt-water L.* between Israel and Jordan; surface 1,286 ft. below level of the Mediterranean; a. 340 sq. m., length 47½ m., greatest width 9½ m., greatest depth 1,309 ft.; receives waters of Jordan; high mineral content.
Deal, *mun. bor., ancient spt.,* E. Kent, Eng.; on S.E. cst. 7 m. N.E. of Dover; opposite Goodwin Sands; seaside resort; Julius Cæsar is said to have first landed nr.; p. (1951) *24,276.*
Dean, Forest of, Gloucester, Eng.; between Wye and Severn Rs.; coal-mining.
Dearborn, *t.,* Mich., U.S.A.; p. (1950) *94,994.*
Death Valley, *depression,* Cal., U.S.A.; in Mohave Desert, 150 m. N.E. of Los Angeles; completely arid; floor covered with saline deposits; tourist attraction; depth of valley floor 276 ft. below sea-level.
Debar, *t.,* Jugoslavia; nr. Drin R.; tr. ctr., cattle breeding, sulphur springs; p. *6,913.*
Debra Markos, *cap.,* Gojjam prov., Ethiopia; p. approx. *5,000.*
Debrecen, *t.,* Hungary; 114 m. E. of Budapest; ctr. of pastoral dist.; fairs; p. (estd. 1957) *130,000.*
Decatur, *t.,* Ala., U.S.A.; steel, textiles; p. (1950) *19,974.*
Decatur, *t.,* Ga., U.S.A.; p. (1950) *21,635.*
Decatur, *t.,* Ill., U.S.A.; mnfs., coal; p. (1950) *66,269.*
Decazeville, *t.,* Aveyron, S. France; coal and ironwks.; p. (1954) *11,510.*
Deccan, The, *gr.* upland of S. India, bounded by the Narbada and Kistna Rs.
Dee, *R.,* N. Wales and Cheshire; length 90 m.
Dee, *R.,* Aberdeen and Kincardine, Scot.; length 87 m.
Dee, *R.,* Kirkcudbright, Scot.; length 38 m.
Dee, *R.,* Louth, Ireland; flowing to Dundalk Bay; length 20 m.
Defiance, *t.,* N.W. Ohio, U.S.A.; light mftg., tr. and agr. ctr.; p. (1950) *11,265.*
De Funiak Springs, *t.,* Fla., U.S.A.; in agr. region; turpentine; p. (1950) *3,007.*
Dehiwala (Mt. Lavinia), *t.,* Ceylon; p. (1946) *56,900.*
Dehra Dun, *t.,* Uttar Pradesh, India; p. (1951) *144,216.*
Deir-ez-Zor, *t.,* Syria; on Euphrates R.; on motor route between Damascus and Baghdad; p. *10,000.*
Dej, *t.,* on Szamos R., Romania; lge. distillery; p. *15,311.*
Delabole, *vil.,* Cornwall, Eng.; on N.W. flank of Bodmin Moor; lge. slate quarries.
Delagoa Bay, *natural harbour,* Mozambique; Portuguese E. Africa; principal pt. Lourenco Marques.
Delatyn, *t.,* Ukrainian S.S.R.; salt, mineral baths; p. *8,815.*
Delaware, *Atlantic st.,* U.S.A.; mainly industl.; grain; cap. Dover; ch. pt. Wilmington; a. 2,057 sq. m.; p. (1950) *318,085.*
Delaware, *R.,* flows from New York State along the Pennsylvania border, through New Jersey to Delaware Bay; length 350 m.
Delaware Bay, *inlet,* Atlantic cst., U.S.A.; drowned estuary of R. Delaware, extends 80 m. inland from C. May into heart of highly industl. a. of Philadelphia.
Delaware, *c.,* Ohio, U.S.A.; p. (1950) *11,804.*
Delémont, *t.,* can. Bern, Switzerland; p. *6,393.*
Delft, *ancient t., pt.,* S. Holland, Netherlands; on Schie R. nr. Rotterdam; butter and cheese mart; earthenware mnfs.; p. (estd. 1955) *69,000.*
Delftshaven, *t.,* on Maas R., Netherlands; sub. of Rotterdam; p. (1947) *8,396.*
Delhi, *c. cap.,* Indian Union; constituted a Union Territory, 1 Nov. 1956; a. 578 sq. m.; cotton mnfs. and other impt. inds.; ancient cap. of Mogul Empire; p. (1956) *1,744,072*; (of c.) (1951) *914,790.*
Delitzsch, *t.,* Saxony-Anhalt, Germany; 16 m. E. of Halle; sugar, chemicals; p. (estd. 1954) *26,100.*
Delmenhorst, *t.,* Lower Saxony, Germany; nr. Bremen; jute, woollens, linoleum, foodstuffs; p. (estd. 1954) *60,900.*
Delphi, N. of Chalcis, in Eubœa, Greece; famous for Delphic oracle on Mt. Parnassus.
Del Rio, *spt.,* Texas, U.S.A.; mkt. for agr a., grapes; exp. wool, sheep; p. (1950) *14,211.*
Demavend, *mtn.,* 17,604 ft.; highest peak, Elburz Mtns., N. Persia, extinct volcano.
Demerara, *co.,* Brit. Guiana; between Essequibo and Demerara Rs.; exp. sugar, molasses, rum; p. (1946) *220,639.*
Demirhissar, *t.,* Macedonia, Greece; under Turkish rule; p. *12,359.*
Demirkapu, "The Iron Gate," rocky defile, through which the Danube rushes, in the Transylvanian Alps.
Demmin, *t.,* Mecklenburg, Germany; sugar ind.; p. (estd. 1954) *18,000.*
Demonte, *fortfd. t.,* Italy; on Stora R.; lead-mines; p. *3,350.*
Denain, *t.,* Nord, N. France; nr. Douai; coal; p. (1954) *27,449.*
Denbigh, *co.,* Wales; sheep, dairying, coal, slate, quarrying; a. 669 sq. m.; p. (1951) *170,699.*
Denbigh, *mun. bor., co. t.,* Denbigh, N. Wales; dairying, slate; in Vale of Clwyd, 10 m. S. of Rhyl; p. (1951) *8,127.*
Denby Dale, *urb. dist.,* W.R. Yorks, Eng.; 8 m. W. of Barnsley; coal-mining, woollen textiles; p. (1951) *9,651.*
Dendermonde or Termonde, *t.,* E. Flanders, Belgium; nr. Ghent; p. (estd. 1948) *9,330.*
Denham, *vil.,* Bucks., Eng.; 1 m. E. of Gerrards Cross; impt. ctr. of film industry; residtl.
Den Helder, *see* **Helder.**
Denholme, *t., urb. dist.,* W.R. Yorks, Eng.; nr. Bradford; dairying, textiles; p. (1951) *2,586.*
Denia, *spt.,* Spain; 45 m. N.E. of Alicante; exp. oranges, raisins, grapes and onions; p. *13,286.*
Deniliquin, *t.,* Riverina, N.S.W., Australia; on Edward R.; sheep ctr.; p. *3,196.*
Denison, *t.,* Iowa, U.S.A.; ctr. of agr. region; p. (1950) *4,554.*
Denison, *c.,* Texas, U.S.A.; on Red R.; cotton, lumber; p. (1950) *17,504.*
Denizli, *t.,* Anatolia, Turkey; 47 m. S.W. of Izmir; gardens—"the Damascus of Anatolia"; nr. site of Laodicea; p. (1950) *22,029.*
Denmark, *kingdom,* N.W. Europe; consisting of peninsula of Jutland and islands in Baltic; agr. and associated inds.; shipbldg., diesel engine man.; cap. Copenhagen; a. 16,576 sq. m.; p. (estd. 1958) *4,499,000.*
Denny and Dunipace, *burgh,* Stirling, Scot.; 6 m. W. of Falkirk; steel castings, precast concrete; p. (1951) *6,692.*
Dent Blanche, *mtn.,* in Pennine Alps, S. Switzerland; height 14,318 ft.
Dent du Midi, *mtn.,* Valais Alps, Switzerland; alt. 10,778 ft.
Denton, *urb. dist.,* Lancs, Eng.; nr. Manchester; felt-hat mkg.; p. (1951) *25,612.*
D'Entrecasteaux Is., *gr.* off S.E. New Guinea, administered by Australia.
D'Entrecasteaux Point, *C.,* S.W. extremity of Australia.
Denver, *c., cap.,* Col., U.S.A.; on the E. slope of Rocky Mtns., on South Platte R.; univ.; impt. inds.; p. (1950) *415,786.*
Deoband, *t.,* Uttar Pradesh, India; nr. Meerut; p. (1941) *24,662.*
Deogarh, *t.,* Santal Pargans dist., Bihar, India;

numerous temples, place of pilgrimage; p. (1941) *14,217*.
Deori, *t.*, Madhya Pradesh, India; nr. Sagar; p. *5,638*.
De Pere, *t.*, Wis., U.S.A.; agr. ctr.; mftg.; boots, paper, chemicals, bricks; p. (1950) *8,146*.
Deptford, *metropolitan bor.*, S.E. London, Eng.; on R. Thames; oil refining, engin.; p. (1951) *75,694*.
De Quincy, *t.*, La., U.S.A.; oil, gas, lumber, rice, sugar; p. (1950) *3,837*.
Dera Ghazi Khan, *cap.*, West Punjab, Pakistan; W. side of R. Indus; silk, brass, ivory goods, handsome mosques; p. *25,000*.
Dera Ismail Khan, N.W. Frontier Province, Pakistan; on Indus R.; large bazaar for Afghan traders, inlaid furniture; p. (1941) *39,341*.
Derbent, *t., spt.*, R.S.F.S.R.; on W. side of Caspian Sea; textiles, petrol; p. (1939) *27,476*.
Derby, *co. bor., co. t.*, Derbyshire, Eng.; on R. Derwent; rly. wks., pottery, aircraft engine mnf. and repair, vehicles, textiles; p. (1951) *141,264*.
Derby, *t.*, Conn., U.S.A.; rubber, metal, hardware mftg.; p. (1950) *10,259*.
Derby, *sm. spt.*, W. Australia; on natural harbour of King Sound on N.W. cst. of Australia; hinterland little developed as yet but potential gold and cattle-ranching within area of artesian basin.
Derbyshire, *co.*, Eng.; hilly and rich in minerals; lge. part of N. and W. scheduled as Nat. Park; E. part highly industl.; *co. t.*, Derby; a. 1,041 sq. m.; p. (1951) *826,336*.
Dereham, East, *t., urb. dist.*, Norfolk, Eng.; 14 m. W. Norwich; agr. implements; p. (1951) *6,441*.
Derg, Lough, in basin of R. Shannon, Ireland, separating Galway and Clare from Tipperary.
Derg, *L.*, Donegal, with cave on I. much visited by R.C. pilgrims and known as "St. Patrick's Purgatory."
Derna, *spt.*, Libya, N. Africa; p. (estd. 1951) *15,600*.
Derry, *t.*, N.H., U.S.A.; boots, shoes; p. (1950) *5,826*.
Derwent, *R.*, Cumberland, Eng.; length 33 m.
Derwent, *R.*, Derby, Eng.; length 60 m.
Derwent, *R.*, Yorks, Eng.; length 57 m.
Derwent, *R.*, trib. of the Tyne R., Eng.; length 30 m.
Derwent, *lgst. R.*, Tasmania; flowing to Storm Bay; length 30 m.
Derwentwater, *L.*, Cumberland, Eng., nr. Keswick; 3 m. long.
Desaguadero, *R.*, Bolivia, S. America; outlet of L. Titicaca.
Desaguadero, *plateau*, S. Peru and W. Bolivia between the Andes ranges, the second highest in the world.
Desborough, *t., urb. dist.*, Northants, Eng.; boot and shoe mnfs., iron; p. (1951) *4,676*.
Desenzano del Garda, *commune*, Lombardy, Italy; on L. Garda; impt. harbour; p. *10,360*.
Désirade, *I.*, Fr. W. Indies; nr. Guadeloupe; a. 10 sq. m.; p. *1,581*.
Des Moines, *R.*, Iowa, U.S.A.; trib. of Mississippi rising in Minnesota; length 550 m.
Des Moines, *c., cap.* Iowa State, U.S.A.; rly. and mftg. ctr.; p. (1950) *177,965*.
Desna, *R.*, trib. of Dnieper R., U.S.S.R.; length 550 m.
Despoto Dagh, *mtn. range*, Balkans; alt. 7,800 ft.
Dessau, *t.*, Saxony-Anhalt, Germany; at confluence of Mulde and Elbe Rs.; cas.; machin., rly. carriages, paper, sugar, chemicals; route ctr.; p. (estd. 1954) *94,000*.
Detmold, *t.*, N. Rhine-Westphalia, Germany; cas.; paints, wood inds.; p. (estd. 1954) *31,200*.
Detroit, *ch. c., pt.*, Mich., U.S.A.; busy comm. and industl. ctr.; gt. grain mart; and ctr. of the "Ford" motor-car wks., aeroplanes, military tanks, synthetic diamonds, lgst. exporting t. on Great Lakes; p. (1950) *1,849,568*.
Detroit, *R.*, channel between L. St. Clair and L. Erie (25 m.), separates st. of Michigan from Ontario, Canada; carries more shipping than any other inland waterway in the world; navigable for eight months in the year.
Detva, *industl. t.*, Czechoslovakia, nr. Hriñova; p. (1947) *7,605*.
Deurne, *t.*, Belgium; nr. Antwerp; p. (estd. 1957) *63 184*.
Deventer, *c., old Hanse t.*, Overyssel, Netherlands; on R. Yssel, 15 m. S.E. of Zwolle; carpets; p. (1951) *47,195*.
Deveron, *R.*, Aberdeen and Banff, Scot.; flows into Moray Firth; length 61 m.
Deville-lès-Rouen, *industl. sub.* of Rouen, France; p. *7,403*.
Devizes, *mkt. t., mun. bor.*, N. Wilts, Eng.; on Kennet Avon Canal at N. foot of Marlborough Downs; tobacco and snuff, bricks, tiles, bacon curing; p. (1951) *7,892*.
Devon, *R.*, trib. of Forth, Scot.; length 34 m.
Devonport, *fortfd. spt.*, S. Devon, Eng.; adjoins Plymouth on Tamar estuary; royal dockyards and naval sta.; p. included with Plymouth.
Devonport, *spt.*, Tasmania, Australia; 82 m. from Launceston; agr. dist.; p. *6,579*.
Devonport, *suburban bor.*, Auckland, N.Z.; naval base and dockyard; p. (1951) *11,699*.
Devonshire, *maritime co.*, S.W. Eng.; between English and Bristol Channels; famous for cream and cider; ch. ts. Exeter and Plymouth; a. 2,611 sq. m.; p. (1951) *798,283*.
Dewsbury, *t., co. bor.*, W.R. Yorks, Eng.; on R. Calder, 8 m. from Leeds; heavy woollens, coal-mining, dyewks.; p. (1951) *53,476*.
Dexter, *t.*, Mo., U.S.A.; cotton, flour, poultry; p. (1950) *4,624*.
Dhahran, *spt.*, Saudi-Arabia; oil.
Dhanushkodi, *t.*, Madras, India; on I. Palk Strait; ferry pt. for passenger traffic from India to Ceylon.
Dhar, *t.*, Madhya Pradesh, India; cultural and tr. ctr.; p. (1941) *22,015*.
Dharmsala, *hill sta.*, E. Punjab, India; 100 m. N.E. of Amritsar; sanatorium; alt. 6,000 ft.; imposing mtn. scenery; p. *10,000*.
Dharwar, *t.*, Bombay, India; 70 m. E. of Goa, Carnatic dist.; cotton mnf.; p. (1951) *66,571*.
Dhaulagiri, *mtn.*, Himalayas, Nepal; alt. 26,810 ft.
Dhofar, *fertile prov.*, Muscat and Oman, Arabia; sugar-cane, cattle; ch. t. Salalah; ch. pt. Murbat.
Dholpur, *t.*, Rajasthan, India; p. *16,500*.
Dhrangadhra, Bombay, India; 75 m. W. of Ahmadabad; brass vessels, cloth, pottery; p. *18,000*.
Dhulia, *t.*, Khandesh dist., Bombay, India; cotton ind.; p. (1951) *76,880*.
Diamante, *t.*, E. Argentina; on Paraná R.; grain, cattle; p. *11,518*.
Diamante, *R.*, Mendoza prov., Argentina; rises in Andes, flows E. to R. Salado; irrigates oasis of San Rafael; length 200 m.
Diamantina, *t.*, Minas Gerais, Brazil; ctr. of diamond dist.; p. (1947) *14,700*.
Diber, *prefecture*, Albania; p. (estd.) *83,491*.
Dibrugarh, *t.*, Assam, India; terminus of rail and river communications along Brahmaputra from Calcutta; coal, tea; p. (1941) *18,734*.
Dickson I., Kara Sea, Arctic Ocean, U.S.S.R.
Didymoteikhon, *t.*, Thrace, Greece; on R. Maritza; p. *10,150*.
Diego Garcia, *Brit. I.*, dep. of Mauritius; coaling sta., Indian Ocean; 12½ m. long, 6½ m. wide; ch. exp. coconut oil; p. *501*.
Diego Suarez, *t., Bay*, extreme N. of Madagascar; meat preserving; p. (1957) *38,212*.
Dieppe, *cross-Channel pt.*, Seine-Maritime, France; 35 m. N. of Rouen; fisheries, shipbldg., machin.; p. (1954) *26,427*.
Differdange, *t.*, S.W. Luxembourg; iron ore, cattle; p. (1958) *17,946*.
Digne, *t.*, Basses-Alpes, France; nr. Aix; cath.; p. (1954) *10,436*.
Dijon, *t.*, Côte-d'Or, E. France; the Roman *Divonense castrum*; cath.; bathing; casino; gt. wine tr., tobacco, brewery, textiles; p. (1954) *112,844*.
Diksmuide, *t.*, W. Flanders, Belgium; on Yser R.; p. *3,155*.
Dillingen, *t.*, Bavaria, Germany; on R. Danube, 20 m. downstream from Ulm; p. *6,500*.
Dilolo, *L.*, Angola; nr. source of Zambesi R.
Dimitrovgrad, *t.*, Bulgaria; founded 1947; fertilisers, chemicals, super phosphate plant, iron, thermo-electric sta.
Dimitrovo, *t.*, Bulgaria, formerly Pernik; steel blast furnaces; p. (1956) *59,721*.
Dinan, *t.*, Côtes-du-Nord, France; nr. St. Brieux; medieval houses and ramparts; mineral water; p. (1954) *13,844*.
Dinant, *fortfd. t.*, Namur, Belgium; on R. Meuse; brass, copperware, summer resort; p. *7,106*.

Dinapore, *military t.*, Bihar, India; on Ganges R., nr. Patna; p. (1941) *24,221.*
Dinard, *hol. res.*, Ille-et-Vilaine, France; opposite St. Malo; ch. wat. pl. of Brittany; p. *8,540.*
Dinaric Alps, *mtn. range*, Jugoslavia; highest peak, Dinara, alt. 6,007 ft.
Dindigul, *t.*, Madras, India; 25 m. S. of Trichinopoly, cigar and tobacco factories; p. (1941) *48,617.*
Dingras, *mun.*, Luzon, Philippine Is.; rice, hemp, tobacco; p. *22,434.*
Dingwall, *burgh*, Ross and Cromarty, Scot.; at head of Cromarty Firth; rly. junction; livestock mkt. ctr.; p. (1951) *3,367.*
Dinslaken, *t.*, N. Rhine–Westphalia, Germany, N. of Duisburg; coal, steel, iron, footwear, timber; p. (estd. 1954) *32,900.*
Diomede Is., two barren granitic islets in Behring Strait between Alaska and Siberia; accepted bdy. between Soviet and U.S. territory.
Diosgyör, *mkt. t.*, N. Hungary; nr. Miskolcz; iron and steel wks.; p. *20,854.*
Diourbel, *t.*, Senegal, Mali; W. Africa; hides, groundnuts; p. (1948) *18,006.*
Diredawa, *t.*, Ethiopia; 25 m. N. of Harar, rly. wks.; p. (estd. 1953) *30,000.*
Dirk Hartog I., off Shark Bay, W. Australia.
Disko I., off W. cst. of Greenland in Baffin Bay; contains harbour of Godhavn, cap. N. Greenland; rendezvous for whalers; a. 3,200 sq. m.
Dismal Swamp, *morass*, S. Virginia and N. Carolina, U.S.A.; contains L. Drummond and extends 30–40 m. S. from nr Norfolk.
Diss, *mkt. t.*, *urb. dist.*, Norfolk, Eng.; on R. Waveney 28 m. S.W. of Norwich; agr. implements; p. (1951) *3,505.*
Ditchling Beacon, nr. Brighton, Sussex, Eng.; alt. 813 ft.
Dittersbach, *commune*, S.W Poland; coal, drugs; p. *14,916.*
Diu, *Portuguese spt.*, *I.*, off S. coast of Bombay, India; a. 20 sq. m.; p. *13,600.*
Divion, *commune*, Pas de Calais, France; coal; p. (1954) *11,187.*
Dixon Entrance, *channel* between Queen Charlotte I. and Alaska, Brit. Columbia, Canada.
Diyarbakir, *t.*, Anatolia, Turkey; on Tigris R.; head of navigation; ancient Amida, old walls, gates, citadel; morocco leather, filigree work; p. (1945) *41,077.*
Dizful, *t.*, Persia; 32 m. N.W. of Shushtar; indigo; p. (1956) *52,153.*
Djambi, *dist.* and *t.*, Sumatra, Indonesia; on E. cst. plain 100 m. N.W. of Palembang; productive oil-field; a. (dist.) 17,345 sq. m.; p. (dist. 1930) *245,272.*
Djapara-Rembang, *prov.*, N.E. Java; petroleum, sugar, rice; a. 2,339 sq. m.; p. *1,885,548.*
Dmitriev, *t.*, N.W. Kursk region, U.S.S.R.; rye, oats, sugar-beet, lumber; p. (1939) *51,436.*
Dneprodzerzhinsk, *t.*, Ukrainian S.S.R.; W. of Dnepropetrovsk on Dnieper R.; iron and steel, engin., chemicals; p. (1959) *194,000.*
Dnepropetrovsk, *t.*, Ukrainian S.S.R.; on Dnieper R.; ironwks., coal, iron, manganese, engin., chemicals, sawmilling; p. (1959) *658,000.*
Dneprostroy, *see* **Zaporozhe.**
Dnieper, *R.*, S.E. Europe; rises in U.S.S.R., flows into the Black Sea; connected by canals with Baltic, etc.; the Dneprostroy dam, a barrage erected across the R. at Kichkas by the Soviet Government, feeds the lgst. power-sta. in the world; length 1,400 m.
Dniester, *R.*, S.E. Europe; rises in Carpathians and flows into the Black Sea; length 700 m.
Doab, *dist.*, between "two rivers" Jumna and Ganges, Uttar Pradesh, India.
Döbeln, *t.*, Saxony, Germany; nr. Leipzig; machin., metallurgy, wood, cigar and sugar inds.; p. (estd. 1954) *30,700.*
Dobrich, *t.*, *see* **Tolbukhin.**
Dobruja, *dist.*, E. Romania; a. 6,102 sq. m., ch. pt. Constanta, traversed by ancient wall of Trajan; p. (1948) *503,217.*
Dobsina, *t.*, Czechoslovakia; cave containing ice-field of 2 acres; asbestos, iron ore; p. *5,300.*
Doce, *R.*, Brazil; flows to Atlantic; length 400 m.
Dodecanese, *gr.* of 12 Greek Is. in Ægean Sea, to S. of Greek Archipelago; Italian 1912–46; a. 1,055 sq. m.; p. (1951) *121,480.*
Dodge City, *t.*, Kan., U.S.A.; p. (1950) *11,262.*
Dodoma, *mkt. t.*, Tanganyika Terr., Brit. E. Africa; 250 m. W. of Dar-es-Salaam on central Tanganyika rly. from Dar-es-Salaam to Kigoma; also on main N. to S. motor road through the Terr.
Dodworth, *urb. dist.*, W.R. Yorks, Eng.; nr. Barnsley; coal; p. (1951) *4,262.*
Dogger Bank, *sandbank* in N. Sea, between England and Denmark; depth varies from 6 to 20 fathoms; valuable fishing ground; action between British fleet under Beatty and German fleet under Hipper; *Blücher* sunk Jan. 1915.
Dogs, I. of, *riverside dist.*, formed by bend in the R. Thames off Greenwich, London, Eng.; Millwall docks and shipbldg. yards.
Dokai Bay, *inlet*, N. Kyushu, Japan; landlocked bay on S. side of Shimonoseki Straits; flanked by highly industl. zone inc. Yawata, Wakamatsu, Tobata cs.; requires constant dredging; length 4 m., width ½–1½ m.
Dokkum, *t.*, Friesland, Netherlands; p. *5,073.*
Dôle, *t.*, Jura, E. France; on R. Doubs, nr. Dijon; ancient cap. of Franche-Comté, ceded to France in 1678; p. (1954) *22,022.*
Dolgarrog, *sm. t.*, N.E. Caernarvon, Wales; on R. Conway; aluminium, milling; p. (1951) *572.*
Dolgelly, *urb. dist.*, *ch. t.*, Merioneth, N. Wales; agr., quarrying, timber; p. (1951) *2,246.*
Dollar, *burgh*, Clackmannan, Scot.; at foot of Ochil Hills, 6 m. N.E. of Alloa; noted for its academy founded in 1818 by Capt. John Mcnab; p. (1951) *1,385.*
Dollar Law, *mtn.*, nr. Peebles, Scot.; alt. 2,680 ft.
Dolomites, *gr. of limestone mtns.*, S. Tyrolese Alps, N.E. Italy; tourist district; peaks assume fantastic forms; principal peak, Marmolata 11,000 ft.
Dolon-Nor, *t.*, Mongolia, China; Buddhist temples; brass idols; p. *30,000.*
Dolores, *t.*, Argentina; p. *25,000.*
Dom, *mtn.*, Valais, Switzerland; alt. 14,942 ft.
Dombasle, *commune*, Meurthe et Moselle, France; soda factories; p. *8,082.*
Dominica, *Brit. col.*, Windward Is., T.W.I.; lime-juice, sugar, cacao, fruits, spices; cap. Roseau; a. 305 sq. m.; p. (estd. 1957) *65,890.*
Dominican Rep., Indep. Spanish-speaking E. part of I. of Hispaniola, Antilles; cap. Cuidad Trujilo; agr., sugar, tobacco, cement, glass, textile mftg., shipbldg. and repair; a. 19,332 sq. m.; p. (1959) *2,703,656.*
Domodossola, *frontier t.*, Piedmont, N. Italy, nr. Simplon; tourist ctr.; p. *10,350.*
Don, *R.*, Aberdeen, Scot.; flows into N. Sea; salmon; length 82 m.
Don, *R.*, W.R. Yorks, Eng.; trib. of R. Ouse, length 70 m.
Don, *R.*, Maine-et-Loire, France; length 40 m.
Don, *lge. R.*, W. Russia; falls into Sea of Azov below Rostov; navigable to Voronezh; access to the Volga by the Don–Volga Canal.
Donaghadee, *spt.*, *urb. dist.*, Down, N. Ireland; nearest point to Scot.; flax; p. (1951) *3,398.*
Donaldsonville, *c.*, La., U.S.A.; on Mississippi R.; agr., sugar, maize, rice; p. (1950) *4,150.*
Donaueschingen, *t.*, Baden-Württemberg, Germany; at confluence of Rs. Brigach and Breg forming R. Danube; cas.; textiles; p. (estd. 1954) *8,900.*
Donawitz, *commune*, Styria prov., Austria; lignite, iron and steel; p. *17,623.*
Donbas, *industl. region*, Ukraine, U.S.S.R.; in valleys of Rs. Donetz and lower Dnieper; about 2,300 sq. m.; produces 60% Russia's coal; adjoins Krivoi Rog ironfields; many lge. industl. ts.
Don Benito, *t.*, Badajoz, Spain; tr. in wheat, wine, fruit; p. *21,095.*
Doncaster, *t.*, *co. bor.*, W.R. Yorks, Eng., on Don R. 17 m. N.E. of Sheffield; rly. wks., mnfs.; racecourse; p. (1951) *81,896.*
Donchery, *ancient t.*, Ardennes, France, on R. Meuse, nr. Sedan; scene of gr. battle 1870.
Donegal (Tirconnail), *co.*, N.W. Ireland; ch. t. Donegal, a. 1,865 sq. m.; p. (1956) *122,061.*
Donegal, *spt.*, *cap.*, Co. Donegal, Ireland; on W. cst. of Donegal Bay; homespun tweeds; p. (1951) *1,131.*
Donets, *R.*, Ukraine S.S.R., U.S.S.R.; rises in uplands of central Russia, flows S.E. 400 m. into R. Don; crosses impt. Donets coalfield. *See* **Donbas.**
Dongola, New, *t.*, Sudan; left bank of R. Nile above 3rd Cataract; replaced Old D., now in ruins; p. *5,000.*

Donna, *t.*, S. Texas, U.S.A.; sugar refining, fruit and vegetables; p. (1950) *7,171*.
Donnybrook, *S.E. sub.* of Dublin, Ireland, on Dodder R.; formerly famous for fair.
Donzère-Mondragon, Provence, France; site of gr. barrage on Rhône supplying hydro-elec. power; completed 1952.
Doon, *R.*, Ayr, Scot.; flows from Loch Doon to Firth of Clyde; length 26 m.
Dora Baltea, *R.*, N. Italy; rises in Mt. Blanc, flows E. and S. through Val d'Aosta to R. Po at Chivasso; impt. routeway from N. Italy to Switzerland (through Gr. St. Bernard Pass) and France (through Little St. Bernard Pass); length 95 m.
Dora Riparia, *R.*, Italy; trib. of R. Po. flowing from Cottian Alps past Turin; length 60 m.
Dorchester, *mun. bor. co. t.* Dorset, Eng.; on R. Frome; Roman remains; p. (1951) *11,623*.
Dorchester, *pt. of entry*, N.B., Canada; on Penticodiac R.; p. *1,000*.
Dordogne, *dep.*, S.W. France; a. 3,550 sq. m.; cap. Périgueux; p. (1954) *377,870*.
Dordogne, *R.*, France; joins Garonne to form the Gironde; length 290 m.
Dordrecht, *t.*, nr. Rotterdam, Netherlands, on R. Maas; timber, shipbldg., seaplanes; p. (estd. 1955) *76,000*.
Dordrecht, *Dutch t.*, C. of Good Hope; battle S. African war 30 Dec. 1899; p. *2,749*.
Dorking, *mkt. t., urb. dist.*, Surrey, Eng.; on R. Mole to S. of gap through N. Downs; residtl.; light inds.; p. (1951) *20,252*.
Dornoch, *c. burgh*, Sutherland, Scot.; on N. side of Dornoch Firth; health resort; p. (1951) *793*.
Dorohoi, *t.*, Moldavia, Romania; 33 m. S.E. of Chernovtsy; gr. annual fair; p. (1948) *15,036*.
Dorp, *t.*, Germany; on R. Wupper, nr. Cologne; mnfs.; p. *14,000*.
Dorset, *co.*, S. Eng.; mainly agr.; sheep, Purbeck marble, Portland stone; co. t. Dorchester; a. 988 sq. m.; p. (1951) *291,157*.
Dorset Heights, *hills*, extend E. to W. across Central Dorset, Eng.; chalk, smooth slopes, few streams; short, dry, grass; pastoral farming, sheep; some cultivation where soil is deep enough; rise to 800–900 ft.
Dorsten, *t.*, N. Rhine–Westphalia, Germany; on R. Lippe; coal, iron, elec., chemical inds.; p. (estd. 1954) *28,500*.
Dortmund, *t.*, N. Rhine–Westphalia, Germany; impt. Ruhr comm. ctr.; coal, iron, steel, machin., brewing; p. (estd. 1954) *580,900*.
Dortmund–Ems Canal, N. Rhine–Westphalia, Germany; links Dortmund on Ruhr Coalfield with R. Ems 5 m. above Lingen; impt. coal, iron-ore traffic; length 90 m.
Dothan, *t.*, Ala., U.S.A.; p. (1950) *21,584*.
Douai, *t.*, Nord, France; nr. Lille on Scarpe R.; coal, iron and engin. wks.; bell founding, arsenal; p. (1954) *43,380*.
Douarnenez, *spt.*, Finistère, N.W. France; on D. Bay; sardine fisheries; p. (1954) *20,089*.
Doubs, *dep.*, E. France; traversed by the Jura range and the R. Doubs; chiefly agr.; watch-mkg. ind.; cap. Besançon; a. 2,052 sq. m.; p. (1954) *327,187*.
Douglas, *cap.*, I. of Man; 75 m. W. of Liverpool, Eng.; seaside resort; p. (1956) *20,361*.
Dounreay, Caithness, Scot.; experimental fast-breeder nuclear reactor.
Douro, *R.*, Portugal and Spain; enters Atlantic below Oporto; flows through one of world's richest wine-producing regions; known as Duero R. in Spain; length 485 m.
Douro Littoral, *prov.*, Portugal; textiles, wine, fruit, cattle; cap. Oporto; a. 1,314 sq. m.; p. (1940) *1,104,925*.
Dove, *R.*, Derby and Staffs, Eng.; trib. of Trent; flows through beautiful dales; length 45 m.
Dover, *spt., mun. bor.*, Kent, Eng.; one of old Cinque pts.; nearest spt. to France, the Strait of D. being only 21 m. wide; strongly fortfd.; naval harbour and chief pt. for passenger and mail traffic with Continent, train ferry to Dunkirk; p. (1951) *35,217*.
Dover, *cap.*, Del., U.S.A.; p. (1950) *6,223*.
Dover, *t.*, N.H., U.S.A.; p. (1950) *15,874*.
Dover, *t.*, N.J., U.S.A.; iron, munitions, explosives; knitwear, silk; p. (1950) *11,174*.
Dovercourt, *sub.*, Harwich, Essex, Eng.; seaside resort.
Dowlais, *mining dist.*, Merthyr Tydfil, S. Wales.
Down, *maritime co.*, N. Ireland; agr. and fisheries; industl. round Belfast; cap. Downpatrick; a. 957 sq. m.; p. (1951) *241,105*.
Downers Grove, *t.*, N.E. Ill., U.S.A.; dairy produce; tools, furniture; p. (1950) *11,886*.
Downham Market, *t., urb. dist.*, Norfolk, Eng.; on R. Ouse; flour-milling, malting, sheet-metal wks.; p. (1951) *2,759*.
Downington, *bor.*, Penns., U.S.A.; textiles, metal prod., bricks; p. (1950) *4,948*.
Downpatrick, *urb. dist., co. t.*, Down, N. Ireland; on R. Quoile; linen; p. (1951) *3,875*.
Downs, *roadstead*, natural harbour of refuge for shipping between Kent coast and Goodwin Sands in the English Channel.
Downs, North and South, two chiefly pastoral broad chalk ridges in S.E. Eng.; N. Downs ending at Dover, and S. Downs at Beachy Head and enclosing the Weald; fine grazing ground for sheep.
Downton, *t.*, S. Wilts, Eng.; nr. Salisbury; on R. Avon; agr. college.
Doylestown, *bor.*, Penns., U.S.A.; light mnfs., agr., dairy produce; p. (1950) *5,262*.
Drachenfels, *mtn. peak* on the Rhine, the steepest of the Siebengebirge range, nr. Königswinter; alt. 1,065 ft.; ascended by light rly.; famous cave of legendary dragon.
Draguignan, *cap.*, Var. dep., S.E. France; nr. Toulon; p. (1954) *13,402*.
Drakensberg, *mtn. chain* between Natal and Orange Free State, S. Africa; extending 500 m. from Gt. Fish R. to Olifants R.; highest peak Mont-aux-Sources 10,763 ft.; rly. crosses range by Van Reenen Pass.
Drama, *pref.* Macedonia, Greece; cap. Drama; p. (1951) *119,009*.
Drammen, *spt.*, Norway; nr. Oslo, on the Drammen R.; exp. timber, wood-pulp, paper, etc.; p. (1946) *26,589*.
Drancy, *t.*, Seine, France; p. (1954) *50,654*.
Drava, *R.*, Jugoslavia; trib. of Danube, flows from the Tyrol across Carinthia and Styria, joining D. nr. t. of Osijek; length 450 m.
Drenthe, *E. prov.*, Netherlands; on German frontier; cap. Assen; a. 1,028 sq. m.; p. (1948) *273,800*.
Dresden, *cap.*, Saxony, Germany; on R. Elbe 50 m. E. of Leipzig; fine art collections; cigarette, engin., chem., brewing, gen. inds., optical and photographic apparatus, porcelain, glass, impt. route ctr.; p. (estd. 1954) *470,000*.
Dreux, *t.*, Eure-et-Loir, France; nr. Chartres; hardware, heavy iron mnfs.; p. (1954) *16,818*.
Driffield, *urb. dist.*, E.R. Yorks, Eng.; on Yorks. Wolds 13 m. N. of Beverley; oil-cake wks.; p. (1951) *6,888*.
Drina, *R.*, trib. Sava, Jugoslavia, separating Serbia from Bosnia; length 300 m.
Dröbak, *spt.*, S.E. Norway; winter pt. for Oslo; summer resort; p. *2,087*.
Drogheda, *spt.*, Louth, Ireland; considerable tr. in agr. produce, salmon, etc.; stormed by Cromwell in 1649; p. (1951) *16,779*.
Drogobych, *c.*, Ukrainian S.S.R.; petroleum, engin.; p. (1954) *50,000*.
Drohobycz, *t.*, Ukraine, U.S.S.R.; 40 m. S.W. of Lwow; ctr. of lge. oilfields, refineries; p. *32,622*.
Droitwich, *t., mun. bor.*, Worcester, Eng.; brine baths, salt wks., wireless-transmission sta.; light inds.; p. (1951) *6,453*.
Drôme, *dep.*, S.E. France; traversed by Alps and watered by Rs. Rhône, Drôme and Isère; cap. Valence; agr., forestry, sericulture, textile ind.; a. 2,533 sq. m.; p. (1954) *275,280*.
Dromore, *mkt. t., urb. dist.*, Down, N. Ireland; on Lagan R.; linen; p. (1951) *2,390*.
Dronfield, *t., urb. dist.*, Derby, Eng.; between Chesterfield and Sheffield; iron, coal, edged tools, engin. and agr. implements; p. (1951) *7,628*.
Droylsden, *urb. dist.*, Lancs., Eng.; sub. of Manchester; cotton spinning; chemicals; p. (1951) *26,365*.
Drumheller, *t.*, Alberta, Canada; coal; p. *2,987*.
Drummondville, *t.*, Quebec, Canada; 45 m. N.E. of Montreal; woollens; p. *10,555*.
Drummoyne, *c.*, N.S.W., Australia; sub. of Sydney, on Parramatta R.; p. *29,214*.
Drumochter Pass, Grampian Mtns., Scot.; carries main Perth to Inverness rly. from Glen Garry into valley of R. Spey; highest alt. reached by any main rly. in Gr. Britain, 1,484 ft.

Duala, *spt.*, Cameroon Rep., W. Africa; rly. to Yaoundé; p. *18,000*.
Dubbo, *t.*, N.S.W., Australia; on Macquarie R., 180 m. N.W. of Sydney; in extensive pastoral and agr. dist.; p. (1958) *13,240*.
Dublin, *co.*, Ireland; co. t., Dublin; a. (inc. Dublin co. bor.) 356 sq. m.; p. (1956) *118,257*.
Dublin (**Baile Atha Cliath**), *co. bor.*, *cap.* Rep. of Ireland; at mouth of R. Liffey; cath., univ., cas.; spirit and chemical produce, stout, glass, etc.; p. (1956) *537,878*.
Dubno, *t.*, Ukranian S.S.R; tobacco; suffered in both world wars; p. *18,167*.
Dubois, *c.*, Penns., U.S.A.; 75 m. N.E. of Pittsburgh; coal; p. (1950) *11,497*.
Dubrovnik (**Ragusa**), *c.*, W. coast of Jugoslavia; oil, silk, leather inds.; p. *16,060*.
Dubuque, *c.*, Iowa, U.S.A., on Mississippi R.; clothing and carriage factories; p. *52,800*.
Duchov, *t.*, N.W. Bohemia, Czechoslovakia; 5 m. S.W. of Teplice; glass, pottery; p. *15,000*.
Dudinka, Arctic *spt.* on R. Yenisei, R.S.F.S.R.; nickel.
Dudley, *t.*, *co. bor.*, Worcester, Eng.; 8 m. N.W. Birmingham; engin., clothing, leather goods, firebricks, chains, cables; p. (1951) *62,536*.
Dudweller, *t.*, nr. Saarbrücken, Saarland; coal-mines and ironwks.; p. (estd. 1954) *28,800*.
Dueñas, *mun.*, Panay, Philippine Is.; rice, hemp; p. *16,310*.
Duffel, *commune*, Antwerp, Belgium; foundries, distilleries, paper, coarse woollen cloth; p. *10,142*.
Duffield, *vil.*, Derby, Eng.; on R. Derwent, 4 m. N. of Derby; p. *2,000*.
Dufftown, *burgh*, Banff, Scot.; 10 m. S.W. of Keith; distilleries, lime wks., woollen mills; p. (1951) *1,460*.
Duisburg, *t.*, *R. pt.*, N. Rhine-Westphalia, Germany; on E. bank of R. Rhine at confluence with R. Ruhr, 10 m. N. of Düsseldorf; extensive iron and steel inds., machin., textiles, chemicals, impt. route and R. tr. ctr.; p. (estd. 1954) *580,900*.
Dukeries, *dist.*, Sherwood Forest, Notts, Eng.; so called from ducal mansions in dist.
Dukinfield, *t.*, *mun. bor.*, Cheshire, Eng.; 6 m. S.E. of Manchester; textiles, engin., rope and twine; p. (1951) *18,445*.
Dukla, *pass*, Carpathian Mtns., Central Europe; easy route N. from Hungarian Plain to Poland; alt. 1,650 ft.
Dulag, *mun.*, Leyte I., Philippine Is.; hemp, rice, cotton, sugar; p. *28,693*.
Dulcigno (**Ulcinj**), *ancient c.*, Montenegro, Jugoslavia; tobacco, olive oil; p. *5,000*.
Dülken, *t.*, N. Rhine-Westphalia, Germany; nr. Krefeld, machin., textiles, leather goods; p. (estd. 1954) *19,200*.
Duluth, *pt.*, Minn., U.S.A.; at W. end of L. Superior; gr. tr. in grain, timber and iron ore; p. (1950) *104,511*.
Dumaguete, *spt.*, Negros, Philippines; on Tañon Strait; p. *16,636*.
Dumbarton, *burgh.*, *co. t.*, Dunbarton, Scot.; on N. bank of R. Clyde, 12 m. below Glasgow; shipbldg, valve and tube-mkg., iron and brass ware; p. (1951) *23,703*.
Dum-Dum, *t.*, W. Bengal, India; ammunition; p. (1941) *28,356*.
Dumfries, *maritime co.*, S. Scot.; on Solway Firth; N. parts mtns., much of the remainder pastoral; lead ore, coal, sandstone; a. 1,068 sq. m.; p. (1951) *85,656*.
Dumfries, *co. burgh*, Dumfries, Scot.; on R. Nith, 10 m. from Solway Firth; p. (1951) *26,320*.
Dunbar, *spt.*, *burgh*, E. Lothian, Scot.; 25 m. E. of Edinburgh; potatoes; p. (1951) *4,115*.
Dunbarton, *co.*, W. Scot;. agr., stock-raising, shipbldg., chemicals, dyeing, paper-mkg., mining, quarrying, lt. engin.; a. 246 sq. m.; p. (1951) *164,263*.
Dunblane, *mkt. burgh*, Perth, Scot.; on Allan Water, 5 m. from Stirling; ancient cath.; woollen ind., light engin.; p. (1951) *2,985*.
Duncan, *c.*, Okla., U.S.A.; oil; oilwell machin.; asphalt, cottonseed oil; p. (1950) *15,325*.
Duncansby Head, *promontory*, Caithness, N.E. Scot.
Dundalk, *spt.*, *urb. dist.*, *cap.*, Louth, Ireland; impt. rly. ctr.; p. (1951) *19,678*.
Dundas, *t.*, N.S.W., Australia; p. *6,017*.
Dundas, *t.*, Ontario, Canada; at W. end of L. Ontario; leather, paper; p. *5,591*.
Dundee, *burgh*, *spt.*, Angus, Scot.; on Firth of Tay, 50 m. N. Edinburgh; jute, preserves, shipbldg., textile machin., cash registers, adding machines, linoleum; p. (1951) *177,333*.
Dundee, *t.*, N. Natal, S. Africa; coal; p. *7,073*.
Dundonald, *vil.*, coast of Ayr, 5 m. S.W. of Kilmarnock; coal; p. (par.) *18,400*.
Dunedin, *cap.*, Otago, S.I., N.Z.; named after the old name of Edinburgh; wool and dairy produce; p. (estd. 1958) *101,600*.
Dunfermline, *burgh*, Fife, Scot.; at foot of Leven Hills, 14 m. E. of Alloa; damask linen tr., rubber; p. (inc. Rosyth) (1951) *44,710*.
Dungannon, *t.*, Tyrone, N. Ireland; linen; p. (1951) *5,674*.
Dungarvan, *spt.*, *urb. dist.*, Waterford, Ireland; brewing, woollens; p. (1951) *5,423*.
Dungeness, *headland of shingle*, Kent, Eng.; 10 m. S.E. of Rye; civil nuclear power-sta. due 1966.
Dunkeld, *t.*, *par.*, Perth, Scot.; on R. Tay at entrance to Strathmore; cath.; tourist resort; p. (1951) *833*.
Dunkirk or **Dunkerque**, *spt.*, Nord, France; strong fort; gd. harbour and tr.; fisheries, shipbldg., oil refining; scene of evacuation of B.E.F. 1940; p. (1954) *21,136*.
Dunkirk, *pt.*, N.Y., U.S.A.; on L. Erie; p. (1950) *18,007*.
Dun Laoghaire (**Kingstown**), *spt.*, *co. bor.*, Dublin, Ireland; mail packet sta., fishing; p. (1956) *47,355*.
Dunloe, Gap of, *mtn. pass*, nr. L. of Killarney, Kerry, Ireland.
Dunmanway, *t.*, Cork, Ireland; on R. Brandon; tweeds, blankets; p. (1951) *1,439*.
Dunmore, *t.*, Penns., U.S.A.; nr. Scranton; anthracite; p. (1950) *20,305*.
Dunmow, Gr., *mkt. t.*, Essex, Eng.; on R. Chelmer; 10 m. N.W. of Chelmsford; p. (par.) *2,882*.
Dunmow, Little, *vil.*, 2 m. E. of Gr. Dunmow; "Dunmow Flitch" trial here annually; p. *408*.
Dunnet Head, *promontory*, Caithness, N.E. Scot.
Dunnottar, *par.*, Kincardine, Scot.; nr. Stonehaven; ruined cas.; p. (1951) *1,514*.
Dunoon, *burgh*, *wat. pl.*, Argyll, Scot.; on N. side of Firth of Clyde, nearly op. Greenock, ancient cas.; holiday resort; p. (1951) *9,940*.
Duns, *burgh*, Berwick, Scot.; agr. and allied inds.; p. (1951) *2,028*.
Dunsinane, *hill*, Sidlaws, Scot.; nr. Perth; alt. 1,012 ft.; referred to by Shakespeare in "Macbeth."
Dunsmuir, *t.*, N. Cal., U.S.A.; summer resort; hunting, fishing; p. *2,359*.
Dunstable, *t.*, *mun. bor.*, Beds, Eng.; on N. edge of Chiltern Hills, 4 m. W. of Luton; motor vehicles, sparking-plugs, car components, engin., cement, rubber and plastic goods; p. (1951) *17,108*.
Dunvegan, *t.*, Peace R., Athabaska, Canada.
Dunville, *t.*, Ontario, Canada; p. *3,405*.
Dupont, *bor.*, Penns., U.S.A.; coal; p. (1950) *4,107*.
Duquesne, *c.*, Penns., U.S.A.; 9 m. S.E. of Pittsburgh; steelwks.; p. (1950) *17,620*.
Du Quoin, *c.*, Ill., U.S.A.; meat packing, flour, leather goods, shoes; p. (1950) *7,147*.
Durance, *R.*, S.E. France; trib. of Rhône; rapid current; length 217 m.
Durango, *inland st.*, N.W. Mexico; mining, agr., stock-raising; a. 42,272 sq. m.; p. (1950) *628,265*.
Durango, *cap.*, D. state, Mexico; cath.; p. (1940) *62,170*.
Durant, *c.*, S. Okla., U.S.A.; cotton gins and compresses, cottonseed oil; p. (1950) *10,541*.
Durban, *spt.*, Natal, Union of S. Africa; ch. comm. t. in S.E. Africa; maize, wool, hides; p. (1951) *475,026*.
Düren, *t.*, N. Rhine-Westphalia, Germany; on R. Ruhr, 23 m. S.W. of Cologne; textiles, leather, machin., rly. ctr.; p. (estd. 1954) *37,100*.
Durham, *cath. c.*, *mun. bor.*, *co. t.*, Durham, N.E. Eng.; univ.; carpet, organ, confectionery mftg.; p. (1951) *19,283*.
Durham Co., N.E. Eng.; fertile valleys, moorland; coal, limestone; cattle; shipbldg., iron, steel, chemicals; a. 1,015 sq. m.; p. (1951) *1,463,416*.
Durham, *t.*, N.C., U.S.A.; tobacco factories; p. (1950) *71,311*.
Durlach, *t.*, Baden-Württemberg, Germany;

2½ m. E. Karlsruhe; cas.; cycles, machin.; p. (estd. 1954) *25,000*.
Dürrës (**Durazzo**), *spt.* Albania, on Adriatic S.; pt. for Tirana; tobacco ind.; p. (estd. 1950) *15,000*.
Duryea, *bor.*, Penns., U.S.A.; anthracite; silk; p. (1950) *6,655*.
Düsseldorf, *cap.*, N. Rhine–Westphalia, Germany; on R. Rhine, 20 m. N. of Cologne; admin. and cultural ctr., art and medical academies; iron, steel, machin., soap, cars, paper, chemical inds.; impt. trans-shipment pt.; p. (estd. 1954) *600,100*.
Dust Bowl, *region*, U.S.A.; name applied to Great Plains on E. flank of Rocky Mtns.; subject to severe soil erosion by wind, particularly in drought years (1933, 1936) due to destruction of natural vegetation by excessive ploughing.
Dutch Guiana, *see* Suriname.
Dutch Harbour, *t.*, Unalaska I., Aleutian gr., N. Pac. Oc.; strategic American naval base.
Dvina, *R.*, (N.) flows to White Sea at Arkhangelsk, and is formed by the junction of the Rs. Sukhona and Vychgeda, U.S.S.R.; connected by canal with Neva and Volga; length 1,000 m.
Dvina, *R.*, (S.) Latvia, U.S.S.R.; rises near sources of Volga and Dnieper, flows to G. of Riga; length 65 m.
Dysart, *spt.*, *mun. bor.*, Fife, on F. of Forth, Scot.; linen, coal; p. *9,068*.
Dzaudzhikau (Ordzhonikidze), *t.* R.S.F.S.R.; on R. Terek; lead, silver and zinc smelting, hydro-elec.; p. (1959) *164 000*
Dzerzhinsk, *industl. t.*, R.S.F.S.R.; W. of Gorki; chemicals; p. (1959) *163,000*.
Dzhargalantu, (**Kobdo**), *t.*, N.W. Mongolia, Asia; wool, skins, sheep; impt. cattle mkt.; p. *6,000*.
Dzhezkazgan, *t.*, Kazakh S.S.R., U.S.S.R.; 350 m. W. of L. Balkhash; copper-mines.
Dzierzoniow, *t.*, S.W. Poland, formerly Germany; ceded to Poland at Potsdam conference; textiles, machin.; cattle, grain mkt.; p. *22,000*.
Dzungaria, *broad trench* leading to the Mongolian plateau from the lowlands round L. Balkhash; formerly independent state.

E

Eagle Grove, *c.*, N. Iowa, U.S.A.; gypsum, agr.; p. (1950) *4,176*.
Eaglesham, *par.*, Renfrew, Scot.; p. (1951) *2,498*.
Ealing, *mun. bor.*, Middlesex, Eng.; sub. to W. London; residtl.; p. (1951) *187,306*.
Earby, *urb. dist.*, W.R. Yorks, Eng.; cotton, plastic, cloths, agr. machin.; p. (1951) *5,348*.
Earlestown, *mftg. t.*, S. Lancs., Eng.; included in Newton le Willows urb. dist.; engin., glass.
Earn, *R.*, Perth, Scot.; issues from Loch Earn (6½ m. long) and flows into the Tay R.; length 46 m.
Earnslaw, *mtns.*, S. I., N.Z.; highest peak, 9,165 ft.
Easdale, *I.*, off W. Argyll, Scot.; nr. Oban; slate quarries.
Easingwold, *t.*, N.R. Yorks, Eng.; rope, steel, agr. ctr.; p. *2,043*.
East C., extreme N.E. point of Asia.
East C., extreme E. point of New Zealand, named by Capt. Cook on his first voyage in 1769.
East Anglia, *dist.*, comprising Norfolk and Suffolk, Eng.; former Anglo-Saxon kingdom.
East Anglian Heights, *hills*, extend S.W. to N.E. across N.E. Hertfordshire, N. Essex and S.W. Suffolk, Eng.; chalk overlain by glacial clays and sands; smooth, rolling surface; region of lge. farms and lge. fields, mixed farms mainly concerned with grain (especially wheat) production; rarely exceed 600 ft. alt.
East Barnet, *urb. dist.*, Herts, Eng.; residtl.; p. (1951) *40,014*.
East Bengal, E. *div.* of Pakistan; includes part of former Bengal Presidency; rice, jute, cotton; a. 5,091 sq. m.; p. (estd. 1951) *42,119,000*.
East Bridgewater, *t.*, Mass., U.S.A.; nr. Boston, p. (1950) *4,412*.
East Chicago, *t.*, Ind., U.S.A.; L. Michigan; iron and steel wks., oil refining; p. (1950) *40,047*.
East Cleveland, *t.*, Ohio, U.S.A.; residtl.; p. (1950) *54,263*.
East Cowes, *see* Cowes.
East Dereham, *see* Dereham, East.
East Greenwich, *t.*, Rhode I., U.S.A.; light mftg.; shellfish; summer resort; p. (1950) *4,923*.
East Grinstead, *t.*, *urb. dist.*, E. Sussex, Eng.; in ctr. of the Weald, 9 m. W. of Tunbridge Wells; agr. mkt.; famous hospital for plastic surgery; p. (1951) *10,845*.
East Ham, *co. bor.*, Essex, Eng.; mftg. sub. E. of London; docks; chemicals; p. (1951) *120,873*.
East Indies (**Malay Archipelago**), gr. of Is. between Asia and Australia, inc. Borneo, Celebes, New Guinea, Sumatra, Java, Bali, Timor (see under **Borneo** and **Indonesia**); sugar, coffee, spices, fruits, rubber, tobacco, sago, tapioca, canes.
East Kilbride, *t.*, N. Lanark. Scot., 7 m. S.S.E. of Glasgow; designated "New Town" 1947; lge. agr. machin., aero engines, engin., elec. goods; p. (estd. 1959) *23,000*.
East Las Vegas, *t.*, N.M., U.S.A.; p. (1950) *6,269*.
East Linton, *burgh*, E. Lothian, Scot.; p. (1951) *990*.
East Liverpool, *c.*, Ohio, U.S.A.; pottery mnfs.; p. (1950) *24,217*.
East London, *spt.*, C. Prov., S. Africa; at mouth of Buffalo R.; holiday resort, wool, mohair; p. (1951) *90,978*.
East Lothian (**Haddington**), *co.*, S.E. Scot.; cereals, potatoes, sheep, coal; *co. t.*, Haddington, a. 267 sq. m.; p. (1951) *52,240*.
East Luangwa, *prov.*, N. Rhodesia; maize, tobacco, coffee, some mining; cap. Fort Jackson; a. 22,350 sq. m.; p. *225,076*.
East Main R., Labrador, Newfoundland, Canada; flowing into James Bay.
East Moline, *t.*, Ill., U.S.A.; p. (1950) *13,913*.
East Orange, *t.*, N.J., U.S.A.; residtl. sub., New York; p. (1950) *7,934*.
East Palestine, *t.*, Ohio, U.S.A.; clay, coal, oil, pottery; p. (1950) *5,195*.
East Providence, *t.*, Rhode I., U.S.A.; p. (1950) *35,871*.
East Retford, *mun. bor.*, Notts, Eng.; on R. Idle, 6 m. E. of Worksop; rubber, wire ropes, engin.; p. (1951) *16,312*.
East Riding, Yorkshire, *see* **Yorkshire, East Riding**.
East River, *tidal strait* about 16 m. long and from 600 to 4,000 ft. wide; the R. separates the bors. of Manhattan and Bronx from the bors. of Queens and Brooklyn.
East St. Louis, *c.*, *R. pt.*, Ill., U.S.A.; on Mississippi R.; large stockyards; meat packing; p. (1950) *82,295*.
East Stonehouse, *t.*, Devon, Eng.; adjoining Plymouth and Devonport.
East Vale, *t.*, Staffs, Eng.; nr. Stoke-on-Trent.
Eastbourne, *t.*, *co. bor.*, E. Sussex, Eng.; on S. cst. to E. of Beachy Head; seaside resort; p. (1951) *57,801*.
Easter I., E. Pac. Oc., W. of Chile; stone images, ruins; p. *250*.
Eastham, *vil.*, Cheshire, Eng.; on S. of Mersey estuary, nr. entrance to Manchester Ship Canal.
Easthampton, *t.*, Mass., U.S.A.; p. (1950) *10,694*.
Eastleigh, *t.*, *mun. bor.*, Hants, Eng.; locomotives; p. (1951) *30,557*.
Easton, *t.*, Md., U.S.A.; p. (1950) *4,836*.
Easton, *t.*, Mass., U.S.A.; p. (1950) *6,244*.
Easton, *c.*, Penns., U.S.A.; on Delaware R.; rly. ctr., coal, steel, machin., furniture; p. (1950) *35,632*.
Eastwood, *t.*, *urb. dist.*, Notts, Eng.; coal; p. (1951) *9,896*.
Eastwood, *t.*, N.S.W., Australia; p. *3,025*.
Eau Claire, *c.*, Wis., U.S.A.; on Chippewa R.; timber, paper, furniture; p. (1950) *36,058*.
Eaux Bonnes, Les, *wat. pl.*, Pyrenees, S. France.
Eaux Chaudes, *wat. pl.*, Pyrenees, S. France.
Ebal, Mt., Israel; opposite Gerizim; alt. 2,986 ft.
Ebbw Vale, *t.*, *urb. dist.*, Monmouth, Eng.; 17 m. N.W. of Newport; coal, iron, steel, tinplate, bricks, pipes, precast concrete; p. (1951) *29,205*.
Eberswalde, *t.*, Brandenburg, Germany; N.E. of Berlin; iron, wood and cardboard wks.; p. (estd. 1954) *30,300*.
Ebingen, *c.*, Württemberg, Germany; knitwear, velvet, precision tools; p. *12,128*.
Eboli or **Evoli**, *t.*, Campagna, Italy; E. of Salerno; p. *13,275*.
Ebro, *R.*, N.E. Spain; flows to Mediterranean from Cantabrian Mtns.; length 440 m.
Ebury, *R.*, Monmouth, Eng.; trib. of Usk R.
Eccles, *mun. bor.*, Lancs, Eng.; 4 m. W. of Manchester; iron and steel, cotton, textiles, leather, chemicals, coal-mining; p. (1951) *43,927*.
Ecclesfield, *t.*, W.R. Yorks, Eng.; N. of Sheffield; cutlery.

Eccleshall, *mkt. t.*, Staffs, Eng.; 6 m. N.W. of Stafford; p. *3,630*.
Echague, *t.*, Philippine Is.; tobacco ctr.
Echternach, *t.*, Luxembourg; famous abbey; Whitsun dancing-procession.
Echuca, *t.*, Victoria, Australia; on R. Murray; 50 m. N.E. of Bendigo; rly. ctr.; irrigation wks.; wine, sheep; p. (1951) *6,000*.
Ecija, *t.*, Seville, Spain; olive oil, wine, pottery; the Roman Astigi; p. *34,944*.
Eck, Loch, *L.*, Argyll, Scot.; 6 m. long.
Eckernförde, *spt.*, Schleswig-Holstein, Germany; on Baltic N.W. of Kiel; fishing; resort; p. (estd. 1954) *22,800*.
Eckington, *t.* Derby, Eng.; S.E of Sheffield; coal, agr. implements; p. *14,614*.
Ecorse, *t.*, Mich., U.S.A.; p. (1950) *17,948*.
Ecuador, *rep.*, S. America; on Equatorial Pacific cst.; Andes mtns.; Chimborazo, 20,600 ft.; climate: lowlands tropical, uplands cool and dry; race chiefly Indian speaking the Quechua language; poor communications; cocoa, sugar, coffee, cereals, fruits, gold, copper, silver, Panama hats; cap. Quito; a. 275,855 sq. m. (inc. Galapagos Is., 3,028 sq. m.); p. (estd. 1957) *3,906,907*.
Edam, *t.*, Holland, Netherlands; coast of Zuider Zee; cheese; p. *8,295*.
Eday, *I.*, Orkney Is., Scot.; the Ocelli of Ptolemy.
Ed Damar, *cap.*, Northern Prov., Sudan; p. (estd. 1949) *8,000*.
Eddystone, *rock with lighthouse*, Eng. Channel; 15 m. S.W. of Plymouth.
Ede, *commune*, E. Netherlands; livestock; p. (1948) *36,436*.
Ede, *t.*, W. Prov., Nigeria; p. *57,500*.
Eden, *R.*, Westmorland, Eng.; rises in Pennines, flows N.W. to Solway Firth below Carlisle; length 65 m.
Eden, *t.*, N.S.W., Australia; on Tasman Sea; p. *661*.
Edenburg, *t.*, Orange Free State, S. Africa.
Edenton, *t.*, N.C., U.S.A.; groundnuts, cotton, herring fisheries; p. (1950) *4,468*.
Edessa (Edhessa), *t.*, *cap.*, Pella prefecture, Macedonia, Greece; p. (1951) *15,415*.
Edfu, *see* **Idfu**.
Edgbaston, *indust. dist.*, Birmingham, Eng.
Edgehill, *ridge*, 15 m. S. Warwick, Eng.; first battle in Civil War, 1642.
Edgewater, *t.*, N.J., U.S.A.; suburban to and connected by ferry with New York; p. (1950) *3,952*.
Edgeworthstown (Meathas Truim), *t.*, Longford, Ireland; p. *654*.
Edgware, *t.*, Middlesex, Eng.; N. sub. of London; residtl.
Edinburg, *t.*, Ind., U.S.A.; p. (1950) *3,283*.
Edinburgh, *c.*, Midlothian; cap. Scot.; royal burgh on F. of Forth; univ., cas.; palace (Holyrood); printing, publishing, brewing; Leith, with docks is joined to E.; p. (1951) *466,770*.
Edirne, *c.*, Turkey; on left bank of the Marica R.; greatly developed by Hadrian 125; residence of the Sultans 1366–1453; wine, tobacco, silk, perfume; p. (1945) *29,439*.
Edjele, *t.*, nr. Tripoli, Algeria, Africa; oilfields.
Edmonton, *cap.*, Alberta, Canada; farming, dairying, coal; head of navigation of N. Saskatchewan R.; p. (estd. 1958) *252,131*.
Edmonton, *mun. bor.*, Middlesex, Eng.; N. sub. of London; residtl.; light inds.; p. (1951) *104,244*.
Edremit, *t.*, Balikesir, N.W. Turkey; cereals, opium; silverwk.; p. (1945) *12,603*.
Edward, *L.*, on frontier of Uganda and Belg. Congo, one of the sources of R. Nile; alt. 3,000 ft., length 44 m., breadth 32 m.
Edwardsville, *t.*, Ill., U.S.A.; p. (1950) *8,776*.
Edwardsville, *t.*, Penns., U.S.A.; p. (1950) *6,686*.
Eekloo, *t.*, E. Flanders, Belgium; textiles; p. *16,903*.
Eger, *c.*, Hungary; wine, soap; cath.; p. *34,428*.
Egersund, *spt.*, S. cst., Norway; p. *3,392*.
Eggan, *R. pt.*, Ilorin, Nigeria; p. *10,000*.
Egham, *urb. dist.*, Surrey, Eng.; on R. Thames, nr. Staines; contains field of Runnymede, where King John signed Magna Carta; residtl.; p. (1951) *24,515*.
Egmont, *mtn.*, N.I., N.Z.; volcanic; alt. 8,200 ft.
Egremont, *mkt. t.*, Cumberland, Eng.; 10 m. S. of Whitehaven; limestone, iron ore; p. *16,727*.
Egypt, *republic*, N.E. Africa; united with Syria Feb. 1958 to form United Arab Republic which federated with Yemen March 1958 to form United Arab States; desert, except fertile Nile valley; agr. depends on annual rise of the Nile waters and irrigation; climate: hot, dry summers, warm winters with little rain; agr.: wheat, barley, rice, onions, cotton; phosphates; communications: Nile rly Cairo–Aswan, caravan routes across desert; Mohammedans; cap. Cairo; chief spt. Alexandria; a. 386,198 sq. m.; p. (estd. 1950) *20,439,000*.
Ehen, *R.*, Cumberland, Eng.; issues from Ennerdale Water to Irish Sea; length 12 m.
Ehrenbreitstein, *t.*, *fort.*, Germany; on R. Rhine opposite Koblenz.
Eibar, *c.*, Guipuzcoa, N. Spain; iron, steel mftg.; p. *11,772*.
Eibenstock, *t.*, Saxony, Germany; p. *7,760*.
Eider, *R.*, Germany; connected with Kiel canal; length 90 m.
Eidsvoll, *t.*, Norway; p. *11,104*.
Eifel, *plateau of ancient rocks*, W. Germany; lies N. of R. Moselle, terminates in steep slope forming W. edge of Rhine gorge between Koblenz and Bonn; drained by Kyll, Ahr, Rur; formerly cultivated, now largely woodland and moorland; farming in valleys; rises to just over 2,000 ft.
Eiger, *mtn.*, one of the highest peaks of the Bernese Oberland, Switzerland; alt. 13,042 ft.
Eigg, *I.*, Inner Hebrides, Scot.; 15 m. S.W. of Malaig; basaltic rocks on cst.; rises to 1,289 ft.
Eilat, *new spt.*, Negev, Israel; on Gulf of Akaba; oil; copper at Timna; p. (estd. 1953) *400*.
Eildon Hills, Roxburgh, Scot.; S. of Melrose; highest point 1,385 ft.
Eilenburg, *t.*, Saxony-Anhalt, Germany; N.E. of Leipzig; rly. junction; machin., chemicals; p. (estd. 1954) *20,600*.
Eindhoven, *t.*, N. Brabant, Netherlands; tobacco, textile, elec. and radio goods; p. (estd. 1955) *152,000*.
Einsiedeln, *t.*, Schwyz, Switzerland; monastery, pilgrim ctr.
Eire, *see* **Ireland, Republic of.**
Eisenach, *t.*, Thuringia, Germany; on R. Hörsel, at foot of Thuringian forest; cars, machin., textiles; birthplace of J. S. Bach; p. (estd. 1954) *52,800*
Eisenberg, *t.*, Thuringia, Germany; pianos, porcelain, cement, machin.; p. (estd. 1954) *15,700*.
Eisenerz Alps, *mtn. range*, Austria; most northerly range of Alps, overlooking Danube valley between Linz and Vienna; impt. iron-ore deposits; alt. from 6,000 to 9,000 ft.
Eisleben, *t.*, Saxony, Germany; birthplace of Luther; machin., copper- and silver-mining ctr.; p. (estd. 1954) *33,400*.
El Alamein, *vil.*, Egypt; in Libyan Desert 60 m S.W. of Alexandria; scene of gr. Allied victory, Second World War.
El Callao, *t.*, Bolivar, st., Venezuela; in ctr. of Guiana Highlands, 125 m. S.E. of Ciudad Bolivar; ctr. of impt. gold-mining region.
El Centro, Cal., U.S.A.; rich agr. a. reclaimed from the desert; p. (1950) *12,590*.
El Dorado, *t.*, Ark., U.S.A.; oil; p. (1950) *23,076*.
El Dorado, *t.*, Kan., U.S.A.; p. (1950) *11,037*.
El Faiyûm or **El Fayum**, *oasis t.*, *cap.* of Faiyûm prov., Egypt; nr. L. Moeris; predynastic arch. finds; lgst. cultivated a. of Egypt outside Nile flood plain; p. (1947) *74,314*.
El Fasher, *cap.*, Darfur Prov., Sudan; p. (estd. 1949) *23,600*.
El Hasa, *dist.*, Saudi Arabia; on Persian Gulf; ch. t. Hofuf.
El Khârga, *oasis*, Libyan desert, Egypt; 85 m. S.W. of Asyut; p. *5,000*.
El Misti, *volcano*, Peru, S. America; N.E. of Arequipa; alt. 19,170 ft.
El Obeid, *cap.*, Kordofan, Sudan; 200 m. S.W. of Khartoum; ivory, gums, ostrich feathers; p. (estd. 1949) *70,100*.
El Oro, *prov.*, Ecuador; cap. Machala; a. 2,238 sq. m.; p. (1950) *89,306*.
El Paso, *t.*, Texas, U.S.A.; on Rio Grande; p. (1950) *130,485*.
El Qantara (El Kantara), *t.*, Egypt; on E. bank of Suez Canal, 21 m. S. of Pt. Said; terminus of Palestine Rly. system; linked by ferry across canal (and temporary swing bridge) to El Qantara (W.) on Egyptian Rly. systems.

El Salvador, *see* Salvador.
El Teniente, *t.*, central Chile; copper-mines; p. *11,761.*
El Turbio, *t.*, S. Argentina; coal.
Elan, *R.*, Radnor, Wales; rises on S.E. sides of Plynlimon, flows S.E. then N.E. into R. Wye at Rhayader; lower valley contains series of 4 lge. reservoirs, length 4 m., capacity 10,000 million gall.; ch. source of water for Birmingham.
Elâzig, *t.*, Turkey; N.E. of Malatya; p. (1945) *23,739.*
Elba, *I.*, off Tuscan cst., Italy; iron ore, wine, marble, salt; Napoleon's first exile here; ch. t. Porto Ferrajo.
Elbasan, *prefecture*, Albania; cap. Elbasan; p. (1941) *110,447.*
Elbe, *R.*, Czechoslovakia, Germany; the Roman "Albis"; rises in Bohemia and flows into N. Sea at Cuxhaven, 65 m. below Hamburg; navigable for 500 m. of total length 725 m.
Elberfeld, *see* Wuppertal.
Elbert, *mtn.*, Col., U.S.A.; alt. 14,420 ft.
Elbeuf, *t.*, Seine-Maritime, France; woollens; p. (1954) *17,293.*
Elblag (Elbing), *spt.*, E. Prussia, Poland; German before 1945; shipbldg., machin., vehicles; p. (1946) *20,924.*
Elbrus Mt., highest point in the Caucasus; alt. 18,526 ft.
Elburz, *mtn. range*, N. Persia; bordering on Caspian Sea; highest peak, Demavend, 18,500 ft.
Elche, *t.*, Alicante, Spain; 15 m. S.W. of Alicante; palm groves; oil, soap; p. (1950) *55,877.*
Eldorado, *radium mine*, N.W. Terr., N. Canada; situated on E. shore of Gr. Bear Lake nr. Arctic Circle; produces 40% of world's radium, sent to Pt. Hope, Ontario, for refining.
Electra, *t.*, N. Texas, U.S.A.; oil; drilling tools and equipment; p. (1950) *4,970.*
Elektrostal, *t.*, R.S.F.S.R.; 35 m. E. of Moscow; p. (1959) *97,000.*
Elephant Butte Dam, N.M., U.S.A.; on Rio Grande, 125 m. above El Paso; built to control flood water; lake, a. 60 sq. m., supplies irrigation water to 780 sq. m. in N.M. and Texas, water also supplied to Mexico.
Elephanta, *I.*, Bombay Harbour, India; cave sculptures.
Elephantine, *I.*, in Nile, Upper Egypt; site of Nilometer.
Eleuthera, *I.*, Bahamas, T.W.I.; p. (1953) *6,070.*
Elgin, *co. t., burgh*, Moray, Scot.; woollens; p. (1951) *10,535.*
Elgon Mt., *extinct volcano*, on bdy. of Kenya and Uganda; 40 m. in diam.; alt. 14,100 ft.; cave dwellings on slopes.
Elie and Earlsferry, *burgh*, Fife, Scot.; summer resort; p. (1951) *1,190.*
Elisabethville, *t.*, Katanga, Belg. Congo; copper-mining ctr.; p. (1950) *103,352.*
Elizabeth, *mftg. t.*, N.J., U.S.A.; univ.; sewing machines, iron, oil-ref.; p. (1950) *112,817.*
Elizabeth, *t.*, N.C., U.S.A.; timber ind.; p. (1950) *12,685.*
Elizabethton, *t.*, Tenn., U.S.A.; manganese; rayon; p. (1950) *10,754.*
Elkhart, *t.*, Ind., U.S.A.; E. of Chicago; paper, machin.; p. (1950) *35,646.*
Elk Mtns., *lofty range*, W. Col., U.S.A.; highest point Castle Peak, alt. 14,115 ft.
Elland, *t., urb. dist.*, W.R. Yorks, Eng.; on R. Calder, 3 m. S.E. of Halifax; woollens; p. (1951) *19,273.*
Ellesmere, *t., urb. dist.*, Shropshire, Eng.; 8 m. N.W. of Wem; mkt., agr.; p. (1951) *2,159.*
Ellesmere, *agr. dist.*, S.I., N.Z.; on Canterbury Plain nr. Christchurch.
Ellesmere I., lge. I. extreme north of Arctic Canada; barren, uninhabited; a. 41,000 sq. m.
Ellesmere Port, *t., urb. dist.*, N.W. Cheshire, Eng.; on Manchester Ship Canal and 9 m. S.S.E. of Liverpool; impt. petrol docks and refinery; metal mftg., paper, engin.; p. (1951) *32,594.*
Ellice, *Is.*, *see* Gilbert and Ellice Is.
Ellichpur, *t.*, Berar, Madhya Pradesh, India; cotton tr.; p. *24,000.*
Ellis I., New York harbour, U.S.A.; impt. sta. for examination of immigrants.
Ellon, *burgh*, Aberdeen, Scot.; on R. Ythan; p. *1,491.*
Ellore, *t.*, Madras, India; cotton goods, carpets, hosiery, oil; p. (1941) *45,862.*
Ellwood, *t.*, Penns., U.S.A.; p. (1950) *12,945.*
Elmhurst, *t.*, Ill., U.S.A.; p. (1950) *21,273.*
Elmina, *t.*, Ghana, W. Africa; fortress; tr. in palm oil, ivory, gold; p. *15,200.*
Elmira, *mftg. t.*, N.Y., U.S.A.; rly. goods, farm implements; burial place of Mark Twain; p. (1950) *49,716.*
Elmshorn, *t.*, Germany; N.W. of Hamburg; p. *15,392.*
Elsinore (Helsingör), *t., spt.*, Denmark; shipbldg.; p. *18,930.*
Elstree, *t.*, Herts., Eng.; 4 m. W. of Barnet; residential; films, light engin., silk hosiery.
Eltham, *residtl. dist.*, Kent, Eng.; S. sub. of London.
Eltham, *t.*, N.I., N.Z.; ctr. of lge. dairying ind.; p. (1951) *1,981.*
Elvas, *c.* (*fortfd.*), Portugal; on Guadiana R.; plums, olives; p. *13,615.*
Elwood, *industl. t.*, Ind., U.S.A.; on Duck Creek; grain, tinplate; p. (1950) *11,362.*
Ely, *c.*, I. of Ely, Cambridge, Eng.; on S. fringe of the Fens; mkt., cath.; agr. ctr. (fruit, roots); p. (1951) *9,989.*
Ely, I. of, *administrative div.*, Cambridge, Eng.; farming, potatoes, sugar-beet; cap. March; a. 372 sq. m.; p. (1951) *89,038.*
Elyria, *t.*, Ohio, U.S.A.; mftg.; p. *35,000.*
Emba, R., Kazakh S.S.R.; rises in S. end of Ural Mtns., flows S.W. to Caspian Sea; crosses productive Ural–Emba oilfield.
Emden, *spt.*, Lower Saxony, Germany; nr. mouth of R. Ems; freighting, shipbldg., fishing prod., imports iron ore, corn; exp. coal and iron from Ruhr; p. (estd. 1954) *39,100.*
Emilia-Romagna, *region*, N. Italy; S. of Po R.; agr. (grain, wine, fruits); a. 8,542 sq. m.; p. (1951) *3,538,851.*
Emmaus, *bor.*, Penns., U.S.A.; textiles, rubber prod.; p. (1950) *7,780.*
Emmaville, *t.*, N.S.W., Australia; mining.
Emmen, *t.*, Drenthe, Netherlands; 30 m. S.E. of Groningen; p. (1951) *57,601.*
Emmerich, *t.*, Germany; on Rhine R., and nr. Netherlands bdy.; industl.; p. *13,500.*
Empedrado, *t.*, Argentina; p. *24,300.*
Empoli, *t.*, Florence, Italy; straw, cotton, leather goods, pottery; p. *21,000.*
Emporia, *t.*, Kan., U.S.A.; stock-raising; p. (1950) *15,669.*
Ems, *t.*, Germany; on Sahn R.; spa, silver, lead; p. *7,070.*
Ems, *R.*, N. Germany; rises in Teutoberger Wald, flows N. to N. Sea at Emden; length 205 m.
Emscher, *R.*, W. Germany; rises in Sauerland, flows W. through heart of Ruhr coalfield to enter R. Rhine at Hamborn; canalised for most of its course; length 55 m.
Emsdetten, *commune*, Germany; on R. Ems; textiles; p. *13,297.*
Emsworth, *vil.*, Hants, Eng.; 2 m. E. of Havant; p. *2,320.*
Encarnación, *t., cap.*, Ipatua dep., S.E. Paraguay; on Paraná R.; rly., agr., cattle; p. *20,000.*
Encounter Bay, S. Australia, receives Murray R.
Enderby Land, *terr.*, Antarctica; S. of C. of Good Hope.
Endicott, *t.*, N.Y., U.S.A.; shoe mftg.; p. (1950) *20,050.*
Endrick, *R.*, Stirling, Scot.; flows to Loch Lomond; length 29 m.
Enez, *t.*, S. Turkey-in-Europe; nr. Gallipoli; p. *566.*
Enfield, *mun. bor.*; Middlesex, Eng.; 10 m. N. London; sm. arms, radios; p. (1951) *110,458.*
Engadine, Switzerland; upper valley of Inn R.; health resort; chief t. St. Moritz.
Engaño, *c.*, S. extremity of Luzon, Philippine Is.
Engelberg, *t.*, Unterwalden, Switzerland; tourists; old monastery; p. *2,409.*
Engels, *t.*, R.S.F.S.R.; on Volgar R. opposite Saratov; chemicals, petroleum refining; p. (1959) *90,000.*
Enghien-les-Bains, *t.*, Seine-et-Oise, France; p. (1954) *12,062.*
England (with Wales), forms S. and lgst. div. Gr. Britain; length 420 m., greatest breadth 360 m.; ch. mtns.: Cheviot Hills, Pennine Chain, Cumbrian Gr., Cambrian Mtns., Dartmoor, Exmoor; ch. Rs.: Thames, Severn, Trent, Mersey, Gr. Ouse, Yorkshire Ouse; climate: temperate maritime; vegetation: woods, moor, heath, grassland; ch. inds.: agr.: arable, pastoral, dairying; ch. crops: wheat, barley, oats, sugar-beet, potatoes, hops, fruit;

livestock; cod, haddock; coal, iron; iron and steel mnfs., machinery, machine tools, engin. prods., road vehicles and aircraft, ships, textiles, pottery; good road and rail comm.; cap. London; a. 50,875 sq. m.; p. (1951) *43,744,924*.
Englewood, *t.*, N.J., U.S.A.; p. (1950) *23,145*.
English Channel (La Manche), *narrow sea* separating England from France; extends from Strait of Dover to Land's End in Cornwall; length 300 m., greatest width 155 m.
Enham-Alamein, Hants.; rehabilitation ctr. for disabled ex-service men; 2½ m. N. of Andover; light inds.
Enid, *t.*, Okla., U.S.A.; ironwks., farm implements; p. (1950) *36,017*.
Enkhuizen, *t.*, *spt.*, Netherlands; on W. cst. Zuider Zee; p. *9,634*.
Enna (Castrogiovanni), *t.*, Sicily; rock salt, sulphur-mines; famous for its connection with the Proserpine legend.
En Nahud, *t.*, central Sudan; tr. in cattle, ivory, cotton, ostrich feathers; p. *19,300*.
Ennepetal, *t.*, N. Rhine-Westphalia, Germany; on R. Ennepe; t. created 1949 with merging of Milspe and Voerde; iron, machin.; p. (estd. 1954) *25,700*.
Ennerdale Water, *L.*, Cumberland, Eng.
Ennis, *mkt. t.*, *urb. dist.*, Clare, Ireland; farming, flour; p. (1951) *6,097*.
Enniscorthy, *mkt. t.*, *urb. dist.*, Wexford, Ireland; brewing, tanning; p. (1951) *5,948*.
Enniskillen, *co. t.*, *mun. bor.*, Fermanagh, N. Ireland; brewing, nylon mftg.; p. (1951) *6,318*.
Enns, *R.*, Austria; S. trib. of Danube; 112 m. l.
Enschede, *t.*, Overyssel, Netherlands; cotton-spinning, weaving; p. (estd. 1955) *115,000*.
Entebbe, *t.*, Uganda, Brit. E. Africa; on L. Victoria; cotton ginning; p. (1948) *7,932*.
Enterprise, *c.*, Ala., U.S.A.; peanuts; p. (1950) *7,288*.
Entre Ríos, *prov.*, Argentina; between Paraná and Uruguay Rs.; wheat, linseed, livestock; cap. Paraná; a. 29,427 sq. m.; p. (estd. 1958) *963,900*.
Entrocamiente, *t.*, Central Portugal, on Tagus R.
Enugu, *cap.* E. prov., Nigeria; coal; p. (1953) *63,000*.
Epernay, *t.*, Marne, France; champagne; p. (1954) *21,222*.
Ephesus, *ruined c.*, Turkey, S. of Izmir.
Ephrata, *t.*, S.E. Penns., U.S.A.; cattle rearing, printing; p. (1950) *7,027*.
Epinal, *cap.*, Vosges dep., France; on Moselle R.; cotton, printing; p. (1954) *28,688*.
Epirus, *dist.*, N.W. Greece; a. 3,688 sq. m.; p. (1951) *331,581*.
Epping, *t.*, *urb. dist.*, Essex, Eng.; mkt. gardening, dairying; p. (1951) *6,934*.
Epping, *forest*, Essex, Eng.
Epsom and Ewell, *mun. bor.*, Surrey, Eng.; 18 m. S.W. of London; residtl., racecourse; drain pipes, brick tiles; p. (1951) *68,049*.
Equatoria, *prov.*, Sudan; a. 76,995 sq. m.; cap. Juba; p. (estd. 1951) *632,900*.
Erandio, *t.*, N. sub. of Bilbao, Spain; iron ore, paper, tobacco, wine; p. *11,268*.
Erebus, *mtn.*, active volcano, Victoria Land, Antarctica.
Ereğli, *spt.*, Black Sea, Turkey; rly. to Zonguldak coal-mines; p. *6,360*.
Erfurt, *c.*, *cap.*, Thuringia, Germany; cath., ctr. of mkt. gardening and seed-growing dist., textiles, machin., foodstuffs, footwear, radios; p. (estd. 1954) *186,700*.
Ericht, *loch*, Perth, Inverness, Scot.; in central Grampians; 15½ m. long; hydro-elec. scheme.
Erie, *lake*, N. America; separating Canada from U.S.A.; a. 9,946 sq. m.; 240 m. long, 40 m. broad.
Erie, *industl. t.*, *lake pt.*, Penns., U.S.A.; iron and steel ind., engin.; p. (1950) *130,803*.
Erie Canal, *see* **New York State Barge Canal.**
Eriskay, I., Outer Hebrides, Scot.
Erith, *t.*, *mun. bor.*, Kent, Eng.; on S. bank of Thames estuary 5 m. below London; engin., oil refining, cables, plastics, paints and varnishes, timber, concrete prods.; p. (1951) *46,263*.
Eritrea, federated with Ethiopia 1952; former Italian col., N.E. Africa; tobacco, cereals, pearl fishing; cap. Asmara, a. 45,754 sq. m.; p. (estd. 1948) *1,086,302*.
Erivan, *cap.* Armenian S.S.R., U.S.S.R.; situated in deep valley in Caucasus Mtns.; woollen mnfs., fruit canning, machine tools; p. (1939) *200,000*.
Erlangen, *t.*, Bavaria, Germany; univ.; textiles, elec. goods; p. (estd. 1954) *54,9)0*.
Ernakulam, *t.*, Travancore-Cochin, India; cotton, coffee, hides; p. (1941) *36,638*.
Erne, *R.*, (72 m.) and *L.*, N. Ireland, flows to Donegal Bay.
Erode, *t.*, S. Madras, India; cotton; p. (1941) *33,672*.
Erskineville, *t.*, N.S.W., Australia; p. *6,624*.
Erzgebirge (Ore Mtns.), *mtn. range*, Germany; highest peak, 4,122 ft.
Erzurum, *t.*, Turkey; brasswork, salt, tanning; forests and mineral springs nearby; p. (1945) *52,534*.
Esbjerg, *spt.*, Denmark; on W. cst. of Jutland; cross-channel steamers to Harwich, Eng.; exp. dairy produce; fishing, airport; p. (1955) *50,921*.
Escalante, *t.*, Philippine Is.; p. *28,934*.
Escanaba, *t.*, Mich., U.S.A.; iron, shipping, lumber, chemicals; p. (1950) *15,170*.
Escatron, *t.*, Spain; on Elbro R.
Esch-sur-Alzette, *t.*, Luxembourg; mining ctr.; p. (1958) *28,832*.
Eschwege, *t.*, Hessen, Germany; cas.; machin., textiles, leather, cigars, chemicals; p. (estd. 1954) *24,000*.
Eschweiler, *t.*, N. Rhine-Westphalia, Germany; N.W. of Aachen; lignite mining, steel, iron, metallurgy, leather, textiles; p. (estd. 1954) *36 400*.
Escoublac-La-Baule, *t.*, Loire-Atlantique, France; p. (1954) *13,166*.
Esdraelon, *plain*, Israel; S.W. Asia; between Carmel and Gilboa Mtns.
Esher, *urb. dist.*, Surrey, Eng.; on R. Mole, residtl.; Sandown Park racecourse; p. *51 130*.
Eshowe, *t.*, Natal, S. Africa; 40 m. from Tugela R.; asbestos; p. *2,223*.
Esk, *R.*, Dumfries, Scot., rises in S. Uplands, flows S. into Solway Firth; length 50 m.
Esk, *R.*, N.R. Yorks, Eng.; rises in Cleveland Hills, flows E. into N. Sea at Whitby; length 28 m.
Eskilstuna, *t.*, Sweden; on R. of same name; iron, steel, cutlery; p. (1951) *53,577*.
Eskisehir, *t.*, Turkey; W. of Ankara, ancient Dorylaeum; rly. ctr.; meerschaum; p. (1955) *122,755*
Esmeralda, *t.*, Venezuela, S. America; on Orinoco R.
Esmeraldas, *prov.*, Ecuador, S. America; cap. E. on R. of same name; cacao, tobacco; a. 5,464 sq. m.; p. (1950) *75,407*.
Esneh, *see* **Isna.**
Esperance, *t.*, W. Australia; summer resort; interesting caves; p. *356*.
Esperanza, *old t.*, Santa Clara, Cuba; guava jelly; p. *18,091*.
Espirito Santo, *maritime st.*, Brazil; sugar, cotton, coffee, fruits, forests, thorium; cap. Vitória; a. 15,785 sq. m.; p. (1950) *870,987*.
Essen, *t.*, N. Rhine-Westphalia, Germany; ch. t. in W. Ruhr; coal-mining, steel (Krupp), machin., glass, textiles, chemicals; p. (estd. 1954) *664,600*.
Essendon, *sub.*, Melbourne, Victoria, Australia; racecourse, air-port; p. (1958) *60,736*.
Essentuki, *t.*, Stavropol, U.S.S.R.; light mnfs., medicinal springs; p. *23,000*.
Essequibo, *R.*, Brit. Guiana, S. America; length 620 m.
Essex, *co.*, Eng.; flat, wooded, agr., wheat, barley; oyster beds; mnfs. agr. implements, engin., brewing, silk, gunpowder; lgst. ts. part of Greater London, E. and W. Ham, Leyton, Walthamstow; a. 1,528 sq. m.; p. (1951) *2,043,574*.
Esslingen, *t.*, Baden-Württemberg, Germany; on R. Neckar, textiles, chemicals, leather goods, machin., iron, metallurgy; p. (estd. 1954) *72,500*.
Estcourt, *t.*, Natal, S. Africa; p. *3,879*.
Este, *t.*, N.E. Italy; ancient fortress; iron, pottery, chemicals; p. *14,438*.
Esteli, *dep.*, W. Nicaragua; a. 772 sq. m.; p. *53,872*.
Estepona, *spt.*, Malaga, Spain; wine, olives, citrus fruit, sardines; p. *11,851*.
Estevan, *t.*, Saskatchewan, Canada; 110 m. S.E. of Regina; coal; p. (estd. 1957) *6,800*.
Eston, *t.*, *urb. dist.*, N.R. Yorks, Eng.; 3 m. E. of Middlesbrough; iron and steel, shipbldg. and repairing; p. (1951) *33,315*.

Estonia, *constituent rep.*, U.S.S.R.; formerly independent st.; climate: severe winter, mild summer, moderate rainfall; farming and dairying, textiles, matches, leather; a. 17,610 sq. m.; cap. Tallin; p. (1959) *1,196,000*.
Estoril, watering-place and thermal spa, Portugal; N. side of Tagus estuary.
Estrela, Sierra da, *mtn. range*, Portugal; highest peak 7,524 ft.
Estremadura, *prov.*, Portugal; cap. Lisbon; a. 2,064 sq. m.; p. (1940) *1,379,533*.
Esztergom, *t.*, Hungary; weaving; mineral springs; cath.; p. *22,171*.
Etampes, *t.*, Seine-et-Oise; France; 30 m. S. of Paris; commerce; p. (1954) *11,890*.
Etang de Berre, *lagoon*, Bouches-du-Rhône, S.E. France; lies E. of Rhône delta, separated from Gulf of Lions by low Chaîne de l'Estaque; traversed by Rhône–Marseille Canal; salt pans; oil refineries in a.; approx. a. 100 sq. m.
Etaples, *t.*, Pas de Calais, France; seaside resort; p. *6,534*.
Etawney, *L.*, Manitoba, Canada.
Ethiopia (Abyssinia), *independent kingdom*, Africa; under Italian domination 1936–41; federated with Eritrea 1952; a. 350,000 sq. m.; tableland with average height 3,000 ft. intersected deep valleys; Samen Mtns. 15,000 ft.; climate; temperature modified by height; summer rains; pastoral, farming, coffee; cap. Addis Ababa.
Etna, *volcano*, N.E. Sicily, Italy; alt. 10,784 ft.
Etna, *t.*, Penns., U.S.A.; p. (1950) *6,750*.
Eton, *t.*, *urb. dist.*, Bucks, Eng.; on N. bank of R. Thames opposite Windsor; famous public school, founded by Henry VI; p. (1951) *3,250*.
Etowah, *R.*, Ga., U.S.A.; trib. of Coosa R.
Etruria, *t.*, Staffs, Eng.; potteries, ironwks.
Etruria, *ancient Italian country*, now Tuscany and part of Umbria and inhabited by Etruscans, powerful before Roman conquest.
Ettelbrück, *t.*, Luxembourg; p. *4,373*.
Etterbeek, *commune*, sub. Brussels, Belgium; carpets, brewing; p. (1947) *45,328*.
Ettrick, *R.*, Selkirk, Scot.; length 32 m.
Euboea, *see* **Evvoia**.
Eucla, *t.*, W. Australia; close to bdy. of S. Australia on Transcontinental rly.; artesian wells.
Euclid, *t.*, Ohio, U.S.A.; p. (1950) *41,396*.
Eugene, *t.*, Ore., U.S.A.; univ.; ironwks.; p. (1950) *35,879*.
Eunice, *t.*, La., U.S.A.; cotton, rice; p. (1950) *8,184*.
Eupatoria, *see* **Yevpatoriya**.
Euphrates, *lgst. R.* in S.W. Asia; rises in Armenian uplands and joined by the Tigris, enters Persian G. at Shatt-et-Arab; length 1,780 m.
Eure, *dep.*, Normandy, France; agr., fruit, livestock, textiles; cap. Evreux; a. 2,331 sq. m.; p. (1954) *332,514*.
Eure-et-Loir, *dep.*, N. France; flour, textiles, iron, paper; cap. Chartres; a. 2,291 sq. m.; p. (1954) *261,035*.
Eureka, *c.*, Cal., U.S.A.; timber; p. (1950) *23,058*.
Eureka, *t.*, Utah, U.S.A.; gold, silver, copper; p. *2,292*.
Europe, *continent*; a. 3,900,000 sq. m.; greatest length N. to S. 2,400 m., breadth E. to W. 3,000 m.; ch. mtns.: Alps, Pyrenees, Carpathians, Balkans, Apennines, Sierra Nevada, Urals, Caucasus; ch. Rs.: Volga, Danube, Rhine, Dnieper, Ural, Don; ch. lakes: Ladoga, Onega, Peipus, Vänern, Vättern; climate: Arctic border, long cold winter, short cool summer, snow; W. seaboard, cool summer, mild winter, abundant rainfall; Continental, warm summer, cold winter; Mediterranean, hot dry summers, warm wet winters; vegetation: N. tundra; Scandinavia and N. Russia, coniferous forests; European plain, woodlands; Mediterranean, drought-resisting evergreens; S. Russia, steppe; Caspian shores, desert; ch. inds.: agr., cereals, fruits, sugar-beet, potatoes, flax, hemp; pastoral, cattle-rearing, dairying, fishing; forestry; wood pulp, paper; mining, iron, coal, petroleum; hydro-elec. power; mountainous regions. Politically divided into reps., kingdoms, principalities and a grand duchy; p. (est.) *533,000,000*.
Europort, *t.*, nr. Rotterdam, Netherlands; new Common Market pt.
Euros, *prefecture*, Thrace, Greece; cap. Alexandroupolis; p. (1940) *153,071*.
Euskirchen, *t.*, N. Rhine–Westphalia, Germany; W. of Bonn; cloth, glass, wood, paper wks.; p. (estd. 1954) *17,600*.
Evanston, *t.*, Ill., U.S.A.; on L. Michigan; sub. of Chicago, seat of N.W. Univ.; p. (1950) *73,641*
Evanston, *t.*, Wyo., U.S.A.; coal, oil, iron; dairying, agr.; p. (1950) *3,863*.
Evans Strait, divides Southampton Land from Coats I., Hudson Bay, Canada.
Evansville, *mftg. t.*, Ind., U.S.A.; on Ohio R.; hardwood tr., coal, farm implements; p. (1950) *128,636*.
Everest, Mt. (Chomolungma = Goddess Mother of the Earth), Himalayas, on frontier of Nepal and Tibet; alt. 29,002 ft.; highest mtn. in the world; Hillary and Tenzing first to reach summit in 1953.
Everett, *mftg. t.*, Mass., U.S.A., nr. Boston; iron and steel; p. (1950) *45,982*.
Everett, *t.*, Wash., U.S.A.; timber, salmon, fruit; p. (1950) *33,849*.
Everglades, Fla., U.S.A.; extensive marshes.
Evesham, *mkt. t.*, *mun. bor.*, Worcester, Eng.; on R. Avon, in Vale of Evesham, 15 m. S.E. of Worcester; fruit ctr.; p. (1951) *12,066*.
Evora, *cap.*, Alto Alemtejo prov., Portugal; iron, cork; famous for its mules; p. *27,038*.
Evreux, *t.*, *cap.*, Eure, France; iron, glass, textiles; p. (1954) *23,647*.
Evvoia (Euboea), *Greek I.*, Ægean Sea; 115 m. long; wheat, olive oil, wine; cap. Khalkis; p. (1951) *163,720*.
Ewell, *t.*, Surrey, Eng.; residtl.; pottery.
Exe, *R.*, Somerset and Devon, rises on Exmoor, flows S. to English Channel at Exmouth; length 44 m.
Exeter, *c.*, co. bor., co. t., mkt. t., Devon, Eng.; E. of Dartmoor on R. Exe 8 m. from the sea; cath.; aircraft components, leather goods; p. (1951) *75,479*.
Exeter, *bor.*, Penns., U.S.A.; coal, timber; p. (1950) *5,130*.
Exmoor, *moorland tract*, Somerset, Devon, Eng.; highest point, Dunkery Beacon, 1,707 ft.
Exmouth, *t.*, *urb. dist.*, Devon, Eng.; on E. side of estuary of R. Exe; holiday resort; p. (1951) *17,232*.
Exploits, *R.*, Newfoundland, Canada; length 150 m.
Extramadura, *old prov.*, S.W. Spain; largely plateau, alt. 1,500–3,000 ft.; heathy moorland; sheep; less arid conditions than in remainder of central Spain allow olives, vines, cereals; irrigation in valleys of Tagus, Guadiana.
Exuma, *gr. sm. Is.*, Bahamas, W.I.; p. (1953) *2,919*.
Eye, *mkt. t.*, *mun. bor.*, Suffolk, Eng.; 18 m. N. of Ipswich; anc. church; p. (1951) *1,631*.
Eyemouth, *burgh*, Berwick, Scot.; on E. cst., 9 m. N. of Berwick; fishing; p. (1951) *2,269*.
Eyre, *L.* (*salt*), N. part of S. Australia; a. 4,000 sq. m., 38 ft. below sea-level; practically dried up.
Eyre Peninsula, S. Australia; between G. of St. Vincent and Spencer G.
Eyzies, Les, *commune*, Dordogne dep., France; caves, arch. interests, Paleolithic paintings, Cromagnon type site.

F

Faaborg, *spt.*, Fyn I., Denmark.
Fabriano, *mftg. t.*, Marches, Italy; 30 m. S.W. of Ancona; fine cath.; paper; p. *26,625*.
Fabrizia, *t.*, nr. Monteleone, Italy; p. *4,150*.
Facone, *sacred L.*, Honshu, Japan; 57 m. from Tokyo.
Faenza, *t.*, Ravenna, Italy; at foot of Apennines, 15 m. S.W. of Ravenna; pottery (faience), silk; p. *50,000*.
Fagersta, *t.*, Vastmanland, Sweden; pig iron; p. *10,022*.
Failsworth, *t.*, *urb. dist.*, Lancs, Eng.; N.E. of Manchester; textiles, elec. goods; p. (1951) *18,033*.
Fair I., midway between Shetland and Orkney, Scot.; famous for brightly patterned, hand-knitted articles.
Fairbanks, *t.*, Alaska, U.S.A.; p. (1950) *5,625*.
Fairfield, *t.*, Ala., U.S.A.; p. (1950) *13,177*.
Fairfield, *t.*, Iowa, U.S.A.; p. (1950) *7,299*.
Fairhaven, *t.*, Mass., U.S.A.; p. (1950) *12,764*.
Fairhead, *C.*, N.W. Antrim, N. Ireland.
Fairmont, *t.*, W. Va., U.S.A.; p. (1950) *29,346*.
Fairweather, *mtn.*, Alaska, N. America; alt. 14,872 ft.

Faiyum, *see* **El Faiyum.**
Faizabad, *ch. t.,* Badakhshan, N.E. Afghanistan; p. *25,770.*
Fakenham, *t.,* Norfolk, Eng.; on R. Wensum.
Fal, *R.,* Cornwall, Eng.; flows to the English Channel; length 23 m.
Falaise, *t.,* Calvados, France; birthplace of William the Conqueror; scene of rout of a German Army, 1944; p. 5,715.
Falaise de l'Ile de France, *low S.E.-facing escarpment,* 50 m. S.E. and E. of Paris, France; overlooks "pays" of Champagne Pouilleuse; ch. vine-growing dist. for champagne-wine ind. of Rheims, Epernay.
Falcón, *st.,* Venezuela; bordering Caribbean Sea; cap. Coro; p. (1941) *232,644.*
Falkirk, *burgh,* Stirling, Scot.; 10 m. S.E. of Stirling; foundries, bricks, chemical, aluminium wks.; battles 1298 and 1746; p. (1951) *37,528.*
Falkland, *burgh,* Fife, Scot.; 3 m. S. of Auchtermuchty; mkt.; p. (1951) *1,037.*
Falkland Is., *Brit. Crown col.,* S. Atlantic; sheep rearing (for wool); whaling ctr.; cap. Stanley on E. Falkland I.; a. 4,618 sq. m.; p. (estd. 1958) *2,253.*
Falkland Is. Dependencies, comprise Falkland Is., S. Shetlands, S. Orkneys, Sandwich Group, Graham Land; all Is. and terrs. between 20° and 50° W. long. South of 50° S. lat., and between 50° and 80° W. long., South of 58° S. lat.
Fall River, *industl. c.,* Mass., U.S.A.; cottons, dyeing, brewing, iron; p. (1950) *111,963.*
Falmouth, *spt., mun. bor.,* Cornwall, Eng.; on W. side of estuary of R. Fal, 10 m. S. of Truro; seaside resort; fisheries, ship repairing, mng., quarrying, lt. engin.; p. (1951) *17,036.*
False Bay, *inlet* on E. side of C. of Good Hope peninsula.
Falster, *I.* in the Baltic, Denmark; cap. Nyköbing.
Falticeni, *t.,* N.E. Romania; timber; p. *14,347.*
Falun, *t.,* Kopparberg, Sweden; copper, iron, wood-pulp; p. *18,136.*
Famagusta, *t., spt.,* Cyprus; on E. cst., 2½ m. S. of ruins of ancient Salamis; p. (estd. 1959) *27,000.*
Famatina, *t.,* La Rioja prov., Argentina; in foothills of Andes, 360 m. N.W. of Cordoba; copper-mines.
Fannich, *loch,* Ross, Scot.; (6½ m. long), drains to Cromarty F.
Fanning, *Brit. I.,* Gilbert and Ellice Is. col.; N. Pac. Oc.; a. 15 sq. m.; guano, mother-of-pearl; p. *196.*
Fano, *t.,* Italy; on Adriatic cst., N. of Ancona; resort; p. *30,900.*
Fanö, I., Denmark; off W. cst. of Jutland, opposite Esbjerg; a. 20 sq. m.
Farafra, *oasis,* Libyan Desert, Egypt; 200 m. W. of Asyut; dates; stage on caravan route from Cyrenaica to Upper Egypt.
Farciennes, *commune,* S W. Belgium; coal, mftg.; p. *10,570.*
Fareham, *t., urb. dist.,* Hants., Eng.; at N.W. corner of Portsmouth Harbour; sm. boats, ceramics; p. (1951) *42,470.*
Farewell, *C.,* southernmost tip of Greenland.
Farewell, *C.,* most northerly point S.I., N.Z.
Fargo, *c.,* N.D., U.S.A.; on Red R.; grain, farm-machin.; p. (1950) *38,256.*
Faribalut, *t.,* Minn., U.S.A.; flour, factories; p. (1950) *16,028.*
Faridpur, *t.,* E. Bengal, Pakistan; cloth, carpets; p. (1941) *14,500.*
Faringdon, *mkt. t.,* Berks, Eng.; on N. edge of Vale of White Horse; p. *11,450.*
Farmington, *t.,* N. Conn., U.S.A.; residtl. and industl.; p. (1950) *7,026.*
Farmville, *t.,* Va., U.S.A.; mkt. for tobacco, lumber; p. (1950) *4,375.*
Farnborough, *t., urb. dist.,* Hants, Eng.; 3 m. N. of Aldershot military camp; Royal Aircraft Establishment; p. (1951) *27,702.*
Farne Is., off Northumberland cst., Eng.; a. 80 acres; since 1923 bird sanctuaries.
Farnham, *mkt. t., urb. dist.,* Surrey, Eng.; at N. Foot of N. Downs, 10 m. W. of Guildford; pottery, engin., coach mkg.; p. (1951) *23,911.*
Farnworth, *mftg. t., mun. bor.,* Lancs, Eng., nr. Bolton, cotton mnfs.; p. (1951) *28,614.*
Faro, *spt., cap.,* Algarve prov., Portugal; wine fruit, cork; p. (1950) *33,903.*
Faro, *C.,* N. point of Sicily, nearest to Italy.
Faroe Is., 200 m. N.W. of the Shetlands, Scot.; cap. Thörshavn (Strömö I.); Danish possession; fishing, agr.; a. 540 sq. m.; p. (1955) *32,380.*
Farrell, *t.,* Penns., U.S.A.; p. (1950) *13,644.*
Farrukhabad, *t.,* Uttar Pradesh, India; on Ganges R.; gold, lace, brass wk.; p. (1941) *69,418.*
Fars, *S.W. prov.,* Persia; on the Persian G.; cap. Shiraz.
Farshût, *t.,* Qena prov., Upper Egypt; agr.; p. *12,000.*
Farsley, *t.,* W.R. Yorks, Eng.; nr. Bradford; woollens; p. *6,158.*
Fasa, *t.,* Fars Prov., Persia; silk, wool; p. *10,000.*
Fasano, *t.,* Bari, Italy; industl.; p. over *20,000.*
Fastnet, *lighthouse* in Atlantic, 4½ m. S.W C. Clear, Irish cst.
Fatehpur, *t.,* Uttar Pradesh, India; hides, grain; p. *10,000.*
Fatshan (Nanhai), *industl. t.,* China; S.W. of Canton; p. (estd. 1948) *95,529.*
Faucilles, Les Monts, *range of hills,* connecting Vosges and Langres plateau, E. France; highest point about 1,600 ft.
Favara, *t.,* Sicily, Italy; sulphur, marble; p. *21,500.*
Faversham, *old mkt. t., mun. bor.,* Kent, Eng.; 10 m. W. Canterbury; fruit, hops, bricks, brushes, engin.; p. (1951) *12,294.*
Fawley, *vil.,* Hants, Eng.; on W. shore of Southampton Water, 2 m. N.W. of Calshot; oil refining; p. (1951) *6,515.*
Fayal I., Azores; orange growing; cap. Horta.
Fayetteville, *t.,* Ark., U.S.A.; univ.; rly. and tr. ctr., agr. implements, resort; p. (1950) *17,071.*
Fayetteville, *t.,* N.C., U.S.A.; p. *40,000.*
Fear, *C.,* point of the N. Carolina cst. U.S.A.
Feather, *R.,* Cal., U.S.A.; trib. of Sacramento R.
Featherstone, *t., urb. dist.,* W.R. Yorks, Eng.; coal; p. (1951) *13,925.*
Fécamp, *spt., wat. pl.,* Seine-Maritime, France; Bénédictine, shipbldg., fishing; p. (1954) *18,201.*
Federal Dist., *st.,* Mexico; a. 431 sq. m.; p. (estd. 1940) *1,500,000.*
Federated Malay States, *see* **Malaya, Federation of.**
Fehmarn, *I.,* in W. Baltic Sea; pastureland; belongs to Schleswig-Holstein, Germany; a. 72 sq. m.; p. *12,000.*
Feilding, *t.,* Wellington, N.Z.; p. (1951) *5,810.*
Felanity, *t.,* E. cst. Majorca, Spain; wine tr.
Feldberg, *mtn. peak,* Black Forest, Germany; alt. 4,900 ft.
Feldkirch, *t.,* Vorarlberg, Austria; on Swiss frontier; p. *15,313.*
Felixstowe, *t., urb. dist.,* E. Suffolk, Eng.; 12 m. S.E. Ipswich; seaside resort; p. (1951) *15,080.*
Felletin, *t.,* Creuse, France; tapestries; p. *2,557.*
Felling, *urb. dist.,* Durham, Eng.; Tyneside mftg. and colly. dist.; p. (1951) *25,286.*
Feltham, *urb. dist.,* Middlesex, Eng.; nr. Staines; cars and accessories, aircraft plastics; p. (1951) *44,830.*
Feltre, *t.,* Venetia, Italy; cath.; silk, wine; p. *19,000.*
Fenny Stratford, *mkt. t.,* Bucks, Eng.; 2 m. E. of Bletchley; straw-plaiting; p. *4,300.*
Fens, The, *low-lying dist.* round the Wash; protected by high embankments against flooding by spring tides; includes parts of 6 English cos.
Fenton, *t.,* Staffs, Eng.; nr. Stoke-on-Trent; earthenware wks.
Feodosiya, *spt.,* Crimea, U.S.S.R.; harbour, health resort; oysters; p. (1939) *27,379.*
Ferentino, *t.,* prov. Rome, Italy; wine, olive oil; cath.; p. *14,625.*
Ferghana, *region,* Uzbek S.S.R., U.S.S.R.; deep basin at W. end of Tien Shan Mtns.; drained W. by R. Syr Darya; semi-arid but extensive irrigation system allows intensive cultivation of cotton, citrus fruits, silk, rice; ch. ts., Kokand, Namangan.
Ferghana, *t.,* Uzbekistan S.S.R.; hydro-elec., petroleum refining, textiles; p. (1959) *80,000.*
Fergus Falls, *t.,* Minn., U.S.A.; flour, dairy produce; p. (1950) *12,917.*
Fermanagh, *inland co.,* N. Ireland; bisected by R. Erne and lakes; cap. Enniskillen; stock-raising, dairying, stone; a. 714 sq. m.; p. (1951) *53,040.*
Fermo, *c.,* Ascoli, Italy; p. *25,000.*
Fermoy, *t.,* Cork, Ireland; on R. Blackwater; p. (1951) *4,017.*
Fernando de Noronha, *st.,* consisting of Is. off E. cst. Brazil; penal sta.
Fernando Po, *mountainous I.,* Spanish col., W.

Africa; in Bight of Biafra, off Cameroon cst.; a. 700 sq. m.; cap. Santa Isabel; cocoa, palm-oil.
Ferndale, *t.*, Mich., U.S.A.; p. (1950) *29,675*.
Fernie, *t.*, Brit. Columbia, Canada; in Rockies, nr. Crows Nest Pass; coal.
Ferozepore, *t.*, Punjab, India; wheat; p. (1941) *65,000*.
Ferrara, *prov.*, N. Italy; cap. Ferrara; a. 1,019 sq. m.; p. (1951) *420,527*.
Ferrara, *fortfd. c.*, N. Italy; nr. head of delta of R. Po; cath., univ.; mnfs. silk, hemp, wine; mkt. for fertile plain; p. (1951) *133,928*.
Ferro, *most S.W. I.*, Canary Is.; a. 106 sq. m.; was chosen by Fr. scientists (1630) as first meridian; cap. Valverde.
Ferrol, *spt.*, *naval arsenal*, Spain; on N.W. cst. nr. Corunna; p. (1950) *77,030*.
Ferryhill, *vil.*, Durham, Eng.; 5 m. S. of Durham, in gap through limestone ridge which separates Wear valley from Tees valley; commands main N. to S. route along lowland E. of Pennines.
Fertile Crescent, an arc of fertile land from the Mediterranean Sea, N. of the Arabian Desert, to Persian Gulf; home of some very early civilisations and migrations.
Festiniog, *see* **Ffestiniog**.
Fethiye, *spt.*, Turkey; opposite Rhodes; p. (1945) *4,174*.
Fetlar I., Shetland Is., Scot.; 6½ m. long by 2¾ m. wide.
Feuerbach, *industl. c.*, Baden-Württemberg, Germany; N.W. sub. of Stuttgart; sandstone; p. *17,617*.
Fez, *c.*, Morocco, Fr. N. Africa; Mohammedan "holy city"; impt. comm. ctr., cap. of Frizone, and one of the three caps. of Morocco; 150 m. S. of Tangier; univ.; p. (estd. 1947) *200,900*.
Fezzan, *prov.*, Libya, N. Africa; numerous wells and inhabited oases.
Ffestiniog (Festiniog), *urb. dist.*, Merioneth, N. Wales; at head of Vale of Ffestiniog 9 m. E. of Portmadoc; contains vils. of Ffestiniog and Blaenau Ffestiniog; impt. slate quarries, hydro-elect. power-sta, cement; p. (1951) *6,923*.
Fianarantsoa, *t.*, Madgascar; p. (1957) *34,845*.
Fichtelgebirge (Fir Mtns.), *mtn. range*, N.E. Bavaria, Germany; highest peak, Schneeberg; alt. 3,454 ft.
Fife, *peninsula*, *co.*, E. Scot.; between the F. of Tay and Forth; *co. t.* Cupar; a. 492 sq. m.; p. (1951) *306,855*.
Fife Ness, extreme E. point, Fife, Scot.
Figuéira da Foz, *t.*, Portugal; resort at mouth of R. Mondego; corn, wine; p. *10,229*.
Figuéras, *fortfd. t.*, Gerona, Spain; nr. French frontier; glass, cork, leather; p. *13,500*.
Fiji, *archipelago of* 322 coral Is. (106 inhabited) in S. Pac.; Brit. Crown Col.; forests, bananas, coconuts, sugar-cane; cap. Suva on Viti Levu I.; a. 7,040 sq. m.; p. (estd. 1957) *361,038*.
Filey, *t.*, *urb. dist.*, E.R. Yorks, Eng.; on E. cst. 5 m. S.E. of Scarborough; seaside resort; p. (1951) *4,764*.
Filton, Bristol, Somerset; aircraft wks.
Finale, *t.*, N. Italy; silk; p. *16,000*.
Finchley, *mun. bor.*, Middx., Eng.; N. sub. of London; residtl.; p. (1951) *69,990*.
Findhorn, *fishing vil.*, Moray, Scot.; holiday resort.
Findlay, *mftg. t.*, Ohio, U.S.A.; on Blanchard R.; p. (1950) *23,845*.
Findon or Finnan, *fishing vil.*, Kincardine, Scot.
Fingal's Cave, Staffa I., Inner Hebrides, W. Scot.; basaltic columns.
Finistère, *dep.*, N.W. France; cap. Quimper; cereals, fruit, livestock; coal, granite; fishing; a. 2,730 sq. m., p. (1954) *727,847*.
Finisterre, *C.*, extreme N.W. point of Spain.
Finland, *rep.*, Europe, low-lying tableland, glaciated, innumerable lakes; forested; oats, rye, barley, potatoes; timber, wood-pulp, textiles; iron mining; official languages, Finnish and Swedish (Swedish names mainly as alternatives on W. cst.); mainly agr.; cap. Helsinki; a. 117,975 sq. m.; p. (1959) *4,412,631*.
Finland, G. of, E. arm of Baltic Sea, 250 m. l.
Finnart, Dunbartonshire, Scot.; oil terminal situated in Loch Long, N.W. Glasgow.
Finnmark, *most northerly co.*, Norway; inhabited by Lapps; whale fisheries; a. 18,581 sq. m.; p. (1950) *64,475*.
Finsbury, *met. bor.*, London, Eng.; p. (1951) *35,347*.
Finsteraarhorn, *mtn.*, Switzerland, (14,023 ft.) highest peak in Bernese Oberland.
Finsterwalde, *t.*, Brandenburg, Germany; textiles, furniture, metallurgy, glass; p. (estd. 1954) *22,000*.
Fir Mountains, *see* **Fichtel Gebirge**.
Firenze, *see* **Florence**.
Firminy, *mftg. t.*, Loire France; S.E. of St. Etienne; p. (1954) *21,161*.
Fishguard and Goodwick, *spt.*, *urb. dist.*, N. Pembroke, Wales; on S. of Cardigan Bay; steamer connection to Cork and Rosslare (Ireland); p. (1951) *4,840*.
Fitchburg, *c.*, Mass., U.S.A.; woollens, paper, machin.; p. (1950) *42,691*.
Fitzroy, *R.*, Queensland, Australia; flows into Keppel Bay.
Fiume, *see* **Rijeka**.
Fivizzano, *t.*, Tuscany, Italy; mineral springs; p. *17,550*.
Flagstaff, *t.*, Arizona, U.S.A.; seat of Lowell Univ.; p. (1950) *7,663*.
Flamborough Head, *C.*, Yorks cst., Eng.; chalk cliffs, alt. 500 ft.; lighthouse.
Fläming, *heathland*, Brandenburg, Soviet Zone, Germany; occupies low sandy ridge, alt. below 800 ft., 50 m. S.W. of Berlin; heathland, coniferous woodland; former military training area.
Flanders, *dist.*, Belgium, divided into two provs. of W. (1,248 sq. m., p. (estd. 1957) *1,044,451*) and E. (1,147 sq. m., p. (estd. 1957) *1,257,002*); caps. Bruges and Ghent.
Flat River, *c.*, Mo., U.S.A.; lead mines; p. (1950) *5,308*.
Flattery Cape, on Pacific cst., Wash., U.S.A.
Flèche, La, *t.*, Sarthe, France; nr. Le Mans; p. (1954) *11,275*.
Fleet, *t.*, *urb. dist.*, Hants, Eng.; 4 m. N.W. of Aldershot; p. (1951) *9,018*.
Fleetwood, *spt.*, *mun. bor.*, Lancs., Eng.; at mouth of Wyre; fishing; p. (1951) *27,525*.
Flémalle, 2 *communes*, Liége prov., Belgium; glass; p. *11,914*.
Flensburg, *spt.*, Schleswig-Holstein, Germany; on Baltic cst.; coal; shipbldg., machin., iron, chemicals, fishing; p. (estd. 1954) *97,100*.
Flevosted, *t.*, Netherlands; administrative ctr. of new S.E. Polder.
Flinders, *R.*, Queensland, Australia; flowing to G. of Carpentaria.
Flinders Range, *mtns.*, S. Australia; extend 250 m. N.E. from head of Spencer G.; alt. 3,900 ft.
Flin Flon, *t.*, Manitoba, Canada; 90 m. by rly. N. of The Pas; ctr. of gold-mining a.
Flint, *co.*, Wales; stock-raising; coal, iron, textiles, chemicals; a. 257 sq. m.; p. (1951) *145,108*.
Flint, *c.*, Mich., U.S.A.; motor cars, lumber, woollens, aeroplane engines; p. (1950) *163,143*.
Flint, *mun. bor.*, *co. t.*, Flint, Wales; viscose textile yarn; p. (1951) *14,257*.
Flint I., (Brit.), Pac. Oc.; uninhabited.
Flodden, *vil.*, Northumberland, Eng.; on R. Till; famous battle 1513, James IV of Scotland defeated by the Earl of Surrey.
Florange, *t.*, Moselle, France; p. (1954) *12,039*.
Florence (Firenze), *c.*, Tuscany, Italy; on R. Arno; famous for art treasures, cath. and churches; ruled by Medici 1421–1737; birthplace of Dante and Michelangelo; p. (1951) *376,383*.
Florence, *c.*, N.W. Ala., U.S.A.; iron, textiles, lumber, food; airport; p. (1950) *23,879*.
Florence, *t.*, S.C., U.S.A.; p. (1950) *22,513*.
Flores, *I.*, most north-westerly of the Azores gr.; Portuguese; cap. Santa Cruz.
Flores, *I.*, Indonesia; divided between Indonesia and Portugal; mountainous, volcanic, densely forested; a. 8,870 sq. m.; p. *500,000*.
Flores, *dep.*, Uruguay; cap. Trinidad; a. 1,744 sq. m.; p. (1953) *35,565*.
Flores Sea, between Celebes and Flores, Indonesia.
Florianopolis, *spt.*, cap. Santa Catarina st., Brazil; cst tr.; p. (1947) *53,400*.
Florida, *st.*, U.S.A.; between Atlantic and G. of Mexico; ch. prod.: grape-fruit, oranges, tobacco, sugar-cane, cotton; ch. mineral: phosphate rock, has almost a monopoly of sponge fishing; cap. Tallahassee; a. 58,560 sq. m.; p. (estd. 1957) *4,098,000*.
Florida, *dep.*, Uruguay; cap. Florida; a. 4,673 sq. m.; p. (1953) *106,284*.

Floridabanca, *t.*, Luzon, Philippine Is.; sugar, rice; p. *17,521*.
Florida Strait, between Florida and Bahama Is.; course of "Gulf Stream" from Gulf of Mexico.
Florina, *see* **Phlorina**.
Flume, The, picturesque gorge, Franconia Mtns., N.H., U.S.A.
Flushing, *spt.*, *wat. pl.*; Walcheren I., Netherlands; steam-packet sta.; p. (1951) *24,048*.
Flushing Meadow, *t.*, Flushing Bay, Long Island, N.Y., U.S.A.; U.N.O. meeting place.
Fly, *R.*, New Guinea; flows S.E. to G. of Papua.
Fochabers, *vil.*, Moray, Scot.; nr. mouth of Spey; tourist resort.
Focsani, *t.*, Putna dist., Romania; on R. Milkov; soap, petroleum; p. *32,799*.
Foggia, *prov.*, Apulia, S. Italy; a. 2,683 sq. m.; p. (1951) *660,703*.
Foggia, *t.*, S. Italy, Apulia; cath.; industl.; p. (1951) *97,386*.
Fogo, *par.*, Berwick, Scot.; nr. Duns; p. (1951) *425*.
Fogo, *I.*, Atl. Oc.; in Cape Verde gr.; volcanic.
Folda Fjord, W. coast, Norway.
Foligno, *t.*, Perugia, Italy; remarkable grotto; numerous factories; p. *38,000*.
Folkestone, *spt.*, *mun. bor.*, Kent, Eng.; seaside resort, pt. for Folkestone–Boulogne route to France 29 m.; p. (1951) *45,200*.
Fond du Lac, *mftg. t.*, Winnebago Lake, Wis., U.S.A.; cath.; p. *27,209*.
Fonsagrada, *industl. t.*, Lugo, Spain; p. *14,832*.
Fonseca Bay, *inlet* on Pacific cst. of C. America, bordering on Nicaragua; U.S.A. naval base; (U.S.A. have acquired the option for a canal route through Nicaragua).
Fontainebleau, *t.*, Seine-et-Marne, France; on R. Seine, 35 m. S.E. of Paris; magnificent forest (a. 42,500 acres) and palace; porcelain; Ecole d'Artillerie; p. (1954) *19,915*.
Fontenay-le-Comte, *industl. t.*, Vendée, France; p. (1954) *9,519*.
Fontenay-sous-Bois, *t.*, Seine, France; sub. of Paris; p. (1954) *36,739*.
Fontenoy, *t.*, Belgium; nr. Tournai; battle, 1745, Marshall Saxe, defeated the Allies under Duke of Cumberland.
Fontevrault, *t.*, dep. Maine-et-Loire, France.
Foochow (**Minhow**), *c.*, Fukien, China; former treaty pt.; gr. tea-exporting ctr.; p. (estd. 1946) *318,075*.
Foots Cray, *sm. t.*, Kent, Eng.; paper-mills.
Forbach, *t.*, Moselle, France; p. (1954) *21,591*.
Forbes, *t.*, N.S.W., Australia; p. (1958) *6,730*.
Fordingbridge, *mkt. t.*, Hants, Eng.; on R. Avon, sail-cloth; p. *3,394*.
Fordlandia, *t.*, Para, N.E. Brazil; on Tapajoz R.; one of the Ford rubber plantations.
Foreland, N. and S., two headlands, on E. cst. of Kent, Eng.; lighthouse.
Forest Hills, *residtl. a.*, part of Queen's bor., N.Y., U.S.A.; on Long I.; p. *21,400*.
Forfar, *burgh*, Angus, Scot.; in Strathmore, 17 m. S.W. of Montrose; linen, jute; p. (1951) *9,981*.
Forli, *ancient c.*, Emilia, Italy; silk factories, ironwks.; felt; p. (1951) *77,033*.
Formby, *t.*, *urb. dist.*, Lancs, Eng.; on W. cst., 6 m. S.W. of Southport; p. (1951) *10,429*.
Formentera, *I.*, Balearic Is., S. of Iviza; 13 m. long.
Formia, *t.*, Caserta, Italy; the ancient Formiæ.
Formigine, *t.*, Modena prov., N. Italy; silk, leather; p. *10,985*.
Formosa (Taiwan), *I.*, China, 100 m. E. of mainland; U.S.A. protection; fishing, rice, tea, sugar, camphor, coal, gold; cap. Taihoku; a. 13,890 sq. m.; p. (1957) *9,409,886* (inc. *c.* 1 million refugees and *c.* 1 million Nationalist army).
Formosa, *terr.*, N. Argentina; bordering on Paraguay; timber; cap. Formosa; a. 27,825 sq. m.; p. (estd. 1958) *196,600*.
Fornaes, *c.*, extreme E. point of Jutland.
Forres, *burgh*, Moray, Scot.; nr. mouth of R. Findhorn, 25 m. E. of Inverness; distilling, oat and woollen mills; p. (1951) *4,462*.
Forst, *t.*, Brandenburg, E. Germany; on R. Neisse; E. section of t. Polish since 1945; textiles; p. (estd. 1954) *34,000*.
Fort Augustus, *vil.*, Inverness, Scot.; at S.W. end of Loch Ness; on Caledonian Canal; Fort now Abbey.
Fort Collins, *t.*, Col., U.S.A.; site of Colorado State College of Agriculture and Mechanic Arts; p. (1950) *14,937*.
Fort de France (formerly **Fort Royal**), *cap.*, Martinique, W. Indies; has a land-locked harbour of some 16 sq. m.; exp. rum, sugar; p. (1946) *66,006*.
Fort Dodge, *t.*, Iowa, U.S.A.; on Des Moines R., in rich agr. cty.; grain, pottery, coal; p. *26,000*.
Fort Edward, *vil.*, N.Y., U.S.A.; on Hudson R.; pulp, paper mills; p. (1950) *3,797*.
Fort Frances, *t.*, Ontario, Canada; pulp, lumbering; p. *5,897*.
Fort George, *R.*, Labrador, Canada; flowing into James Bay.
Fort Jameson, *t.*, N. Rhodesia; cotton.
Fort Lamy, *t.*, *cap.*, Chad terr., Fr. Equatorial Africa; p. *18,465*.
Fort Madison, *c.*, Iowa, U.S.A.; meat packing; p. (1950) *14,954*.
Fort Monroe, Va., U.S.A.; at mouth of James R.; p. *2,000*.
Fort St. John, *t.*, B.C., Canada; on Peace R.; p. *600*.
Fort Scott, *t.*, Kan., U.S.A.; maize, wheat, cattle; p. (1950) *10,335*.
Fort Smith, *c.*, Ark., U.S.A.; on Arkansas R.; rly. ctr., cotton, maize, wagons, furniture; p. (1957) *59,959*.
Fort Smith, *t.*, N.W. Terr., Canada; on Slave R.; p. *200*.
Fort Victoria, *t.*, S. Rhodesia; agr. and mining ctr., cattle; historic ruins in Zimbabwe Nat. Park; p. *5,130* (incl. *1,700* Europeans).
Fort Wayne, *c.*, Ind., U.S.A.; rly.-carriage bldg. and machine shops; p. (1950) *133,607*.
Fort William, *c.*, Ontario, Canada; on L. Superior; grain pt.; p. *30,585*.
Fort William, *burgh*, Inverness, Scot.; nr. head of Loch Linnhe, at base of Ben Nevis; p. (1951) *2,661*.
Forth Worth, *c.*, Texas, U.S.A.; rly. and comm. ctr. on Trinity R.; petroleum, meat packing, aeroplanes, oilfield equipment; p. (1950) *278,778*.
Fort Yukon, Alaska, U.S.A.; trading sta. on Yukon R.; p. *274*.
Fortaleza, *cap.*, Ceará st., Brazil; exp. sugar, rubber, cotton, carnauba wax; p. (1950) *280,084*.
Fortescue, *R.*, W. Australia.
Forth, *R.*, Scot.; rises on Ben Lomond, and flows E. into F. of Forth nr. Alloa; length 65 m.
Forth Bridge, *rly. bridge*, Scot.; spans F. of Forth between N. and S. Queensferry; length 1½m.
Forth, Firth of, *lge. inlet*, E. cst. of Scot.; submerged estuary of R. Forth; navigable by lge vessels for 40 m. inland to Grangemouth; other pts., Leith, Rosyth (naval), Bo'ness; length (to Alloa) 50 m., width varies from 1 to 13 m.
Forth and Clyde Canal, Scot.; links F. of Forth at Grangemouth, and F. of Clyde at Glasgow; length 38 m.
Fortrose, *t.*, *burgh*, Ross and Cromarty, Scot.; on S. cst. of Black Isle, on Moray Firth; p. (1951) *882*.
Fortune Bay, *inlet*, S. cst. of Newfoundland, Canada.
Fossano, *t.*, Italy; nr. Turin; cath.; paper, silk; p. *21,850*.
Fostoria, *t.*, Ohio, U.S.A.; glass, quarries, stockyards; p. (1950) *14,351*.
Fotheringay, *vil.*, on R. Nen, Northampton, Eng.; Mary Queen of Scots beheaded in F. Castle, 1587.
Fougères, *t.*, Ille-et-Vilaine, France; cas.; p. (1954) *23,151*.
Fougerolles, *t.*, Haute-Saône, France.
Foula, I., Shetland Is., Scot.; westward of main gr.
Foulness Island, Essex, Eng.
Foulweather, *C.*, Ore., U.S.A.
Fountains Abbey, fine ruin, Cistercian, founded 1132, W.R. Yorks, Eng.; nr. Ripon.
Fourchambault, *t.*, Nièvre, France; on R. Loire; p. *4,817*.
Fourmies, *t.*, Nord, France; nr. Valenciennes; p. (1954) *13,414*.
Foveaux Strait, N.Z.; separates S.I. from Stewart I.
Fowey, *spt.*, *mun. bor.*, Cornwall, Eng.; on W. of Fowey estuary, 22 m. W. of Plymouth; seaside resort, fishing; exp. kaolin; p. (1951) *2,344*.
Foxboro, *t.*, Mass., U.S.A.; mnfs. light metal goods; p. (1950) *7,030*.

Fox Is., one of the Aleutian Is. gr.
Foxe Basin and Channel, to N. of Hudson Bay, between Baffin I. and Southampton I.
Foxe Peninsula, Baffin I., Franklin, Canada.
Foxton, *bor.*, N.I., N.Z.; p. (1951) *2,226*.
Foyers, *falls*, Inverness, Scot.; E. of Loch Ness, nr. Fort Augustus; aluminium wks., hydro-elec. scheme.
Foyle, Lough, estuary of Foyle R., between Donegal and Londonderry, N. Ireland.
Foynes, *spt.* and *airport*, Ireland; on S. shore of Shannon estuary 20 m. S.W. of Limerick; imports coal, petroleum; impt. refuelling base on trans-Atlantic air services (mainly American) from U.S.A. to Europe.
Framingham, *industl. t.*, Mass., U.S.A.; 10 m. W. of Boston; p. (1950) *28,086*.
Framlingham, *mkt. t.*, E. Suffolk, Eng.; 15 m. N.E. of Ipswich.
Francavilla, *t.*, Lecce, Italy; wine, oil, leather; p. *21,375*.
France, *rep.* (*former monarchy and empire*), W. Europe, bounded N. by Belgium and English Channel, W. by the Bay of Biscay, S. by the Pyrenees and the Mediterranean, E. by Italy, Switzerland and Germany. Greatest length about 600 m., greatest breadth 540 m.; a. 212,600 sq. m., or 3½ times size of England and Wales; F. is divided into 90 metropolitan deps.; ch. ts. are Paris (the cap., the fifth lgst. c. in Europe), Bordeaux, Marseilles, Lyons, Lille, Nice and Toulouse. Cols. and dependencies of France, in Asia, America and Africa, have an area of about 5,120,000 sq. m.; ch. mtns.: Cevennes, Jura, Vosges, Pyrenees; ch. Rs.: Seine, Loire, Rhône, Garonne; climate, temperate; agr.: wheat, oats, potatoes, sugar-beet, vine, fruits, silk, cattle, sheep, dairying; minerals: coal, iron, bauxite, potash; mnfs.: iron and steel, machin., textiles; communications excellent; p. of the Rep (1960) *43,355,000*.
Franceville, *t.*, Middle Congo terr., Fr. Equatorial Africa; on R. Ogowe; p. *1,000*.
Francisco Morazán, *dep.* central Honduras; a. 3,870 sq. m.; p. (1950) *209,395*.
Francis Lake, *L.*, Yukon, Canada.
Francistown, *gold-mining t.*, Bechuanaland, Africa; p. *10,000*.
Frankental, *t.*, Rhineland Palatinate, Germany; N.W. of Mannheim; engin., farm implements, metallurgy, cork; p. (estd. 1954) *27,500*.
Frankfort, *t.*, Ky., U.S.A.; mining, horse-breeding; p. (1950) *11,916*.
Frankfort, *t.*, Ind., U.S.A.; p. (1950) *15,028*.
Frankfurt-on-Main, *c.*, Hessen, W. Germany; restored cath.; univ.; birthplace of Goethe; machin., cars, chemicals, publishing, transshipment pt., impt. airfield; p. (estd. 1954) *601,800*.
Frankfurt-on-Oder, *t.*, Brandenburg, Germany; 50 m. from Berlin; gr. route ctr.; machin., iron; E. section of t. Polish since 1945; p. (estd. 1954) *59,000*.
Frankischer (**Franconian**) **Jura**, *plateau with steep N.-facing edge*, S.W. Germany; runs 80 m. S.W. from Fichtel Gebirge (Fir Mtns.), highest elevation just exceeds 3,000 ft.; drained by Regnitz Altmühl; slate quarrying; vine, maize in sheltered valleys.
Franklin, *t.*, N.H., U.S.A.; p. (1950) *6,552*.
Franklin, *bor.*, N.J., U.S.A.; ctr. of U.S. zinc ind.; p. (1950) *3,864*.
Franklin, c., Penns., U.S.A.; petroleum, oil-well tools, rolling stock; p. (1950) *10,006*.
Franklin, *t.*, Tasmania, Australia; 20 m. from Hobart; principal fruit-growing dist. in island.
Franklin, *dist.*, N.W. Terr., Canada; comprising the Is. of Arctic Canada from Banks I. to Baffin I., including Boothia Peninsula and Melville Peninsula; sparsely populated; furs; a. 554,032 sq. m.
Frantiskové Lázne (**Franzenbad**), *t.*, *wat. pl.*, Czechoslovakia.
Franz Josef Land, U.S.S.R., *archipelago* in Arctic Ocean; N. of Novaya Zemlya; a. 7,050 sq. m.; mainly ice-covered.
Frascati, *t.*, Italy; 12 m. S.E. of Rome; summer resort; famous villas and arch. remains; p. *11,425*.
Fraser, *R.*, B.C., Canada; famous salmon fisheries; length 750 m.
Fraserburg, *agr. t.*, C. of Good Hope, S. Africa; supply sta. for stock-raisers between Calvinia and Carnarvon.
Fraserburgh, *cst. burgh*, N.E. Aberdeen, Scot.; extreme N.E. of Buchan peninsula; impt. herring fishery; granite; p. (1951) *10,444*.
Fraserville, *t.*, Quebec, Canada; on St. Lawrence R.
Fratta Maggiore, *t.*, Italy; 6 m. from Naples; p. *18,100*.
Frauenfeld, *cap.*, Thurgau, Switzerland; cas.; cotton; p. *9,581*.
Fray Bentos, *t.*, *cap.*, Rio Negro, Uruguay; on R. Uruguay 50 m. from its mouth; meat canning and salting, meat extracts; p. (1942) *18,000*.
Frechen, *t.*, N. Rhine–Westphalia, Germany; W. of Cologne; lignite, pottery; p. (estd. 1954) *21,100*.
Fredericia, *spt.*, *t.*, Veile, Jutland, Denmark; traffic ctr., barracks; rly. wks. tobacco, cottons; new bridge over Little Belt; p. (1945) *22,963*.
Frederick, *c.*, Md., U.S.A.; canning, tanning; p. (1950) *18,142*.
Fredericksburg, *t.*, Va., U.S.A.; scene of severe Federal rebuff, Civil War; p. (1950) *12,158*.
Fredericton, *t.*, *cap.*, N.B., Canada; on St. John R.; univ., cath.; lumbering; p. (1956) *18,303*.
Frederiksberg, *sub.*, Copenhagen, Denmark; p. *113,584*.
Frederikshaab, *sm. spt.* on W. cst. of Greenland.
Frederikshavn, *spt.*, *fishing t.*, N. cst. of Jutland; p. *16,827*.
Frederikstad, *t.*, Norway; at mouth of Glommen R.; timber, rly. wkshps., shipbldg.; p. (1946) *14,117*.
Fredonia, *t.*, N.Y., U.S.A.; p (1950) *7,095*.
Freehold, *t.*, N.J., U.S.A.; p. (1950) *7,550*.
Free Port, *mftg. t.*, Ill., U.S.A., on the Pecatonica R.; p. (1950) *22,467*.
Free Port, *t.*, Long Island, N.Y., U.S.A.; p. (1950) *24,680*.
Freeport, *spt.*, Texas; sulphur, chemicals, magnesium from sea; p. (1950) *6,012*.
Freetown, *cap.*, Sierra Leone, W. Africa; coaling sta.; exp. palm oil; p. (estd. 1956) *100,000*.
Fregenal de la Sierra, *t.*, Spain; nr. Badajoz; p. *10,806*.
Freiberg, *c.*, Saxony, Germany; cath.; cas.; metallurgy, textiles, glass, porcelain; p. (estd. 1954) *42,500*.
Freiburg (**Fribourg**), *can.*, Switzerland; much forest and unproductive land; a. 645 sq. m.; p. *158,400*.
Freiburg, *cap.*, Freiburg, Switzerland; between Berne and Lausanne; fine viaduct and bridges; univ.; machin., chocolate; p. *26,045*.
Freiburg, *t.*, Baden-Württemberg, Germany; in Black Forest; cath., univ.; textiles, paper, metallurgy; p. (estd. 1954) *128,800*.
Freising, *c.*, Bavaria, Germany; cath.; agr. machin., textiles, brewing; p. (estd. 1954) *25,700*.
Freital, *t.*, Saxony, Germany; S.W. of Dresden; coal-mining, iron, leather, glass; p. (estd. 1954) *40,100*.
Fréjus, *cst. t.*, Var, France; p. (1954) *13,452*.
Fréjus, Col de, the Alpine pass under which the Mont Cenis tunnel runs.
Fremantle, *spt.*, W. Australia; at mouth of Swan R., 12 m. S.W. from Perth, principal pt. of commerce in W. Australia and first Australian pt. of call for mail steamers; p. (1947) *27,926*.
Fremont, *t.*, Nebraska, U.S.A.; on Platte R.; p. (1950) *14,762*.
Fremont, *c.*, Ohio, U.S.A.; on Sandusky R.; petroleum field; p. (1950) *16,537*.
Fremont's Peak, highest peak of Wind River Range, Wyoming St., U.S.A.; alt. 13,570 ft.
French Equatorial Africa, formerly comprised the French African cols. Gabun (cap. Libreville), Middle Congo (cap. Brazzaville), Ubangi-Shari (cap. Bangui), and Chad (cap. Fort Lamy); timber, ivory; a. 953,740 sq. m.; p. (1957) *4,879,000*. These sts. are now aut. reps. within Fr. Community. *See* under separate headings: Gabun, Congo, Central African Rep., Chad.
French Guiana, *col.*, S. America; forests; cocoa, gold, phosphates; poor communications; cap. Cayenne; a. 34,740 sq. m.; p. (1954) *27,863*.
French Guinea, *see* **Guinea**.
French Indo-China, *see* **Indo-China**.
French, *R.*, Ontario, Canada; the outlet of L. Nipissing into L. Huron.
French Somaliland, *see* **Somaliland, French**.
French Sudan, former Fr. col., now **Sudanese Rep.**, united with Rep. of Senegal in Mali Fed.; millet, sorghum, rice, maize, groundnuts, cotton; cap. Bamako; a. 465,052 sq. m.; p. (1957) *3,708,000*.

French West Africa, formerly comprised Dahomey, Ivory Coast, Mauritania, Niger, French Guinea, Upper Volta, Senegal, French Sudan. Guinea is ind. st., others are aut. reps. within Fr. Community (Senegal united with Sudanese Rep. in Mali Fed.). *See* under separate headings.

Freshwater, *sm. t., bathing resort,* I. of Wight, Eng.; at. W. end of I., 8 m. W. of Newport.

Fresnillo, *t.*, Zacatecas St., Mexico; p. *25,000.*

Fresno, *c.*, Cal., U.S.A.; ctr. of impt. irrigated fruit-growing dist.; dairying, copper, petroleum; p. (1950) *91,699.*

Friedrichshafen, *t., L. pt.*, Germany; on L. Constance; machin., boat bldg., motors; p. (estd. 1954) *24,100.*

Friedrichsthal, *t.*, Saar; coal-mining, steel wks.; p. (estd. 1954) *16,400.*

Friendly Is. (Tonga), Pac. Oc.; 400 miles S.E. Fiji; independent Polynesian kingdom under Brit. protection; mild and healthy climate; ch. I., Tongatapu; cap. Nukualofa in Tongatapu; copra, bananas; a. 269 sq. m.; p. (1956) *56,838.*

Friern Barnet, *urb. dist.*, Middx., Eng.; N. sub. of London; residtl.; p. (1951) *29,164.*

Friesland, *prov.*, Netherlands; cap. Leeuwarden; dairying, horses, cattle; a. 1,325 sq. m.; p. (1948) *460,519.*

Frimley and Camberley, *urb. dist.*, Surrey, Eng.; 3 m. N. of Farnborough (Hants); light engin., plastics; p. (1951) *20,376.*

Frinton and Walton, *urb. dist.*, Essex, Eng.; on E. cst., 5 m. N.E. of Clacton; seaside resort; p. (1951) *8,440.*

Friol, *commune*, Lugo, N.W. Spain; leather, linen; p. *10,667.*

Frisches Haff, *shallow freshwater lagoon*, Baltic cst. of Poland; 53 m. long, 4–11 m. broad.

Frische Nehrung, *sandspit*, G. of Danzig, Baltic Sea; astride bdy. between Poland, U.S.S.R.; almost separates Frisches Haff (Zalew Wislany) from G. of Danzig; length 36 m.

Frisian Islands, *chain of Is.* stretching from Zuyder Zee and N. to Jutland, along the csts. of the Netherlands and N. Germany; ch. Is. are Texel, Vlieland and Ameland.

Frobisher Bay, *inlet* in S. Baffin I., N. Canada, extending 200 m. between Cumberland Sound and Hudson Strait.

Frodingham, *t.*, Lincoln, Eng.; on W. flank of limestone ridge, Lincoln Edge; impt. iron-ore open-cast mines; mnfs. iron and steel; p. (1951) *54,245* (with Scunthorpe).

Frodsham, *mkt. t.*, Cheshire, Eng.; 10 m. N.E. Chester; chemicals.

Frome, *mkt. t., urb. dist.*, Somerset, Eng.; on R. Frome, 11 m. S. of Bath; woollens, printing, brewing, iron, metal and plastic wks.; p. (1951) *11,116.*

Frosinone, *industl. t.*, Lazio, Italy; on R. Cosa; p. (1951) *24,706.*

Frostburg, *t.*, Md., U.S.A.; p. (1950) *6,876.*

Froward, *C.*, Magallanes prov., Southern Chile.

Frunze, *cap.*, Kirgiz S.S.R.; engin., textiles, p. (1959) *217,000.*

Fthiotis and Focis, *pref.*, Greece; cap. Lamia; p. (1940) *216,416.*

Fucino, *L.* (*now drained*), Aquila, Central Italy; old volcanic crater.

Fuente-Alamo, *industl. t.*, S.E. Spain; 18 m. S. from Murcia; p. *9,270.*

Fuente de Cantos, *industl. t.*, Badajoz, Spain; p. *10,982.*

Fuente-Ovejuna, *t.*, Cordoba, Spain; ctr. of lead-mining dist.

Fuerteventura, *I.*, Canary gr.; a. 663 sq. m.; p. *14,069.*

Fujiyama, extinct volcano, Japan, 60 m. S.W. of Tokyo; pilgrim resort; alt. 12,395 ft.

Fukien, *prov.*, China; cap. Foochow (Minhow); tea, rice, cotton, sugar, tobacco; paper, coal, gold, silver; a. 45,845 sq. m.; p. (1953) *13,142,721.*

Fukui, *t.*, Honshu, Japan; silk, paper; p. (1950) *100,691.*

Fukuoka, *t.*, Kyushu, Japan; silk-weaving; p. (1950) *392,649.*

Fukuyama, *t.*, S. Hokkaido, Japan; p. (1947) *56,653.*

Fulda, *c.*, Hessen, Germany; nr. Cassel; on R. Fulda; palace, abbey; textiles, metallurgy, rubber; route ctr.; p. (estd. 1954) *43,000.*

Fulda, *R.*, Central Germany; with the Werra forms the R. Weser.

Fulham, *metropolitan bor.*, London, Eng.; on R. Thames; p. (1951) *122,047.*

Fullerton, *t.*, Cal., U.S.A.; p. (1950) *13,958.*

Fulton, *t.*, Mo., U.S.A.; firebrick and shoe factories; p. (1950) *10,052.*

Fulton, *c.*, N.Y., U.S.A.; woollens, cutlery, paper; p. (1950) *13,922.*

Fulwood, *urb. dist.*, Lancs, Eng.; 2 m. N.E. of Preston; p. (1951) *13,087.*

Funchal, *t., spt., cap.*, Madeira; winter resort; wine; p. *70,000.*

Fundy, Bay of, *inlet* between Nova Scotia and New Brunswick, Canada.

Furneaux, *Is.*, gr. in Bass Strait, belonging to Tasmania.

Furnes, *industl. t.*, Belgium; nr. Bruges; p. *7,569.*

Furness, *dist.*, N.W. Lancs, Eng.; between Morecambe Bay and the Irish Sea; haematite iron ore.

Fürstenwalde, *industl. t.*, Brandenburg, E. Germany; on R. Spree; metallurgy, leather; p. (estd. 1954) *21,900.*

Fürth, *t.*, Bavaria, Germany; nr. Nürnberg; toys, metallurgy, glass, paper, radio, footwear, brewing; p. (estd. 1954) *100,500.*

Fusan, *see* Pusan.

Fushiki, *t., spt.*, Honshu, Japan; on Toyama Bay to E. of Noto Peninsula; lge. coastwise tr. in rice from Koga and Toyama plains; exp. chemicals, lumber, metals; imports metals, coal, bean-cake, flax.

Fushun, *c.*, Liaoning, N. China; at foot of Changpai Shan, 22 m. S.E. of Shenyang (Mukden); most impt. coal-mines in Far East; possesses world's thickest bituminous coal seam (417 ft.) worked by deep and open-cast mines; p. (estd. 1952) *233,000.*

Fushimi, *c.*, Honshu, Japan; sub. of Kyoto; p. *29,700.*

Fusing, *c.*, Jehol, N. China; p. (estd. 1941) *166,186.*

Futa, La, *pass*, Tusco-Emilian Apennines, N. Italy; used by main road from Bologna to Florence; alt. 2,962 ft.

Futa Jalon, *upland dist.*, Senegambia, Fr. W. Africa; cap. Timbo.

Futuna and Alofi, *Is.*, S. of Wallis Is., dependency of Fr. Col. of New Caledonia; p. about *2,000.*

Fuyu, *t.*, Manchuria; on Sungari R.; agr.; p. *57,065.*

Fylde, *rural dist., geographical sub-region*, W. Lancs., Eng.; extends along W. cst. between estuaries of Ribble and Wyre; low, flat plain behind coastal sand dunes, covered by very fertile glacial deposits; intensively cultivated where drained, grain, vegetables; impt. pig and poultry rearing dist.; ch. t., Blackpool, famous holiday resort; p. (rural. dist., 1951) *16,219.*

Fyn, *second lgst. I.*, Denmark; in the Baltic Sea; a. 1,320 sq. m.; cap. Odense.

Fyne, *loch* on Argyll cst. W. Scot.; an arm of F. of Clyde; length 40 m.

Fyvie, *par.*, Aberdeen, Scot.; on R. Ythan; p. (1951) *3,006.*

Fyzabad, *t.*, Uttar Pradesh, India; sugar; p. *55,215.*

G

Gabes, *spt.*, Tunisia, on G. of Gabes, 200 m. S. of Tunis, dates, henna, wool; p. *22,512.*

Gabun, *aut. rep.* within Fr. Community, Equatorial Africa; cap. Libreville; ivory, ebony, palm-oil; a. 101,400 sq. m.; p. (1957) *404,000.*

Gadag, *t.*, Bombay, India; cotton and silk weaving; p. *25,000.*

Gadsen, *industl. t.*, Ala., U.S.A.; cotton, cars, coal, iron, steel; p. (1950) *55,725.*

Gaeta, *spt., fort*, Caserta, Italy; 40 m. N.W. of Naples; the ancient Caietae Portus; cath.; p. *22,882.*

Gaffney, *t.*, S.C., U.S.A.; limestone, textiles; p. (1950) *8,123.*

Gafsa, *t.*, Tunisia; phosphates; p. *11,320.*

Gagny, *commune*, Seine-et-Oise, France; light inds.; p. (1954) *17,255.*

Gaillac, *t.*, Tarn, France; wines; p. (1954) *8,356.*

Gaillard Cut, *excavated channel*, Panama Canal Zone; carries Panama Canal through Culebra Mtn. from L. Gatun to Pac. Oc.; length 7 m.

Gainesville, *t.*, Fla., U.S.A.; p. (1950) *26,681.*

Gainesville, *t.*, Ga., U.S.A.; p. (1950) *11,936.*

Gainesville, *t.*, Texas, U.S.A.; p. (1950) *11,246*.
Gainsborough, *mkt. t.*, *urb. dist.*, Lincs., Eng.; on R. Trent, 15 m. N.W. of Lincoln; shipping, agr. implements, engin., milling, malting, timber; p. (1951) *17,509*.
Gairdner, *L.*, S. Australia; 130 m. long, 23 m. broad.
Galápagos, *volcanic Is.*, Pac. Oc.; 600 m. W. Ecuador; administered by Ecuador; peculiar fauna and flora; guano; a. 2,868 sq. m.; p. *1,000*.
Galashiels, *burgh*, Selkirk, Scot.; on Gala Water, 2 m. above confluence with R. Tweed; tweeds, woollens; p. (1951) *12,496*.
Galati, *Black Sea pt.*, Romania, on Danube R.; naval base; engin., p. (1948) *80,411*.
Galatina, *t.*, Apulia, Italy; p. *20,300*.
Galena, *t.*, Kan., U.S.A.; lead; p. (1950) *4,029*.
Galena, *t.*, Ill., U.S.A.; lead, zinc, marble, granite; p. (1950) *4,648*.
Galesburg, *t.*, Ill., U.S.A.; engin.; p. (1950) *31,425*.
Galicia, *former Austrian prov.*, Polish 1918–39, since 1939 E. part transferred to Ukrainian S.S.R. and W., remaining Polish (provs. Kraków and Rzeszów); mountainous; agr., paper, pottery, leather.
Galicia, *old prov.*, N.W. Spain; now forming provs. of La Coruña, Lugo, Orense and Pontevedra; mountainous; dairying; mining, lead, copper, iron; p. *2,200,000*.
Galilee, *N. div.* of Palestine in Roman period, containing Capernaum, Nazareth.
Galilee, Sea of (**Lake Tiberias**) (formerly Sea of Chinnereth, L. of Gennesaret), 13 m. long; greatest width 7 m., 686 ft. below sea-level.
Galion, *t.*, Ohio, U.S.A.; mftg.; rly. ctr.; p. (1950) *9,952*.
Galla and Sidamo, *prov.*, Ethiopia.
Gallarate, *commune*, Lombardy, N. Italy; cotton weaving; p. *24,505*.
Galle, *spt.*, Ceylon; on S.W. cst.; extensive tr. in tea, coconut oil; p. (1953) *55,874*.
Galleana, *mkt. t.*, Leon Prov., Mexico; at foot of Sierra Madre Oriental, 120 m. S. of Monterrey; focus of tr. between tropical lowlands and high plateau.
Gallego, *R.*, N.E. Spain; rises in Pyrenees, flows S. to R. Ebro at Zaragoza; R. provides water for irrigation around Zaragoza; valley used by main rly. across Pyrenees from Pau (France) to Zaragoza; length 110 m.
Gallegos, *t.*, *cap.*, Santa Cruz terr., Argentina; p. *7,003*.
Gallipoli, *spt.*, Italy; on E. shore G. of Taranto; p. *12,200*.
Gallipoli, *see* **Gelibolu**.
Gallipolis, *t.*, Ohio, U.S.A.; p. (1950) *7,871*.
Gällivare, *t.*, N. Sweden; inside Arctic Circle, 120 m. N.W. of Lulea; iron ore; p. *21,666*.
Galloway, *dist.*, S.W. Scot.; inc. the cos. of Wigtown and Kirkcudbright.
Galloway, Mull of, extreme S.W. point of Scot.
Gallup, *t.*, N.M., U.S.A.; coal, wool, sheep, cattle rearing; p. (1950) *9,133*.
Galston, *burgh*, Ayr, Scot.; on R. Irvine, nr. Kilmarnock; hosiery, lace; p. (1951) *4,560*.
Galt, *t.*, Ontario, Canada; mnfs.; p. *15,346*.
Galty Mtns., Tipperary, Ireland; alt. 3,000 ft.
Galveston, *spt.*, Texas, U.S.A.; on I. in G. of Mexico; gr. cotton pt.; mills, foundries; p. (1950) *66,568*.
Galway, *co.*, Galway Bay, Connacht, Ireland; fishery, cattle, marble quarrying; a. 2,452 sq. m.; p. (1956) *155,441*.
Galway, *t.*, *cap.*, Galway, Ireland; p. (1951) *21,316*.
Gambela, *tr. sta.*, leased to Sudan by Ethiopia; p. *15,013*.
Gambia, *Brit. Col.* and *Protectorate*, W. Africa; narrow terr., average 20 m. wide, extends 200 m. inland astride R. Gambia; hot all year, summer rain; savannah grassland; ground-nuts, palm-kernels, bees-wax, hides; cap. Bathurst; a. 29 sq. m. (col.), 3,974 sq. m. (protectorate); p. col. (estd. 1956) *28,820*; prot. (estd. 1957) *237,084*.
Gambia, *R.*, Fr. W. Africa and Gambia Col. and Protectorate; rises in Futa Jallon Plateau, flows N. and W. into Atl. Oc. at Bathurst; forms main means of communication through Gambia Protectorate.
Gananoque, *t.*, Ontario, Canada; p. *4,044*.
Gander, *airport*, Newfoundland, Canada; p. (1956) *4,929*.
Gandia, *t.*, Valencia, Spain; p. *19,975*.
Ganges, *gr. sacred R.*, India; rises in Himalayas and flows to Bay of Bengal, by several delta mouths, on one of which stands Calcutta. Delta very fertile and densely populated. Navigable for lge. ships from Allahabad; length 1,500 m.
Gangpur, former *st.*, now inc. in Bihar st., Indian Union; agr., rice; a. 2,477 sq. m.; p. (1941) *398,771*.
Ganjam, *t.*, Orissa, India; S.W. of Cuttack; p. *5,100*.
Gao, *t.*, Fr. W. Africa; p. *9,000*.
Gap, *c.*, Hautes Alpes, S.E. France; silk and other textiles; p. (1954) *12,317*.
Gard, *Mediterranean dep.*, France; cap., Nîmes; vines, olives, sericulture; a. 2,270 sq. m.; p. (1954) *396,742*.
Garda, *L.*, between Lombardy and Venezia, Italy; a. 143 sq. m.; greatest depth, 1,135 ft.
Garden City, *t.*, N.Y., U.S.A.; p. (1950) *14,486*.
Gardena, *t.*, S.W. Cal., U.S.A.; mkt.-gardening; p. (1950) *14,405*.
Gardiner, *t.*, Me., U.S.A.; p. (1950) *6,649*.
Gardner, *t.*, Mass., U.S.A.; chair mftg.; p. (1950) *19,581*.
Garelochhead, *vil.*, Dunbarton, Scot.; summer resort; p. *1,300*.
Garfield, *t.*, N.J., U.S.A., p. (1950) *27,550*
Garfield Heights, *t.*, Ohio, U.S.A.; iron, steel, oil refineries, abrasives; p. (1950) *21,662*.
Garhwal, *dist.*, Uttar Pradesh, India; on S. slopes of Himalayas; forested; tea, grain, coarse cloth; a. 5,612 sq. m.; p. (1941) *485,000*.
Garmisch-Partenkirchen, *t.*, Bavaria, Germany; nr. Austrian frontier; spa and winter sports. p. (estd. 1954), *25,700*.
Garoet, *t.*, W. Java, Indonesia; mtn. resort; p. *24,219*.
Garo Hills, *mountainous dist.*, Assam, India; a. 3,140 sq. m.; dense forests; p. *180,000*.
Garonne, *R.*, S.W. France; rises at foot of Mt Maladetta (Pyrenees), and enters the Gironde estuary 20 m. below Bordeaux; length 350 m.
Garonne, Haute, *dep.*, S. France; a. 2,458 sq. m.; p. (1954) *525,669*.
Garrigue, *region*, Languedoc, S. France; low limestone hills, run N.E. to S.W., W. of Rhône delta; semi-arid; scanty vegetation; winter pasture for sheep, olives; Montpellier, Nîmes located on S. flank.
Garston, *spt.*, Mersey estuary, Lancs, Eng.; docks; p. *28,000*.
Gary, *t.*, Ind., U.S.A.; at S. end of L. Michigan; steel, tin-plate; p. (1950) *133,911*.
Gas City, *t.*, Ind., U.S.A.; glass; p. (1950) *3,787*.
Gascony, *ancient prov.*, *duchy*, S.W. France.
Gaspé, *peninsula*, Quebec, Canada; on S. side of St. Lawrence.
Gastein, *t.*, Salzburg, Austria; mineral springs.
Gastonia, *c.*, N.C., U.S.A.; p. (1950) *23,069*.
Gateshead, *t.*, *co. bor.*, Durham, Eng.; on R. Tyne, opposite Newcastle; engin.; p. (1951) *115,017*.
Gatesville, *t.*, Texas, U.S.A.; cotton processing; p. (1950) *3,856*.
Gatineau, *R.*, Canada; trib. of Ottawa R., which it joins nr. Ottawa; length 300 m.
Gatooma, *t.*, S. Rhodesia; farming, mining and cotton mnfs., gold, mineral deposits; p. *6,600* (incl. *2,000* Europeans).
Gatun, *artificial L.*, Panama Canal Zone, Central America; passed through by Panama Canal; alt. 40 ft. above Caribbean Sea; a. 250 sq. m.
Gatwick, Surrey–Sussex border; 25 m. S. London; 1st airport in world where trunk road, main rly. line and air facilities combined in one unit.
Gauhati, *t.*, Assam, India; silk, cotton, lace, oil refinery; p. *17,000*.
Gauri-Sankar, *mtn.* in Himalayas; 35 m. W. of Mt. Everest; alt. 23,440 ft.
Gävle, *spt.*, Sweden; textiles, sail-cloth; exp. wood-pulp; p. (1950) *46,894*.
Gävleborg, *co.*, Sweden; ch. t., Gävle; a. 7,610 sq. m.; p. (1950) *285,024*.
Gawler, *t.*, S. Australia; iron foundries; p. *4,427*.
Gaya, *t.*, Bihar, India; famous Buddhist pilgrim ctr.; cottons, silks; p. (1951) *133,700*.
Gaza, *spt.*, Israel; exp. cereals, wool; p. (1946) *37,820*.
Gayyarah, Mosul, Iraq; bitumen refinery.
Gaziantep, *t.*, Turkey; S.W. of Malatya; p. (1945) *62,873*.
Gdansk. *prov.* (*voivodship*), Poland; ch. t. Gdansk (Danzig); a. 4,290 sq.m.; p. (estd. 1950) *898,939*.
Gdansk (**Danzig**), *spt.*, Poland; on R. Vistula;

formerly Polish, Prussian (1713–1919), constituted Free City by Treaty of Versailles; 1939–45 German; restored to Poland 1945; shipbldg., distilling, brewing, machin.; p. (1957) *266,000*.

Gdynia, *spt.*, Poland; especially constructed by Poles after 1919, when Danzig was Free City; exp. dairy produce, timber, matches; p. (1957) *137,000*.

Géant, Aiguille du, *mtn.* in Savoy Alps, France; alt. 13,170 ft.; nearby Col du Géant, pass from Chamonix to Italy, alt. 11,145 ft.

Geelong, *spt.*, Port Phillip, Victoria, Australia; fine harbour; tr. in flour, wool; p. (1957) *82,820*.

Geestemünde, *spt.*, Germany, at mouth of R. Weser; fishing; p. *20,000*.

Geislingen, *t.*, Württemberg, Germany; p. *17,500*.

Gelderland, *prov.*, Netherlands; S.E. of Zuider Zee; a. 1,939 sq. m.; cap. Arnhem; cereals, tobacco; cattle rearing; p. *1,039,025*.

Gelibolu, (Gallipoli), *t.* and *peninsula* on the Dardanelles, Turkey; vines, sericulture; scene of unsuccessful landing by British and Anzac troops 1915; p. *16,496*.

Gelligaer, *t.*, *urb. dist.*, Glamorgan, Wales; 4 m. N.E. of Pontypridd; mining; p. (1951) *36,159*.

Gelsenkirchen, *t.*, N. Rhine–Westphalia, Germany; nr. Dortmund; collieries, ironwks., glass, chemicals; p. (1950) *315,460*.

Gemmi, *mtn. pass* across Swiss Alps, Valais to Berne; alt. 7,600 ft.

Gemona, *t.*, Italy; in Plain of Lombardy, nr. Udine; p. *10,000*.

General Pico, *t.*, S. central Argentina; grain, cattle; p. *14,500*.

Geneva, *c.*, *cap. can.* Geneva, Switzerland; at W. end of L. of Geneva, the Rhône flows through the c.; cath., univ.; former H.Q. of League of Nations, H.Q. of I.L.O., W.H.O., I.T.U., International Red Cross; watch-mkg., jewellery, elec. goods, chocolate; tourist resort; p. (1950) *145,473*.

Geneva, *can.*, Switzerland; a. 109 sq. m.; p. (1950) *202,918*.

Geneva, *L.*, S.W. corner of Switzerland; length 40 m., greatest breadth 8¾ m.; a. 108 sq. m.

Geneva, *t.*, Ill., U.S.A.; foundries, car parts; livestock; p. (1950) *5,139*.

Geneva, *t.*, N.Y., U.S.A.; engin.; p. (1950) *17,144*.

Génissiat, France; site of gr. barrage and hydro-elec. power sta. on Rhône below Geneva; completed 1950.

Genk, *t.*, Limburg, Belgium; (est. 1957) *46,497*.

Gennevilliers, *t.*, Seine, France; p. (1954) *33,137*.

Genoa, *maritime prov.*, Liguria, N. Italy; a. 1,582 sq. m.; p.(1951) *921,723*.

Genoa (Genova), *spt.*, and *comm. c.*, situated on G. of Genoa; fine palaces, cath., univ.; shipbldg., engin., tanning, sugar, textiles; p. (1951) *680,563*.

Gentilly, *t.*, Seine, France; p. (1954) *17,497*.

George, *t.*, C. of Good Hope, S. Africa; between C. Agulhas and Port Elizabeth; p. *11,987*.

Georgetown, *cap.*, Brit. Guiana, S. America; on Demerara R.; exp. sugar, cocoa, coffee, timber, gold, diamonds, bauxite; p. (1957) *120,000*.

Georgetown, *t.*, S.C., U.S.A.; fish, lumber, cotton; p. (1950) *6,004*.

Georgetown, *t.*, Washington D.C., U.S.A.; on R. Potomac; univ., cath.

Georgetown, *c.*, *spt.*, Penang, Malaya; p. *189,068*.

Georgia, *st.*, U.S.A.; on Atlantic cst.; one-third of population is coloured; forested, agr.: cotton, tobacco, maize, peaches, kaolin, fuller's earth, iron-ore; chief ts.: Atlanta (cap.) and Savannah; a. 58,876 sq. m.; p. (1950) *3,444,578*.

Georgia, *constituent rep.*, U.S.S.R.; maize, cotton, tobacco, silk; rich manganese-ore beds; agr.: wheat, forests, timber; Stalin a native of this state; cap. Tbilisi; a. 37,570 sq. m.; p. (1959) *4,049,000*.

Georgian Bay, *lge. inlet*, Ontario, Canada; E. shore of L. Huron; many impt. lake pts. (Owen Sound, Parry Sound) where Prairie wheat is transhipped to rly. for despatch to Montreal; a. approx. 4,500 sq m.

Georgievsk, *t.*, S. Stavropol Terr., U.S.S.R.; tr. ctr. for agr.; large cattle fairs; p. (1939) *21,629*.

Gera, *t.*, Thuringia, Germany; lignite, woollens, printing; p. (1946) *101,000*.

Geraldton, *spt.*, W. Australia; 306 m. from Perth; in agr. and pastoral dist.; exp. gold, copper, wool; p. (1957) *9,094*.

Germany, after defeat in Second World War divided into E. and W. Germany. W. Germany is Federal st. (declared sovereign May 5, 1955) of nine Länder, Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North Rhine-Westphalia, Hesse, Rhineland Palatinate, Baden-Württemberg, and Bavaria. Previously divided into British, American, and French zones; a. 94,716 sq. m.; admin. ctr. Bonn; Saar incorporated, 1956; a. 991 sq. m.; p. (1959) *52,500,000* inc. Saar, excluding W. Berlin; E. Germany comprises old provinces of Mecklenberg, Saxony, Thuringia, and those parts of Brandenburg, Pomerania, and Silesia west of the Oder–Neisse line. Previously the Soviet zone, became sovereign st., March 25, 1954; a. 41,571 sq. m.; p. (1954) *17,800,000*. Berlin under four-Power control; ch. German inds.: agr.: rye, oats, wheat, potatoes, sugar-beet, wines; pastoral; cattle, pigs, sheep; forests, timber; minerals; coal, lignite, iron, potash, copper, zinc, salt; mnfs., machine., shpbldg., textiles, chemicals, dyes, printing, etc.; commerce; communications very good.

Germiston, *t.*, Transvaal, S. Africa; nr. Johannesburg; gold-mining; p. (1951) *149,982*.

Gerona, *maritime prov.*, N.E. Spain; cap. G.; textiles, coal, paper; a. 2,264 sq. m.; p. (1950) *327,321*.

Gerona, *mun.*, Luzon, Philippine Is.; rice, sugar, pineapples; p. *20,892*.

Gerrard's Cross, *t.*, S.E. Bucks, Eng.; 9 m. E. of High Wycombe; residtl.; projected nuclear power sta. for aircraft; p. (1951) *2,942*.

Gers, *dep.*, S.W. France; cap. Auch; grain, vines, brandy; a. 2,429 sq. m.; p. (1954) *185,111*.

Gers, *R.*, rising in the Pyrenees, flows to the Garonne; length 75 m.

Gettysburg, *t.*, Penns., U.S.A.; Federal victory 1863; granite; p. (1950) *7,046*.

Gevelsberg, *c.*, Westphalia, Germany; iron stoves; p. *20,704*.

Geyser Springs, *summer resort* Cal., U.S.A.; 90 m. N.W. of San Francisco.

Gezira, *dist.*, Sudan, N.E. Africa; situated between Blue and White Niles above confluence at Khartoum; approx. 4,700 sq. m. capable of irrigation by water drawn from Blue Nile at Sennar Dam; large-scale growing of high-quality cotton; total a. approx. 7,800 sq. m.

Ghadames, *oasis*, Sahara Desert, Libya; N. Africa; at point where terr. of Tunis, Algeria, Libya converge 300 m. S.W. of Tripoli; impt. focus of caravan routes.

Ghana, W. Africa; sovereign and independent st. within British Commonwealth, 6 March 1957; agr.: cocoa, palm-oil, ground-nuts; mahogany, manganese, gold, diamonds; cap. Accra; total a. 91,843 sq. m.; p. (1952) *4,409,000* (inc. *6,000* non-Africans).

Ghardaia, *terr.*, S. Algeria, N. Africa; caravan tr.; dates; p. *166,366*.

Ghats, E and W., *two mtn. ranges* bordering the triangular upland of S. India, the Deccan; alt. of ch. summits, 4,700–7,000 ft.

Ghazipur, *t.*, N. India; on Ganges R., E. of Benares; agr. school; p. *25,000*.

Ghazni, *fortfd. mtn. t.*, Afghanistan; 78 m. S.W. of Kabul; gr. tr. ctr.; cap. of the Empire of Mahmud, c. A.D. 1000; p. *10,500*.

Ghent, *c.*, Belgium; cap. of E. Flanders, on R. Scheldt; cath., univ.; extensive cotton, woollen, sugar inds.; p. (estd. 1957) *161,382*.

Ghernigap, *t.*, Victoria, Australia; 55 m. from Melbourne; p. *4,500*.

Giant Mtns., *see* **Riesengebirge**.

Giant's Causeway, *famous basaltic columns*, on promontory of N. cst. of Antrim, Ireland.

Giarre, *t.*, Sicily, Italy; nr. Mt. Etna; industl.; p. *20,050*.

Gibare, *t.*, Oriente prov., Cuba, W. Indies; exp. bananas; p. *8,045*.

Gibraltar, *Brit. fortress and naval base* of gr. strategic importance, W. end of Mediterranean; on rocky peninsula (1,396 ft.), extreme S. of Spain; captured by British in 1704; a. 2¼ sq. m.; civilian p. (1956) *25,000*.

Gibraltar, Strait of, connects Atlantic and Mediterranean; its narrowest breadth is 9 m.

Giessen, *t.*, Hesse, Germany; on R. Lahn; machin., iron, tobacco; univ.; p. (estd. 1954) *49,700*.
Gifu, *t.*, Central Honshu, Japan; silk; paper; p. (1950) *211,845*.
Gigha, *I.*, Argyll, Scot.; off W. cst.; 6 m. long, 2 m. wide; p. (with Cara) *243*.
Gijón, *spt.*, Oviedo, Spain; on Bay of Biscay; fine harbour; tobacco, petroleum, coal, earthenware; p. (1950) *110,935*.
Gila, *R.*, New Mexico and Arizona, U.S.A.; trib. of Rio Colorado; water used for irrigation in Imperial Valley; length 650 m.
Gilan, *prov.*, N. Persia; on S.W. shore Caspian Sea; a. 4,673 sq. m.; cap. Resht.
Gilbert and Ellice Islands Colony, *gr. of Is.* (Brit.), Micronesia, Pac. Oc.; ch. crops; pandanas fruit and coconuts; exp. phosphates and copra; a. 369 sq. m.; p. (estd. 1956) *39,102*.
Gilford, *t.*, Down, N. Ireland; linen; p. (1951) *813*.
Gilgit, *cap.*, G. extreme N.W. dist. of Kashmir.
Gilgit, *R.*, of the Punjab rising in Chitral, trib. of the Indus, flowing along the Gilgit valley into Kashmir.
Gill, Lough, *L.*, on borders of cos. Sligo and Leitrim, Ireland.
Gillespie, *t.*, Ill., U.S.A.; coal; p. (1950) *4,105*.
Gillingham, *t.*, *mun. bor.*, Kent, Eng.; 2 m. E. of Chatham; cherry orchards, cement, light inds.; p. (1951) *68,099*.
Gilly, *t.*, Hainaut, Belgium, nr. Charleroi; coal; p. *22,610*.
Gilolo I., *see* **Halmahera I.**
Gilp Loch, Argyll, Scot.; inlet of Loch Fyne, at head of Crinan Canal.
Gioja del Colle, *c.*, Bari, S. Italy; olive oil, wine, wool; p. *24,000*.
Giovinazzo, *spt.*, S. Italy; on the Adriatic, N. of Bari; p. *12,150*.
Gippsland, *dist.*, S.E. Victoria, Australia; a. 13,900 sq. m.; mountainous; farming, grazing; coal.
Girardot, *t.*, Colombia, S. America; impt. R. pt. and airport on upper course of R. Magdalena, 685 m. upstream from Caribbean Sea; linked by rly. (70 m.) to Bogotá.
Giresun, *spt.*, Black Sea, Turkey, W. of Trabzon; p. *12,431*.
Girga, *t.*, Upper Egypt; on R. Nile; p. *1,000*.
Girga, *admin. div.*, Upper Egypt, N.E. Africa; a. 595 sq. m.; p. (1947) *1,288,425*.
Girgenti, (same as Agrigento, *q.v.*), *t.*, S. Sicily, Italy; famous for its Greek temples.
Girishk, *t.*, Afghanistan; on Helmand R.; ctr. of agr. dist.
Gironde, *dep.*, France; vineyards, grain, fruit, wines; cap. Bordeaux; a. 4,140 sq. m.; p. (1954) *896,517*.
Gironde, *R.*, *estuary*, S.W. France; formed by junction of Rs. Garonne and Dordogne; navigable to Pauillac.
Girton *par.*, nr. Cambridge, Eng.; women's college.
Girvan, *burgh*, Ayr, Scot.; on F. of Clyde, 18 m. S.W. of Ayr; summer resort; p. (1951) *5,990*.
Gisborne, *spt.* N.I., N.Z.; on Poverty Bay, 60 m. N.E. of Napier; freezing-wks.; p. (estd. 1958) *23,400*.
Gisburn, *t.*, W.R. Yorks; on R. Ribble, nr. Clitheroe.
Giugliano, *t.*, Italy; N.W. of Naples; mnfs.; p. *20,500*. [*20,000*.
Giulianova, *t.*, Teramo, Italy; fruit, grain; p.
Giurgiu, *pt.*, Romania; on R. Danube; opposite Ruse; good tr.; timber; p. *36,798*.
Givet, *t.*, Ardennes, N.E. France; on R. Meuse; tanneries; p. *6,000*.
Givors, *t.*, Rhône dep., France; on Rhône R., 10 m. S. of Lyons; mnfs.; p. (1954) *14,242*.
Giza, *admin. div.*, Egypt; cap. Giza; a. 392 sq. m.; p. (1947) *820,241*.
Giza, *t.*, Lower Egypt; on the Nile, 3 m. S.W. of Cairo; nr. pyramids of Khafra (Chephren), Khufu (Cheops) and Men-ka-va; also the Sphinx; contains Museum of Egyptian antiquities; p. (1947) *68,520*.
Gjinokastër (Argyrocastro), *prefecture*, Albania; cap. G.; p. (estd.) *159,695*.
Gjövik, *t.*, S. Norway; on L. Mjösa; dairying; p. *5,072*.
Gjuhëzës, C. (**Glossa C.**), Albania, Strait of Otranto.
Glace Bay, *t.*, Nova Scotia, Canada; coal; p. (1956) *24,416*.
Gladbeck, *t.*, N. Rhine–Westphalia, Germany; N. of Essen; coal-mining, chemicals, rly. junction; p. (estd. 1954) *73,600*.
Gladewater, *t.*, N.E. Texas, U.S.A.; oil, lumber; p. (1950) *5,305*.
Gladstone, *t.*, Queensland, Australia; p. (1957) *7,300*.
Gladstone, *t.*, S. Mich., U.S.A.; harbour; mnfs. sports equipment; p. (1950) *4,831*.
Glamorgan, *co.*, S. Wales; immense coal and iron deposits; copper and tin smelting; machin.; chemicals; co. t. Cardiff; a. 813 sq. m.; p. (1951) *1,201,989*.
Glamorgan, Vale of, *see* **Gwent, Plain of.**
Glarus, *can.*, Switzerland; E. of Schwyz; a. 264 sq. m.; sheep, cheese, cottons; p. (1950) *37,663*.
Glarus, *c.*, *cap.*, can. G., Switzerland; on R. Linth, nr. Weesen; p. (1941) *5,266*.
Glasgow, *c. burgh*, Lanark, Scot.; on R. Clyde; third lgst. c. in Gr. Britain; many thriving mnfs.; shipbldg., heavy and light engin., printing; comm. and musical ctr. of Scot.; univ. and famous cath.; p. (1951) *1,089,555*.
Glasport, *bor.*, Penns., U.S.A.; tools, steel, hoops, glass; p. (1950) *8,707*.
Glastonbury, *t.*, *mun. bor.*, Somerset, Eng.; at foot of Mendip Hills, 7 m. S.E. of Wells; noted 8th-century abbey with legend of thorn planted by Joseph of Arimathea, also adjacent to Avalon, burial I. of King Arthur; gloves, sheepskin rug and slipper mnfs.; p. (1951) *5,081*.
Glatz, *see* **Kladzko.**
Glauchau, *t.*, Saxony, Germany; on R. Mulde; woollens, calicoes, dyes, machin.; p. (estd. 1954) *35,100*.
Glazov, *t.*, R.S.F.S.R., in Urals; p. (1959) *59,000*.
Gleiwitz, *see* **Gliwice.**
Glen, The, beautiful valley and resort in White Mountain dist. of New Hampshire, U.S.A.
Glen Affric, Inverness, Scot.; drained E. to Moray Firth; hydro-elec. scheme.
Glen Garry, Inverness, Scot.; used by Perth to Inverness rly. on S. approach to Drumochter Pass.
Glen Innes, *hill t.*, N.S.W., Australia; alt. 3,518 ft.; pastoral and agr. dist.; p. *5,462*.
Glen More, Scottish Valley traversed by Caledonian Canal, from Fort William to Inverness.
Glen Roy, Inverness, Scot.; 15 m. N.E. of Fort William; remarkable terraces, remains of series of glacial lakes.
Glen Spean, Inverness, Scot.; used by Glasgow to Fort William rly.
Glencoe, Argyll, Scot.; S.E. of Ballachulish; scene of massacre of MacDonalds, 1692.
Glendale, *t.*, Cal., U.S.A.; p. (1950) *95,702*.
Glendalough, *valley*, Wicklow, Ireland; scenic beauty; ecclesiastical ruins; tourists.
Glenelg, *R.*, S.W. Victoria, Australia; length 200 m.
Glenelg, *t.*, S. Australia; on Holdfast Bay, nr. Adelaide
Glenluce, *vil.*, Wigtown, Scot.; at head of Luce Bay; p. *806*.
Glenolden, *bor.*, Penns., U.S.A.; surgical instruments; p. (1950) *6,450*.
Glenora, *t.*, B.C., Canada; on R. Stikine.
Glenrothes, *t.*, Fifeshire, Scot.; one of the "New Towns" designated 1948; coal, transistor factory, mng. machin.; p. (estd. 1959) *10,200*.
Glens Falls, *t.*, N.Y., U.S.A.; on Hudson R.; lime kilns and many mnfs.; lumber, paper; p. (1950) *19,610*.
Glenside, *t.*, S.E. Penns., U.S.A.; mnfs. rubber and wood prod.; paints, toys; p. (1950) *9,654*.
Glittertind, *mtn.*, Opland co., S. Norway; highest peak in Scandinavia; alt. 8,140 ft.
Gliwice, (Gleiwitz), *t.*, Upper Silesia, Poland; German before 1945; nr. Katowice; chemicals, iron and steel; p. (1957) *129,000*.
Globe, *t.*, Ariz., U.S.A.; copper, manganese, gold, silver, vanadium, tungsten mining; p. (1950) *6,419*.
Glogów (Glogau), *c.*, Poland, German before 1945; on R. Odra; cath.; sugar, wood, iron inds.; rly. junction; p. (1946) *1,681*.
Glommen R., Norway; lgst. Norwegian R., flows S. in Skaggerak.
Glossa, C. (*see* **Gjiuhëzës, C.**), *strait*, Otranto, Albania.
Glossop, *mkt. t.*, *mun. bor.*, Derby, Eng.; at W. foot of Pennines, 12 m. S.E. of Manchester;

cotton, paper, food canning; p. (1951) *18,014*.
Gloucester, *co.*, W. of Eng.; fertile valleys, Cotswold Hills; dairying, cheese, sheep, coal machin., textiles, glass, broadcloth; a. 1,257 sq. m.; p. (1951) *938,618*.
Gloucester, *cath. c.*, *co. bor.*, on R. Severn; aircraft mftg. and repair, wagon wks., matches; p. (1951) *67,268*.
Gloucester, *t.*, Mass., U.S.A.; fishing; granite; p. (1950) *25,167*.
Gloversville, *c.*, N.Y., U.S.A.; gloves; p. (1950) *23,634*.
Glyder Fach, *mtn.*, Caernarvonsh., N. Wales; alt. 3,262 ft.
Glyder Fawr, *mtn.*, Caernarvonsh., N. Wales; alt. 3,279 ft.
Glyncorrwg, *urb. dist.*, Glamorgan, Wales; 4 m. N. of Maesteg; coal, iron; p. (1951) *9,236*.
Gmünd, *t.*, Austria, on Czechoslovakian border.
Gmünd, *t.*, Baden-Württemberg, Germany; on R. Rems, nr. Stuttgart; clocks, metallurgy, glass; p. (estd. 1954) *34,100*.
Gniezno (Gnesen), *mftg. t.*, Poland; E. of Poznan; cath.; linen; p. *30,292*.
Gôa, *Portuguese terr.*, W. cst., India; farming and fishing, coconut prod., spices, iron and manganese; cap. Nova Gôa; a. about 1,500 sq. m.; p. *c. 650,000* (Christians and Hindus).
Goajira, *peninsula* on G. of Maracaibo, N. cst. of S. America; crossed by bdy. of Venezuela and Colombia.
Goalunda, *pt.*, Pakistan; at junction of Rs. Ganges and Brahmaputra.
Goat Fell, *mtn.*, I. of Arran, Bute, Scot.; alt. 2,866 ft.
Gobi, steppes and stony or sandy desert in Central Asia; divided into two principal divs.; Shamo in Central Mongolia, and the basins of the Tarim, E. Turkestan; length about 1,500 m. (E. to W.), breadth 500–700 m.
Godalming, *t.*, *mun. bor.*, Surrey, Eng.; 4 m. S.W. of Guildford; 1st public supply of elec. 1881; tanning, timber yards, corn mills; Charterhouse School; p. (1951) *14,239*.
Godavari, *R.*, India; flows E. across Deccan to Bay of Bengal; forms large delta; length 900 m.
Goderich, *pt.*, Ontario, Canada; on S.E. cst. of L. Huron; transh. wheat from prairies; p. *4,557*.
Godesberg, Bad, N. Rhine-Westphalia, Germany; nr. Bonn; famous Spa; chalybeate springs; p. (estd. 1954) *46,700*.
Godhavn, Danish settlement, Disco I., W. of Greenland; whaling; scientific sta.
Godhra, *t.*, Bombay, W. Indian Union; timber tr.; tanneries; p. (1941) *35,110*.
Godmanchester, *sm. t.*, *mun. bor.*, Hunts, Eng.; on R. Ouse; clothing, printing; p. (1951) *2,499*.
Godstone, *vil.*, *rural dist.*, Surrey, Eng.; nr. Reigate; p. (1951 rural dist.) *32,815*.
Godthaab, *t.*, Greenland; first Danish col. 1721; p. *1,313*.
Godwin Austen (K^2), **Mt.**, Himalaya, second highest in the world; alt. 28,250 ft. Summit reached by Prof. Desio in July 1954. Mt. named Chobrum.
Gogo, *spt.*, Bombay, India; on G. of Cambay.
Gogra, *sacred R.*, India; rising in Tibet, trib. of Ganges; length 600 m.
Goiánia, *cap.*, Goiás State, Brazil; p. *9,828*.
Goiás, *st.*, Central Brazil; mountainous, forested; stock raising; tobacco; gold, diamonds; cap. Goiánia, on Vermelho R.; a. 240,334 sq. m.; p. (1950) *1,234,740*.
Golborne, *t.*, *urb. dist.*, Lancs, Eng.; p. (1951) *16,876*.
Golconda, *fort and ruined c.*, nr. Hyderabad, S. India; famous for diamonds in former days and mausoleums of ancient kings.
Gold Coast, *see* **Ghana**.
Golden, *c.*, Col., U.S.A.; nr. Denver; p. (1950) *5,238*
Golden Gate, entrance of Bay of San Francisco, California, U.S.A.; famed Golden Gate Bridge, opened 1937.
Golden Horn, *peninsula* on the Bosporus, forming the harbour of Istanbul.
Golden Vale, *dist.*, Limerick, Tipperary, Ireland; lies between Slieve Bloom Mtns. and Galtee Mtns., drained W. to Shannon and E. to Suir; rich farming a., beef and dairy cattle, pigs.
Goldingen, *t.*, Latvia, U.S.S.R.; on R. Windau.
Goldsboro, *t.*, N.C., U.S.A.; on Neuse R.; cotton, tobacco; p. (1950) *21,454*.
Golspie, *sm. fishing pt.*, E. cst., Sutherland, Scot.
Gomal Pass, from Afghanistan to W. Punjab, Pakistan, over Sulaiman mtns.
Gomel, *t.*, Byelorussia S.S.R.; on R. Sozh; grain and timber tr., paper; p. (1959) *166,000*.
Gomera, *I.*, Canaries; 13 m. S.W. Tenerife; cap. San Sebastian.
Gometray I., Hebrides, included in co. Argyll, Scot.; fishing, sta., and harbour.
Gonaives, *spt.*, Haiti, W. Indies; on W. cst.; p. *21,000*.
Gondal, *t.*, Bombay, India; p. *267,048*.
Gondar, *t.*, Amhara prov., Ethiopia; p. *22,000*.
Gonzaga, *t.*, Mantua, N. Italy; p. *9,950*.
Good Hope, *t.*, N.W. Terr., Canada; on Mackenzie R.
Good Hope, C. of, *see* **C. of Good Hope**.
Goodenough Bay, *inlet*, N. coast of Papua, New Guinea, E. Indies.
Goodwick, *see* **Fishguard and Goodwick**.
Goodwin Sands, *dangerous sand-banks* off E. cst. of Kent, Eng.; shielding the Down roadstead.
Goole, *t. mun. bor.*, W.R. Yorks, Eng.; second pt. to Hull on Humber est.; iron, shipbldg., flour milling, fertilisers, alum and dextrine mftg.; p. (1951) *19,227*.
Goose Bay, *t.*, Labrador, Canada; on Hamilton R.
Göppingen, *t.*, Baden-Württemberg, Germany; between Ulm and Stuttgart; machin., iron, wood, chemicals; p. (estd. 1954) *41,100*.
Gorakhpur, *t.*, Uttar Pradesh, India; on the Rapti R., 100 m. N. of Benares; grain, timber; Govt. agr. school; p. (1951) *132,436*.
Gordon, *t.*, Victoria, Australia; mining and agr. dist.
Gordon Bennett, *mtn.*, in Ruwenzori range, Central Africa; nr. L. Albert Nyanza; alt. 16,000 ft.
Gore, *t.*, Otago, S.I., N.Z.; p. (1951) *5,548*.
Gorgonzola, *t.*, N. Italy; 12 m. N.E. of Milan, famous for its cheese; p. *5,725*.
Gorham, *t.*, Me., U.S.A.; p. (1950) *6,146*.
Gori, *t.*, Georgia, U.S.S.R.; grain, timber; p. (1939) *12,820*.
Gorinchem, *t.*, S. Holland, Netherlands; p. *14,433*.
Goring, *t.*, on R. Thames, Oxford, Eng.; p. *1,989*.
Gorki (formerly **Nizhni-Novgorod**), *t.*, R.S.F.S.R.; at confluence of Rs. Oka and Volga; gr. comm. ctr., noted for its fairs; engin., chemicals, petroleum refining, steel, textiles; p. (1959) *942,000*.
Gorkum or **Gorcum**, *t.*, Netherlands; nr. Rotterdam on the Merewede Canal.
Gorleston, Norfolk, Eng.; at mouth of R. Yare; seaside resort; inc. in co. bor. of Gt. Yarmouth.
Görlitz, *t.*, Saxony, Germany; on W. Neisse R.; E. part transferred to Poland 1945, re-named Zgorzelice; iron, wood, metallurgy, machin.; p. (estd. 1954) *90,000*.
Gorlovka, *t.*, Ukrainian S.S.R.; coal, chemicals, engin.; p. (1959) *293,000*.
Gorodok Yageloski, *t.* Ukrainian S.S.R.; tr. in flax, wheat; p. *15,015*.
Gorseinon, *vil.*, Glamorgan, S. Wales; nr. Loughour estuary, 4 m. N.W. of Swansea; steel-wks., zinc refineries.
Gort, *rural dist.*, Galway, Ireland; p. (1946) *9,374*.
Gorizia (Görz), *c.*, cap. Gorizia prov., N.E. Italy, cas.; agr. mkt., fruit, wine; cotton mills, textile mach.
Göschenen, *vil.*, Switzerland; at W. end of St. Gotthard tunnel.
Gosford, *t.*, N.S.W., Australia; 50 m. N. of Sydney; p. *4,413*.
Gosforth, *t.*, *urb. dist.*, sub. to Newcastle-on-Tyne, Eng.; coal; p. (1951) *24,424*.
Goshen, *c.*, Ind., U.S.A.; p. (1950) *13,003*.
Goslar, *t.*, Lower Saxony, Germany; at foot of Harz Mtns.; building materials, textiles, wood inds.; rly. junction; p. (estd. 1954) *41,400*.
Gosport, *mun. bor.*, *spt.*, *Naval depot*, Hants, Eng.; W. side of Portsmouth harbour; shipbldg., engin.; p. (1951) *58,246*.
Gossau, *t.*, St. Gallen, Switzerland; embroidery, lace; p. *7,914*.
Göta, *R.*, Sweden; flows from L. Vänern to the Kattegat; also canal connecting L. Vänern with the Baltic; the G. Canal provides a popular tourist trip from Stockholm to Göteborg.
Göteborg and Bohus, *prov.*, Sweden; on cst. of Kattegat; a. 1,989 sq. m.; p. (1950) *557,545*.
Göteborg, *c.*, *cap.*, Göteborg and Bohus, Sweden; at mouth of R. Göta; second c. in Sweden for commerce and ind.; p. (1950) *353,991*.
Gotha, *t.*, Thuringia, Germany; iron, machin.,

porcelain, printing, cartography; p. (estd. 1954) *60,100*.
Gotland I., *fertile Swedish I.* in the Baltic; cap. Visby; a. 1,225 sq. m.; p. (1950) *58,993*.
Gotland, *prov.*, S. Sweden; a. 35,788 sq. m.; p. (1948) *2,750,000*.
Gottesberg, *t.*, S.W. Poland; coal, mftg.; assigned to Poland at Potsdam conference; p. *8,000*.
Göttingen, *t.*, Lower Saxony, Germany; univ.; scientific instruments, pharmaceutics, film studios; p. (estd. 1954) *80,100*.
Gouda, *t.*, Netherlands; on R. Yssel 11 m. from Rotterdam; famous cheese; p. (1951) *39,140*.
Gough I., Atl. Oc. dependency of St. Helena; breeding ground of the great shearwater
Goulburn, *t.*, N.S.W., Australia; commands route across Gr. Dividing Range; in agr. dist. 134 m. W. of Sydney; mnfs.; p. (1958) *20,870*.
Goulburn R., Victoria, Australia.
Gourock, *burgh*, Renfrew, Scot.; on Firth of Clyde, 2 m. W. of Greenock; p. (1951) *9,107*.
Gouverneur, *t.*, N. N.Y., U.S.A.; mines talc, lead, zinc; mnfs. wood pulp, silk; p. (1950) *4,916*.
Govan, *par.*, Lanark, Scot.; on the Clyde, part of Glasgow; shipbldg.; p. (1951) *312,911*.
Governor's I., *fort*, Boston Harbour; also fortfd. islet in harbour of N.Y., U.S.A.
Gower, *peninsula*, W. Glamorgan, Wales.
Gowerton, *vil.*, Glamorgan, S. Wales; S. cst. of Loughour estuary, 4 m. W. of Swansea; new steel-wks.
Gowrie, Carse of, fertile tract N. side Firth of Tay, Scot.; includes Dundee, Kinnoul, Perth.
Goya, *t.*, Argentina; on R. Paraná; cattle; p. *22,099*.
Goyanna, *comm. t.*, Brazil; 40 m. N. of Recife.
Gozo, *Br. I.* in Mediterranean, nr. Malta; the ancient Gaulos; surrounded by perpendicular cliffs; a. 26 sq. m.; p. *27,612*.
Graaff-Reinet, *t.*, C. of Good Hope, S. Africa; fruit growing, wool; p. *13,914*.
Graciosa, *I.*, Azores gr., N.W. of Terceira.
Grado, *commune*, Oviedo, N.W. Spain; iron foundries; p. *17,318*.
Grado-Aquileia, N. Adriatic, prov. Gorizia, Italy; pleasure resort and former Roman spt.; rich in early Christian mosaics and other antiquities; p. (est.) *3,000*.
Graengesberg, *t.*, Kopparberg co., Sweden; on S. fringe of Scandinavian mtns.; iron ore deposits.
Grafton, *t.* N.S.W., Australia; on Clarence R.; p. (1958) *15,340*.
Graham, *t.*, N. Texas, U.S.A.; oil refining, flour milling; p. (1950) *6,742*.
Graham I., the lgst. of the Queen Charlotte gr. in the Pacific; off cst. of Brit. Columbia.
Graham Land, Falkland Is. Dependencies, Antarctica; mountainous, icebound; discovered 1832.
Grahamstown, *c.*, C. of Good Hope, S. Africa; N.E. of Port Elizabeth; p. (1946) *22,836*.
Graian Alps, *mtns.* between Savoy and Piedmont; highest point Gran Paradiso; alt. 13,320 ft.
Grain Coast, general name formerly applied to cst. of Liberia, W. Africa; "grain" refers to pepper, spices, etc.
Grammichele, *t.*, E. Sicily, Italy; 23 m. S.W. of Catania; marble; p. *14,014*.
Grammont, *t.*, E. Flanders, Belgium; nr. Ghent, on Dender R.; mftg.
Grampians, *highest mtns.* of Scot.; highest point Ben Nevis; alt. 4,406 ft.; includes Cairngorms, high granitic mtns.
Gran, *see* Esztergom.
Granada, *prov.*, S. Spain; traversed by Sierra Nevada; wheat, olives, textiles, liqueurs, paper; a. 4,838 sq. m.; p. (1950) *782,953*.
Granada, *ancient c.*, Granada, S. Spain; at foot of Sierra Nevada; formerly cap. of the Moorish Kingdom of G., now cap. of fertile maritime prov.; famous 14th-century Alhambra; p. (1950) *153,256*.
Granada, *c.*, Nicaragua, Central America; gold-wire-drawing ind.; p. *38,918*.
Granby, *t.*, Quebec, Canada; on Yamaska R.; sawmills, leather; p. *14,197*.
Gran Chaco, *extensive dist.*, N. Argentina and Paraguay; flat with lge. areas of forest; quebracho.
Grand Bank, *submarine plateau*, extending S.E. from Newfoundland, Canada; a. 500,000 sq. m.; impt. cod fisheries.
Grand Bassam, *t.*, *spt.*, Ivory Cst., Fr. W. Africa; exp. bananas, palm-kernels; p. *5,743*.
Grand Bahama, one of the Bahama Is., W. Indies; p. (1953) *4,095*.
Grand Canal, *canal*, N. China; about 1,000 m. long from Tientsin to Hangchow; built between A.D. 605–18 and 1282–92; now silted up and cst. or rail transport more impt.
Grand Canal, main water thoroughfare through Venice, Italy.
Grand Canary, *I.*, Canaries; cap. Las Palmas.
Grand Canyon, Arizona, U.S.A.; narrow gorge, 3,000 to over 5,000 ft. deep of Colorado R.
Grand Cayman I., T.W.I.; a. 85 sq. m.; coconuts; cap. Georgetown; p. (estd. 1957) *6,636*.
Grand Combin, *mtn.* in the Alps, N. of Aosta, Italy; alt. 14,141 ft.
Grand-Comme (La), *t.*, Gard, France; p. (1954) *14,565*.
Grand Coulée Dam, Wash., U.S.A.; across R. Columbia 110 m. below Spokane; world's lgst. dam; reservoir formed 151 m. long, a. 130 sq. m. supplies irrigation water to 1,900 sq. m. between Rs. Columbia and Snake; hydro-elec. power sta. when complete will generate 2,700,000 h.p.
Grande Chartreuse, La, *monastery*, Isère, France; 15 m. N. of Grenoble; famous for its liqueur.
Grande Prarie, *t.*, Alberta, Canada; wheat; p. *2,267*.
Grand Forks, *t.*, B.C., Canada; sawmills, copper and gold smelting; p. *1,259*.
Grand Forks, *t.*, N.D., U.S.A.; on Red R.; in wheat region; p. (1950) *26,836*.
Grand Island, *c.*, Nebraska, U.S.A.; cattle and grain t.; p. (1950) *22,682*.
Grand Junction, *t.*, Col., U.S.A.; p. (1950) *14,504*.
Grand Lake, *lgst. L.*, Newfoundland; a. about 200 sq. m.
Grand Lahou, *t.* Ivory Cst., Fr. W. Africa; p. *1,000*.
Grand' Mère, *t.*, Quebec, Canada; pulp and paper mills; p. (1941) *8,608*.
Grand Prairie, *see* **Black Prairie**.
Grand Rapids, *t.*, Mich., U.S.A.; on Grand R.; fruit, flour, iron and steel; p. (1950) *176,515*.
Grand R., Mich., U.S.A.; enters L. Mich. at Grand Haven, navigable to Grand Rapids; length 250 m.
Grand R., W. Colorado and E. Utah, U.S.A.; trib. of the Colorado R.; length 350 m.
Grand Turk I., *seat of government*, Turks and Caicos Is.; p. *1,693*.
Grange, *t.*, *urb. dist.*, N. Lancs, Eng., on N. cst. of Morecambe Bay; sm. summer resort; p. (1951) *3,070*.
Grangemouth, *burgh*, Stirling, Scot.; on F. of Forth, 20 m. W. of Leith; shipbldg. and repair, marine engin., oil refining, petroleum prods., chemicals; p. (1951) *15,305*.
Granite City, Ill., U.S.A.; p. *28,000*.
Gran Sasso d'Italia, *rugged limestone highlands*, Abruzzi, Central Italy; highest part of Apennines, Monte Corno alt. 9,584 ft.; winter sports ctr., Aquila.
Grantham, *t.*, *mun. bor.*, Lincoln, Eng.; on Witham R.; tanning, agr. machin., engin., brewing, malting; p. (1951) *23,405*.
Grant Land, *region*, N. of Ellesmere I., Arctic Canada.
Grantown-on-Spey, *burgh*, Moray, Scot.; on R. Spey; health resort; p. (1951) *1,541*.
Grants Pass, *t.*, S.W. Ore., U.S.A.; fruit growing; lumber, mining, fishing; p. (1950) *8,116*.
Granville, *spt.*, *wat. pl.*, Manche, France; at mouth of the Bosq; fisheries; p. (1954) *10,368*.
Granville, *sub.*, Sydney, N.S.W., Australia; p. *19,717*.
Grasmere, *picturesque vil.*, Westmorland, Eng.; at head of Grasmere Lake; home of Wordsworth.
Grasse, *t.*, *health resort*, Alpes-Maritimes, S.E. France; perfumes; p. (1954) *22,187*.
Graubünden (Grisons), *can.*, Switzerland; cap. Chur; a. 2,746 sq. m.; p. (1941) *128,247*.
Graudenz, *see* **Grudziadz**.
's-Gravenhage, *see* **Hague**.
Graves, Pointe de, N. point of Médoc Peninsula, France; in famous wine dist.
Gravesend, *spt.*, *mun. bor.*, Kent, Eng.; S. bank R. Thames facing Tilbury; shipping, paper, cement, rubber tyres, engin.; p. (1951) *45,043*.
Gravina, *industl. c.*, Apulia, Italy; p. *20,775*.
Gray's Peak, Rocky Mtns., Col., U.S.A.; alt. 14,341 ft.
Grays Thurrock, *urb. dist.*, Essex, Eng.; on the

Thames, nr. Tilbury Fort; cement mftg; p. (1951) *81,634.*
Graz, *t.,* Austria; on R. Mur; machin., iron and steel, rly. wks.; p. (1951) *226,271.*
Great Altai, *range of mtns.,* lying mainly in outer Mongolia but also in Western Siberia.
Great Atlas, *mtns.,* N.W. Africa; alt. 7,000 ft.
Great Australian Basin, *artesian basin,* Australia; underlies plains of S.W. Queensland, N.W. New South Wales, N.E. of S. Australia; water supply used on sheep-farms, cattle-ranches, in a. from Normanton in N. to Kenmare in S., Oodnadalta in E. to Roma in E.; a. 570,000 sq. m.
Great Australian Bight, *wide inlet,* S. of Australia, between C. Arid and Port Whidbey; 850 m.
Great Barrier Reef, *coral reef barrier,* off N.E. cst. of Australia; 1,000 m. long, 75–100 m. from cst.
Great Barrington, *t.,* Mass., U.S.A.; summer resort; p. (1950) *3,913.*
Great Basin, *high plateau region* between the Wasatch and Sierra Nevada Mtns., U.S.A., inc. most of Nev., parts of Utah, Cal., Idaho, Ore., Wyo.; inland drainage ctr. Great Salt Lake; a. 210,000 sq. m.; much desert; sparse p.
Great Bear Lake, on the Arctic Circle, in N.W. Terr., Canada, over 150 m. long; a. 14,000 sq. m.; outlet through Great Bear R. to Mackenzie R.; on E. shore radium.
Great Belt, *strait,* separating I. of Fyn from Zealand, Denmark.
Great Britain, *see* **England, Scotland, Wales, Britain.**
Great Dividing Range, *mtn. system,* E. Australia; extends, under different local names, from Queensland to Victoria and separates E. cst. plains from interior; reaches max. alt. in Mt. Koskiusko (7,328 ft.), in Australian Alps on bdy, between Victoria and New South Wales.
Great Falls, *t.,* Mont., U.S.A.; on Missouri R.; wool; gold, silver; lead and copper smelting; p. (1950) *39,214.*
Great Fish R., C. of Good Hope, S. Africa.
Great Fisher Bank, *submarine sandbank* in N. Sea; 200 m. E. of Aberdeen, 100 m. S.W. of Stavanger; valuable fishing-ground; depth of water, from 25 to 40 fathoms.
Great Gable, *mtn.,* Cumberland, Eng.; alt. 2,949 ft.
Great Grimsby, *see* **Grimsby.**
Great Harwood, *t., urb. dist.,* Lancs, Eng.; 5 m. N.E. of Blackburn; cotton weaving, textiles, engin.; p. (1951) *10,738.*
Great Inagua, *I.,* one of the Bahama Is. W. Indies; p. (1953) *999.*
Great Karroo, C. of Good Hope, U. of S. Africa; high plateau; ostrich farming.
Great Lakes, N. America; comprising Ls. Superior, Michigan, Huron, Erie, Ontario; frozen 4 to 5 months in winter; enormous L. traffic in cereals, iron, coal, etc.; a. 96,000 sq. m.
Great Makarikari, Bechuanaland Protectorate, South Africa; salt pan.
Great Namaqualand, S. region of S.W. Africa.
Great Ormes Head, *promontory,* N. Wales; nr. Llandudno.
Great Plains, *lowland area* of central N. America, extending E. from Rocky Mtns. and S. from Mackenzie to S. Texas.
Great St. Bernard, *pass,* Switzerland; 8,111 ft. over Pennine Alps; hospice with St. Bernard dogs.
Great Salt Lake, Utah, U.S.A.; in the Great Basin plateau of N. America; 90 m. long; a. over 2,000 sq. m.; alt. 4,218 ft.; receives Bear, Jordan and Beaver Rs.; no outlet.
Great Sandy Desert, N. part, W. Australia.
Great Slave Lake, N.W. Terr., Canada; length 300 m.; greatest breadth 50 m., outlet Mackenzie R.
Great Slave R., Canada, flowing between L. Athabaska and the Great Slave L.
Great Smoky Mtns., Tenn., U.S.A.; with Blue Ridge Mtns. form E. Zone of Appalachian Mtn. system; rise to alt. over 6,000 ft.; largely preserved as National Park.
Great Yarmouth, *see* **Yarmouth, Great.**
Greater Antilles Is., W. Indies.
Greece, *kingdom,* S. part of Balkan Peninsula, bounded on N. by Albania, Jugoslavia and Bulgaria, on W. and S. by the Mediterranean, and on the E. by the Ægean Sea, and inc. Is. in the Mediterranean, Ægean and Ionian Seas; cap. Athens; agr.: cereals, tobacco, currants, vines, fruit; sheep, goats, cattle; minerals: iron, lead, magnesite, lignite; mnfs.: olive oil, wine, textiles, chemicals, shipyds., oil refining; a. 51,182 sq. m.; p. (1951) *7,632,801.*
Greeley, *t.,* Col., U.S.A.; nr. Denver, site of st. college of education; lumber, flour; p. (1950) *20,354.*
Green Bay, *t.,* Wis., U.S.A.; tr. in timber, flour, etc., paper, coal; p. (1950) *52,735.*
Greencastle, *t.,* Londonderry, N. Ireland; on Loch Foyle.
Greenfield, *t.,* Mass., U.S.A.; p. (1950) *15,075.*
Greenford, *sub.* of London, W. Middx., Eng.
Greenhithe, Thames-side, nr. Dartford, Kent, Eng.
Greenland, *I.,* between Arctic Ocean and Baffin Bay; lofty ice-capped plateau; peopled by coastal settlements of Eskimos; whale oil, seal skins; U.S. base at Thule; part of Danish kingdom; cap. Godthaab; a. 840,000 sq. m., of which 708,000 sq. m. are under a permanent ice-cap; p. (1955) *27,101.*
Greenlaw, *t.,* Berwick, Scot.
Green Mtns., Vermont section of Appalachian mtns.; highest peak, alt. 4,430 ft.
Greenock, *burgh,* Renfrew, Scot.; on S. shore of Firth of Clyde, 20 m. W. of Glasgow; shipbldg., sugar-refining, woollens, chemicals, aluminium casting, tin plate inds.; p. (1951) *76,299.*
Greenore, *cape,* Louth, Ireland; separating Dundalk Bay from Carlingford, Lough.
Green R., trib. of Grand R., Utah, U.S.A.; length 750 m.
Greensboro', *t.,* N.C., U.S.A.; cotton, tobacco; p. (1950) *74,389.*
Greensburg, *t.,* Penns., U.S.A.; iron and glass factories; p. (1950) *16,923.*
Greenville, *t.,* Miss., U.S.A.; on Miss. R.; cotton tr.; p. (1950) *29,936.*
Greenville, *t.,* S.C., U.S.A.; in the cotton belt; p. (1950) *58,161.*
Greenville, Texas, U.S.A.; cotton, rayon, shipping; p. (1950) *14,727.*
Greenwich, *metropolitan bor.,* London, Eng.; on S. bank of R. Thames; famous for its Hospital, Observatory (now moved to Hurstmonceux) and R.N. College; longitudes conventionally calculated Greenwich meridian either E. or W.; p. (1951) *91,492.*
Greenwood, *t.,* Miss., U.S.A.; p. (1950) *18,061.*
Greenwood, *t.,* S.C., U.S.A.; p. (1950) *13,806.*
Greifswald, *spt.,* Mecklenburg, Germany; on Baltic inlet; shipbldg., textiles, wood inds.; p. (estd. 1954) *43,500.*
Greiz, *t.,* Thuringia, Germany; paper, textiles, chemicals; p. (estd. 1954) *45,500.*
Grenaa, *t.,* Randers, Jutland, Denmark; textiles.
Grenada, *I.,* T.W.I.; cap. St. George's; fruit, cocoa, spices; a. 133 sq. m.; p. (1957) *90,852.*
Grenadines, *Brit. gr. of sm. Is.,* between Grenada and St. Vincent, Windward Is.; sea-island cotton; p. (estd. 1946) *13,000.*
Grenoble, *fortfd. c.,* Isère, S.E. France; on R. Isère; 60 m. from Lyons; gloves, buttons, machin., liqueurs, cement; p. (1954) *116,440.*
Gretna, *t.,* La., U.S.A.; on the Mississippi R.; p. (1950) *13,813.*
Gretna Green, *vil.,* Dumfriesshire, Scot., on Eng. border; famous as place of runaway marriages, 1754–1856.
Grey Range, *mtns.,* S.W. Queensland, Australia; extends S.W. from Gr. Dividing Range towards Flinders Range and Spencer G.; forms divide between streams draining E. to R. Darling and those draining W. to L. Eyre.
Greymouth, *spt.,* S.I., N.Z.; on W. cst. at mouth of Grey R.; ch. t. prov. of Westland; coal; p. (1951) *8,862.*
Greytown, *see* **San Juan del Norte.**
Greytown, *t.,* Natal, S. Africa; wattle bark; p. *4,644.*
Greytown, *bor.,* N.I., N.Z.; p. (1951) *1,258.*
Griffin, *c.,* Ga., U.S.A.; cotton factories and tr.; p. (1950) *13,982.*
Grigoriopol, *t.,* Moldavian S.S.R., U.S.S.R.; on R. Dniester.
Grim, *C.,* N.W. Tasmania.
Grimaldi, *caves,* N.W. Italy; remains of prehistoric man, late Paleolithic, found there.
Grimsby, *spt., co. bor.,* Lincoln, Eng.; on S. bank of R. Humber; fishing, shipbldg., fertilisers, chemicals, engin., paper mkg., tanning and cod liver oil; p. (1951) *94,527.*
Grimsel Pass, Bernese Alps, Switzerland; alt. 7,100 ft.
Grindelwald, *vil.,* Bernese Oberland, Switzerland; tourist ctr.

Griqualand East, *dist.*, C. of Good Hope, S. Africa; pastures, wool; ch. t. Kokstad; a. 6,602 sq. m.; p. *265,000*.
Griqualand W., *dist.*, C. of Good Hope, S. Africa; diamonds; ch. t., Kimberley; a. 15,197 sq. m.; p. *160,793*.
Gris Nez, *C.*, N.E. France; nearest point on French cst. to Dover.
Grisons (Graubünden), *can.*, Switzerland; one-half only productive, many glaciers, contains the mtn. health resorts of Davos-Platz (alt. 5,115 ft.), St. Moritz (alt. 6,089 ft.), Arosa (alt. 6,108 ft.); a. 2,746 sq. m.; p. (1950) *137,100*.
Grivegnee, *t.*, Belgium; nr. Liége; ironwks.
Grodno, *t.*, W. Byelorussia (Polish until 1939); agr.; engin., textiles, chemicals; p. (1959) *72,000*.
Grodzisk Mazowiecki, *commune*, Poland; 12 m. S.W. of Warsaw; p. *18,737*.
Gronau, *t.*, N. Rhine–Westphalia, Germany; nr. Dutch frontier; textiles, rly. junction; p. (estd. 1954) *25,200*.
Grong, *spt.*, Norway, on Falda Fjord.
Groningen, *t.*, *cap.*, Groningen, Netherlands; woollens, glucose, shipbldg.; p. (estd. 1955) *141,000*.
Groningen, *prov.*, N.E. Netherlands; agr. and dairying; a. 883 sq. m.; p. (1948) *453,057*.
Groote Eylandt, *I.*, G. of Carpentaria; off cst. of N. Terr., Australia.
Grootfontein, *t.*, S.W. Africa; copper- and lead-mining; world's lgst. known meteorite on nearby farm; p. *2,008*.
Grosseto, *prov.*, central Italy; ch. t. Grosseto, a. 1,735 sq. m.; p. (1951) *211,470*.
Grosseto, *t.*, *cap.* Grosseto Prov., Central Italy; p. (1951) *37,897*.
Groton, *industl. t.*, Conn., U.S.A.; opp. New London at mouth of Thames R.; p. (1950) *7,036*.
Grottaglie, *t.*, Lecce, Apulia, Italy; nr. Brindisi; white glaze pottery; p. *14,850*.
Grove City, *bor.*, Penns., U.S.A.; engines, carriages; p. (1950) *7,411*.
Grozny, *t.*, N. Caucasia, R.S.F.S.R.; on R. Terek; naphtha wells, refinery, engin.; p. (1959) *240,000*.
Grudziadz (Graudenz), *t.*, on R. Vistula, Polish Pomerania; sawmilling; p. *37,000*.
Grumo, *t.*, Apulia S. Italy; nr. Bari; p. *10,625*.
Grünberg, *see* **Zielona Gora.**
Gruyère, *dist.*, can. Fribourg, Switzerland; cheese.
Gruz, *t.*, Jugoslavia; nr. Dubrovnik; p. *10,000*.
Gstaad, *fashionable summer and winter res.*, Bernese Oberland, Switzerland.
Guadalajara, *c.*, Mexico; cap. of Jalisco st.; cotton and wool mnfs.; cath.; p. (1950) *337,000*.
Guadalajara, *prov.*, Spain; agr. and salt mines; a. 4,709 sq. m.; p. (1950) *203,278*.
Guadalajara, *mftg. t.*, G. prov., Spain; woollens, leather; p. (1949) *21,562*.
Guadalaviar, *R.*, E. Spain; flows into Mediterranean, nr. Valencia; length 130 m.
Guadalcanal, *I.*, Brit. Solomon Is., Protectorate, Pac. Oc.
Guadalquivir, *R.*, Spain; flows through Andalusia to Atlantic; length 375 m.
Guadalupe Hidalgo, *t.*, Mexico; treaty signed 1848 terminating Mexican–U.S. war; p. (1940) *25,934*.
Guadeloupe and Dependencies, Leeward gr.; a. 722 sq. m.; sugar produce; ch. pt. Pointe-à-Pitre; p. (1954) *229,120*. French Overseas Dept.; Leeward gr. consists of Guadaloupe (p. *113,412*, ch. t. Basse-Terre), Grand Terre p. (*113,545*, ch. t. Pointe-à-Pitre); united a. of Is., 583 sq. m.; and 5 smaller Is., Marie Golante, Désirade, St. Barthelemy and St. Martin (total p. *304,000*) still inhabited by white descendants of French emigrants of 300 years ago; mountainous; rum, sugar, coffee, bananas.
Guadiana, *R.*, forms part of Spanish and Portuguese frontier; flows into Bay of Cadiz; length 510 m.
Guadix, *c.*, Granada, S. Spain; cath.; hats, hemp, brandy, pottery; p. *26,023*.
Guaira, La, *spt.*, Venezuela; linked by rly. and motor road to Carácas; exp. hides, sugar, cocoa, coffee; p. (1941) *10,103*.
Gualdo Tadino, *commune*, central Italy; cath.; pottery; p. *12,791*.
Guam, *I.*, most S. and lgst. of Marianas Archipelago, N. Pacific; naval sta. of the U.S A.; ch. t. Agaña and spt. is Piti; maize, sweet potatoes, bananas; a. 225 sq. m.; p. (1950) *59,498*.
Guanabacoa, *industl. t.*, nr. Havana, Cuba; p. *21,999*.
Guanacasta, *prov.*, Costa Rica, Central America; p. (1950) *88,190*.
Guanajuato, *st.*, Central Mexico; very fertile, productive and prosperous; a. 11,804 sq. m.; p. (1950) *1,326,448*.
Guanajuato, *ch. t.*, G. st., Mexico; 250 m. from Mexico c.; cotton, silver, lead; p. (1940) *44,875*.
Guanta, *spt.*, Anzoategui st., Venezuela, S. America; on Caribbean Sea, linked by rail to Barcelona (10 m.); exp. cattle, coal.
Guapore, *R.*, Brazil, S. America; joins the Mamore; length 900 m.
Guapore, *Fed. terr.*, Brazil; on Bolivian border; a. 98,135 sq. m.; cap. Porto Velho; p. (1947) *24,696*.
Guaranda, *cap.*, Bolivar prov., Ecuador, S. America; cinchona bark; p. (1938) *15,606*.
Guarda, *t.*, Portugal; alt. over 3,000 ft.; p. *9,766*.
Guarda, *wine-growing dist.*, Portugal; between Rs. Tagus and Douro; a. 2,126 sq. m.; p. (1950) *307,003*.
Guardafui, *C.*, most E. point of Africa.
Guastalla, *commune*, N. Italy; spun silk, leather, cheese; p. *13,732*.
Guatemala, *republican st.*, Central America; adjoins Mexico, Br. Honduras and El Salvador, coffee, bananas, chicle (for mnf. of chewing gum in U.S.A.); a. 45,452 sq. m.; p. (1950) *2,790,868*.
Guatemala City, *cap. c.*, Guatemala; minerals: gold, silver, copper, lead; p. (1946) *241,335*.
Guayaquil, *ch. pt.*, Ecuador, S. America; on Guayas R., 30 m. above its entrance into the Bay of Guayaquil; devastated by fire in 1896 and 1899; univ.; shipbldg., rubber, Panama hats; p. (1950) *262,624*.
Guayas, *prov.*, Ecuador; cap. Guayaquil; a. 8,331 sq. m.; p. (1950) *582,144*.
Gubat, *mun.*, Luzon, Philippine Is.; hemp, coconuts, sugar-cane region; p. *22,880*.
Gubbio, *t.*, Perugia, Italy; lustre ware; p. *30,850*.
Gubin (Guben), *t.*, Brandenburg, Poland; W. sector of t. still German; on R. Neisse; textiles, machin., leather; p. (estd. 1939) *45,800*.
Gudbrandsdal, *gr. valley*, S. Norway; leads S.E. from Dovre Fjeld towards Oslo; drained by R. Logan; used by main road Oslo to Trondheim; provides relatively lge. a. of cultivable land; hay, oats, barley, dairy cattle.
Gudiyatam, *t.*, Madras India; p. (1941) *24,688*.
Guebwiller, *t.*, Haut-Rhin, France; cottons; p. (1954) *10,414*.
Guelders (Gelderland), *prov.*, Netherlands; cap. Arnhem; a. 1939 sq. m.; p. (1947) *1,039,025*.
Guelph, *t.*, Ontario, Canada; cloth, yarn, pottery, paper; p. *23,275*.
Guernsey, Channel Is., between cst. of France and England; tomatoes, grapes (under glass), flowers, cattle; tourist res.; t. and ch. spt. St. Peter Port; a. 15,654 acres; p. (1959) *40,721*.
Guerrero, *Pacific st.*, Mexico; cereals, cotton, coffee, tobacco; cap. Chilpancingo; ch. pt. Acapulco; a. 24,885 sq. m.; p. (1950) *915,528*.
Guiana, *region*, S. America; a. 179,000 sq. m.; comprises Brit., Fr. and Neth. Guiana (*q.v.*).
Guiana Highland, *plateau*, S. America; extends approx. 900 m. from E. to W. across S. parts of Venezuela, Brit. Guiana, Suriname, Fr. Guiana; steep sides, rounded tops approx. 3,000 ft. alt. but rises to 8,635 ft. in Mt. Roraima; chiefly composed crystalline rocks rich in minerals.
Guienne, *old French prov.*, separated by R. Garonne from Gascony.
Guildford, *mkt. t.*, *mun. bor.*, Surrey, Eng.; 30 m. S.W. London; on gap cut by R. Wey through N. Downs; light inds.; residtl.; p. (1951) *47,484*.
Guildford, *sub.* of Sydney, N.S.W., Australia; p. *12,000*.
Guimarães, *t.*, Minho, Portugal; vineyards; p. *11,257*.
Guinea, *ind. rep.* (Oct. 1958), formerly Fr. Guinea; iron-ore, bauxite, diamonds, groundnuts, palm oil; cap. Conakry; p. (estd. 1957) *2,492,000*.
Guinea, general name for W. African coastlands round the greatest bend of G. of G. from the Gambia to the Congo Rs.
Guinea, *military dep.*, Port. W. Africa; between Senegal and Fr. Guinea, inc. archipelagos of Bissagos and Bolama; ch. prod.: rice, palm oil, seeds, hides; cap. and ch. spt., Bissao; a. 13,948 sq. m.; p. (1940) *351,089*.
Guinea, *Span. col.*, W. African cst.; inc. Is. of Fernando Po (a. 800 sq. m., p. *26,405*); Annobon (7 sq. m.), Corsisco (5½ sq. m.), Little Elobey (22 acres), and Gr. Elobey (¾ sq. m.); ch. t. Bata; prod.: cocoa, coffee, gold, etc.; p. *351,089*.
Guinea Current, *ocean current*, flows W. to E.

along Guinea Cst., diverted away from cst. in Bight of Benin by C. Three Points; relatively warm water.
Güines, *t.*, Havana, Cuba, W. Indies; sugar; p. *22,669.*
Guingamp, *t.*, Côtes-du-Nord, N.W. France; on R. Trieux, nr. St. Brieuc; ch. of Notre Dame; pilgrim resort; p. *8,575.*
Guinobatan, *mun.*, Luzon, Philippine Is.; hemp; lime deposits; p. *26,419.*
Guipuzcoa, *Basque provs.*, Spain; mftg., minerals, agr.; cap. San Sebastian; a. 728 sq. m.; p. (1950) *374,040.*
Guiranwala, *c.*, W. Punjab, Pakistan; N. of Lahore; p. (1951) *120,860.*
Guisborough, *t.*, *urb. dist.*, N.R. Yorks, Eng.; in Cleveland iron-mining dist., 8 m. S.E. of Middlesbrough; p. (1951) *8,009.*
Gujrat, *t.*, W. Punjab, Pakistan; on Chenab R.; pottery and furniture; p. (1941) *22,000.*
Gulbarga, *t.*, India; oil, cotton, flour, paint; p. (1941) *41,083.*
Gulf Basin, W. Australia; artesian well basin.
Gulfport, *t.*, Miss., U.S.A.; p. (1950) *22,659.*
Gulf Stream, current of the Atlantic, issuing from Gulf of Mexico by Florida Strait.
Gulf Stream Drift, *see* **North Atlantic Drift**.
Gumbinnen, *see* **Gussew**.
Gummersbach, *t.*, N. Rhine-Westphalia, Germany; textiles, leather, metallurgy, paper, machin.; p. (estd. 1954) *31,500.*
Gumti, *R.*, trib. of Ganges, India; flows past Lucknow.
Guntur, *t.*, Madras, India; cotton mftg.; p. (1951) *125,255.*
Gurdaspur, *t.*, E. Punjab, India; p. *10,000.*
Gurgan (Asterabad), *t.*, N. Persia; nr. S.E. end of Caspian Sea; carpets, cotton, rice.
Guryev, *t.*, Kazakh S.S.R.; on mouth of R. Ural, entrance to Caspian Sea; petrol refining, engin.; p. (1959) *78,000.*
Gussew (Gumbinnen), *t.*, E. Prussia, U.S.S.R., German before 1945; machin.; p. (estd. 1939) *24,000.*
Güstrow, *t.*, Mecklenberg, Germany; S. of Rostock; cas.; steel and wood inds.; rly. junction; p. (estd. 1954) *33,100.*
Gütersloh, *t.*, N. Rhine-Westphalia, Germany; nr. Bielefeld; silk and cotton inds.; famous for its Pumpernickel (Westphalian rye bread); machin., furniture, publishing, metallurgy; p. (estd. 1954) *48,100.*
Guthrie, *t.*, Okla., U.S.A.; p. (1950) *10,113.*
Gwadar, Oman terr. on cst. of W. Baluchistan; p. *15,000.*
Gwalior, *dist.*, Madhya Pradesh, India; a. 26,008 sq. m.
Gwalior, *t.*, Madhya Pradesh, India, formerly Lashkar, situated 76 m. S. of Agra in Gwalior dist.; cotton spinning, muslin, carpets, cereals, sugar-cane; bauxite; p. (1951) *241,577.*
Gwatar, *spt.* on G. of Oman, Persia; by border of Pakistan.
Gweebarra Bay, *inlet* Donegal cst., Ireland.
Gwelo, *t.*, S. Rhodesia; impt. indust. ctr.; p. *18,000* (incl. *6,700* Europeans).
Gwent, Plain of (Vale of Glamorgan), *lowland dist.*, Glamorgan, S. Wales; lies S. of moorland of S. Wales Coalfield, extends E. into Monmouth; fertile soils; mixed farming except in industl. areas of Cardiff, Barry.
Gympie, *t.*, Queensland, Australia; on Mary R., 106 m. from Brisbane; former goldfield; now dairying and pastoral dist., with extensive banana plantations; p. (1957) *10,420.*
Györ, *c.*, Hungary; at junction of R. Raab with arm of R. Danube; cath.; horses, textiles, chemicals, engin.; p. (estd. 1957) *66,000.*
Gytheon, *spt.*, Peloponnese, Greece; on G. of Laconia; p. (1940) *7,893.*

H

Haapsalu, *t.*, Estonia, U.S.S.R.; p. *10,000.*
Haarlem, *t.*, *cap.*, N. Holland, Netherlands; textiles, printing, brewing, bulb growing; p. (estd. 1955) *166,000.*
Habab, *dist.*, W. coast Red Sea, Ethiopia.
Hachioji, *c.*, Honshu, Japan; weaving, silk-cotton mixtures; p. (1947) *73,494.*
Hackensack, *t.*, N.J., U.S.A.; iron foundries, silk, jewellery, paper; p. (1950) *29,219.*
Hackettstown, *t.*, N.J., U.S.A.; silk, leather; agr. implements; p. (1950) *3,894.*
Hackney, *metropolitan bor.*, London, Eng.; furniture, clothing, footwear mftg.; p. (1951) *171,337.*
Haddington, *burgh*, *cap.*, E. Lothian, Scot.; on R. Tyne 16 m. E. of Edinburgh; woollen mnf.; grain mkt., corn mills; p. (1951) *4,497.*
Haderslev, *t.*, Denmark; gloves, tobacco, ironwks. tanning; p. *17,583.*
Hadhramaut, *dist.* Arabia; E. of Aden Protectorate; subject to loose British control; fertile coastal valley; frankincense, aloes, tobacco, shawls, carpets; p. *150,000* (estd.).
Hadsund, *t.*, Jutland, Denmark; p. *7,451.*
Hafnarfjördur, *t.*, S. of Reykjavik, Iceland; p. (1950) *5,055.*
Hagen, *t.*, N. Rhine-Westphalia, Germany, N.E. of Wuppertal; iron, steel, textiles, paper; p. (estd. 1954) *168,200.*
Hagenau, *t.*, Bas-Rhin, France; textiles, porcelain, soap, beer; p. (1954) *19,531.*
Hagerstown, *c.*, Md., U.S.A.; college for women; machin., furniture, chemicals; p. (1950) *36,250.*
Hagonoy, *mun.*, Luzon, Philippine Is.; maize, rice, sugar; p. *29,734.*
Hague, C. de La, Cotentin Peninsula, France; French fleet defeated by British 1692.
Hague, The, or **'s-Gravenhage** or **Den Haag**, *t.*, S. Holland, Netherlands; seat of the Dutch Government; numerous canals, cas., Palace of Peace, art gall.; copper, lead, iron; printing, distilling; p. (estd. 1955) *597,000.*
Haifa, *ch. spt.*, Israel; on Bay of Acre at foot of Mt. Carmel; terminus of Iraq oil pipeline; inds., inc. oil refining, car assembly, steel and chemical wks.; Technion univ.; p. (estd. 1951) *190,000.*
Hail, *t.*, Nejd, Saudi Arabia; p. over *10,000.*
Hailsham, *mkt. t.*, *rural dist.*, Sussex, Eng.; 5 m. N. of Eastbourne; mats, rope and twine; p. (rural dist. 1951) *36,916.*
Haimen, *c.*, Kiangsu, China; on N. bank of Yangtze-Kiang estuary; commands channel N. of Tsungming I.; p. (estd. 1935) *100,572.*
Hainan, *I.*, S. coast of China; ch. t. Kiungchow; densely wooded, camphor, mahogany, rosewood; a. 13,974 sq. m.
Hainaut, *prov.*, Belgium, adjoining N.E. border of France; industl. and agr.; coal- and iron-mines; a. 1,436 sq. m.; p. (estd. 1957) *1,259.063.*
Hainburg, *t.*, Austria; on R. Danube; tobacco; Roman remains; p. *7,545.*
Haine, *R.*, Belgium, and Nord, France; trib. of R. Scheldt; length 40 m.
Haiphong, *t.*, *ch. port*, Tongking, Viet-Nam, Indo-China; thriving tr.; cotton, thread, soap; p. of greater H. (estd. 1948) *143,000.*
Haiti, *rep.* (the "Black Republic"), W. Indies; consists of W. portion of I. of Hispaniola; cap. Port au Prince; language French; ch. prod.: coffee, sisal, tobacco, sugar, rice; a. 10,204 sq. m.; p. (1950) *3,097,220.*
Hakâri, *t.*, S.E. Turkey; p. *2,145.*
Hakodate, *spt.*, Hokkaido, Japan; fishing ctr., sulphur, dried fish, timber; p. (1950) *228,994.*
Hal, *t.*, central Belgium; flax; p. *17,408.*
Halberstadt, *c.*, Saxony-Anhalt, Germany; cath.; metallurgy, textiles, rubber inds.; rly. junction; p. (estd. 1954) *48,000.*
Halden, *t.*, S.E. corner of Norway; wood-pulp, paper; p. *9,368.*
Haldensleben, *t.*, Saxony-Anhalt, Germany; N.W. of Magdeburg; leather, stoneware; p. (estd. 1954) *22,100.*
Hale, *urb. dist.*, Cheshire, Eng.; 2 m. S. of Altrincham; p. (1951) *12,155.*
Halesowen, *industl. t.*, *mun. bor.*, S.W. of Birmingham, Worc., Eng.; coal, iron, steel, elec., engin. inds.; p. (1951) *39,884.*
Halesworth, *t.*, *urb. dist.*, E. Suffolk, Eng.; on R. Blyth, 7 m. S. of Beccles; farming, corn mills, malting, engin.; p. (1951) *2,154.*
Halfaya, *t.*, Sudan; nr. Khartoum.
Halicz, *t.*, S.W. Ukraine, U.S.S.R.; p. *4,386.*
Halifax, *spt.*, *cap.*, Nova Scotia, Canada; gr. tr.; naval sta. and dockyard, open in winter; machin. iron foundries, boots and shoes; p. (1956) *93,301.*
Halifax, *t.*, *co. bor.*, W.R. Yorks, Eng.; in valley of R. Calder, 7 m. S.W. of Bradford; carpets, textiles and machine tools; p. (1951) *98,376.*
Hall, *t.*, Württemberg, Germany; salt-mines; p. *15,165.*

Hall Peninsula, S.E. Baffin Land, Canada; between Cumberland Sound and Frobisher Bay.

Hallamshire, S., *dist.*, W.R. Yorks, Eng.; including Sheffield and Ecclesfield.

Halland, *co.*, Sweden; a. 1,901 sq. m.; p. (1950) *163,496*.

Halle, *t.*, Saxony, Germany; on R. Saale; univ.; lignite, potash, engin., chemicals; p. (1946) *222,505*.

Hallein, *t.*, Salzburg, Austria; on Austro-German frontier, 13 m. S. of Salzburg; impt. salt-mines.

Halliwell, *t.*, Lancs, Eng.; nr. Bolton; cotton goods.

Hallstatt, *vil.*, Upper Austria; early Iron Age culture type site.

Halluin, *frontier industl. t.*, Nord, France; on R. Lys; p. (1954) *13,345*.

Halmahera, *I.*, Indonesia; mountainous, active volcanoes, tropical forests; spices, pearl fisheries; grows sago and rice; a. 6,648 sq. m.

Halmstad, *spt.*, Kattegat, Sweden; cloth, jute, and paper factories; salmon fishing, granite, timber; p. (1951) *35,276*.

Hals, *t.*, Jutland, Denmark; on Lim Fjord; p. *3,157*.

Hälsingborg, *see* **Helsingborg**.

Halstead, *t.*, *urb. dist.*, Essex, Eng.; on R. Colne, 12 m. N.W. of Colchester; rayon weaving, farming; p. (1951) *5,995*.

Haltwhistle, *mkt. t.*, *rural dist.*, Northumberland, Eng.; on R. Tyne; coal, paint wks., agr.; p. (rural dist. 1951) *7,487*.

Ham, *t.*, Somme dep., N. France; on R. Somme, nr. Amiens; old cas.; p. (1954) *3,598*.

Hama, *c.*, Upper Syria; on R. Orontes; the ancient Hamath, cap. of a kingdom in times of Kings David and Solomon; p. (estd. 1950) *146,564*.

Hamadan, *c.*, Persia; the ancient Ecbatana; carpet mftg.; shellac; p. (1956) *100,029*.

Hamamatsu, *t.*, S. Honshu, Japan; on cst. plain 60 m. S.E. of Nagoya; ctr. of impt. cotton-mftg. region; textiles, dyeing, musical instruments; p. (1950) *152,028*.

Hamar, *t.*, Norway; on L. Mjösa; p. (1946) *10,177*.

Hamburg, *Land*, W. Germany; cap. Hamburg; a. 299 sq. m.; p. (1952) *1,674,811*.

Hamburg, *gr. spt.*, *industl. and comm. t.*, Land Hamburg, N. Germany; astride R. Elbe, 85 m. upstream from N. Sea; second lgst. German t., and ch. pt.; univ. and hydrographic institute; handles vast tr., inc. liner traffic and barge traffic down Elbe from Saxony and Bohemia (Czechoslovakia), also much trans-shipment of goods; imports, fuel, raw materials for inds., foodstuffs; exp., textiles, leather goods, chemicals, light-engin. prod.; inds. shipbldg., food processing, leather, brewing, tobacco, textiles, rubber, oil, wood; also impt. airport; p. (estd. 1954) *1,700,000*.

Hamburg, *t.*, N.Y., U.S.A.; optical goods; mkt. gardening; p. (1950) *6,938*.

Hamburg, *bor.*, S.E. Penns., U.S.A.; coal, mnfs.; p. (1950) *3,805*.

Hame (**Tavastehus**), *dep.*, Finland; a. 7,118 sq. m.; p. (1950) *556,327*.

Hamelin (**Hameln**), *t.*, Lower Saxony, Germany; on R. Weser; iron, textiles; legend of "The Pied Piper"; p. (estd. 1954) *50,100*.

Hamilton, *cap.* Bermudas (on largest I.); p. (estd. 1957) *3,000*.

Hamilton, *t.*, W.Victoria, Australia; p. (1957) *9,080*.

Hamilton, *c.* and *L. pt.*, S.E. Ontario, Canada; at W. end of L. Ontario; varied metallurgical mnfs. and has been called the "Birmingham" and "Manchester" of Canada; fruit ctr.; univ.; p. (1956) *239,625*.

Hamilton, *t.*, N.Z.; p. (estd. 1958) *43,700*.

Hamilton, *burgh*, Lanark, Scot.; in Clyde valley, 10 m. S.E. of Glasgow; elec. goods, iron and steel foundries, carpet mftg., cotton, woollen and knit-wear goods; p. (1951) *40,173*.

Hamilton, *c.*, Ohio, U.S.A.; on the Gr. Maine R., thriving ind. and tr.; p. (1950) *57,951*.

Hamilton, *R.*, flows into H. Inlet, cst. of Labrador, Canada; magnificent waterfall, Grand Falls.

Hamlet, *t.*, N.C., U.S.A.; rly. ctr. in peach- and tobacco-growing region; p. (1950) *5,061*.

Hamm, *t.*, N. Rhine-Westphalia, Germany; on R. Lippe, nr. Dortmund; rly. marshalling yards, iron inds.; p. (estd. 1954) *62,100*.

Hamme, *t.*, E. Flanders, Belgium; rope, linen and lace factories; p *16,534*.

Hammerfest, *spt.*, Norway; p. *2,297*.

Hammersmith, *Thames-side metropolitan bor.*, London, Eng.; industl. and residtl.; elec. and car accessories, synthetic rubber; p. (1951) *119,357*.

Hammond, *c.*, Ind., U.S.A.; ironwks., pork packing; p. (1950) *87,594*.

Hammond, *t.*, La., U.S.A.; strawberry culture; p. (1950) *8,010*.

Hamoaze, estuary of the R. Tamar, Plymouth, Eng.

Hampshire, *co.*, Eng.; ch. town Southampton; farming; shipbldg., brewing, tanning; a. 1,599 sq. m. (inc. I. of Wight); p. (1951) *1,292,211*.

Hampstead, *hilly metropolitan bor.*, N. London, Eng.; mainly residtl.; p. (1951) *95,073*.

Hampton, *Thames-side t.*, W. of London, Eng.; Hampton Court Palace in the par.; Hampton Wick is a mile E. of H. Court.

Hampton, *t.*, S.E. Va., U.S.A.; oldest English community in the U.S.; fishing, oyster and crab packing; p. (1950) *5,966*.

Hamtramck, *t.*, Mich., U.S.A.; p. (1950) *43,355*.

Han Kiang, *R.*, Hupeh, China; rises in E. edge of Tibet plateau, flows S.E. between Tsinling Shan and Tapa Shan into Yangtze-Kiang at Hankow; upper course crosses fertile Nancheng valley, length 60 m., width 12 m.; lower course interrupted by many deep gorges, especially below Ankang; ch. trib. of Yangtze-Kiang, length over 1,000 m.

Hanau, *t.*, Hessen, Germany, on R. Main; gold and silver wk., diamond cutting, wood, leather, machin.; p. (estd. 1954) *34,600*.

Hancock, *t.*, Mich., U.S.A.; copper-mines; iron and brass mnfs.; p. *5,554*.

Hangchow, *c.*, *cap.*, Chekiang, China; head of H. Bay; former treaty pt.; extensive tr.; ctr. of silk-weaving ind.; p. (estd. 1944) *606,134*.

Hangö, *t.*, on S. point, Finland; p. *6,083*.

Hankow, *c.*, *former treaty pt.*, Hupeh, China; 700 m. from mouth of Yangtze-Kiang; great tea mart, also lge. tr. in opium, raw silk, cotton, etc., iron and steel wks., textiles, flour; p. (estd. 1948) *749,942*. *See also* **Wuhan**.

Hanley, *industl. t.* (now inc. in co. bor. of Stoke-on-Trent), Staffs, Eng.; pottery, china.

Hannibal, *c.*, Mo, U.S.A.; on R. Mississippi; timber and wagon bldg.; p. (1950) *20,444*.

Hanoi, *c.*, *cap.*, Tongking, Viet-Nam, Indo-China; ancient "Ke-Sho" or "great market" on the Red R.; old Annamese fort, now modern comm. ctr.; univ.; cotton, silks, tobacco, pottery; p. greater H. (estd. 1948) *237,500*.

Hanover, *t.*, *cap.*, Lower Saxony, Germany; W. of Brunswick; iron, textiles, machin., paper, biscuits, cigarettes; gr. route ctr.; p. (estd. 1954) *500,100*.

Hanover, *bor.*, Penns., U.S.A.; mnfs. shoes, jute, wire cloth; p. (1950) *14,048*.

Hanwell, *t.*, Middx., Eng.; on R. Brent.

Hanyang, *industl. c.*, China; opp. Hankow, on Yangtze-kiang; lge. iron wks.; p. (estd. 1934) *137,241*. *See also* **Wuhan**.

Haparanda, *spt.*, N. Sweden; exp., tar, timber, and prod. of the Lapps; p. *2,951*.

Hapur, *t.*, W. Uttar Pradesh, India; tr. in sugar timber, cotton, brassware; p. (1941) *26,116*.

Harar, *cap.*, Harar prov., Ethiopia; hides and skins, ivory, cattle; p. approx. *25,000*.

Harbin (**Pinkiang**), *t.*, Manch., China; former treaty pt.; rly. junction; soya-beans, flour, tanning, distilling; p. (estd. 1947) *760,000*.

Harbour Grace, *t.*, *pt.*, Conception Bay, Newfoundland, Canada; p. *2,065*.

Harburg, *spt.*, Hanover, Germany; on R. Elbe, nr. Hamburg; linseed-crushing, india-rubber ind., etc.

Hardanger Fjord, W. cst. Norway; length 75 miles.

Hardt Mtns., W. Germany; northward continuation of Vosges on W. of Rhine rift valley; formerly forested, now largely cleared for pasture; highest points reach just over 2,000 ft.

Hardwar, *t.*, Uttar Pradesh, India; on R. Ganges; gr. annual fair and pilgrimage; p. *33,287*.

Harelbeke, *t.*, N.W. Belgium; tobacco; p. *10,446*.

Harfleur, *t.*, *spt.*, Calvados, France; potteries, distilling, chemicals; p. *5,080*.

Hari-Rud, *R.*, N. Afghanistan and Persia; the ancient "Arius"; length 650 m.

Harlech, *t.*, Merioneth, Wales; on Cardigan Bay, 10 m. N. of Barmouth; famous cas.; farming.
Harlen, *R.*, N.Y., U.S.A.; and Spuyten Duyvil Creek together form a waterway *c.* 8 m. long, extending from the East R. to Hudson R., and separates the bors. Manhattan and Bronx.
Harlingen, *spt.*, Friesland, Netherlands; margarine, mixed farming, fish; p. *10,400*.
Harlow, *t.*, Essex, Eng.; in valley of R. Stort, 22 m. N.E. of London: one of "New Towns" designated 1947; spreads S.W. from nucleus of old mkt. t. of Harlow; light inds.; p. (estd. 1959) *45,000*.
Härnösand, *t.*, Sweden; on G. of Bothnia; saw-mills, pulp; p. (1948) *13,316*.
Harpenden, *t.*, *urb. dist.*, Herts, Eng.; in Chiltern Hills, 5 m. N. of St. Albans; Rothamsted agr. experimental sta.; rubber, hosiery, basket mftg., engin.; p. (1951) *14,236*.
Harringay, *residtl. sub.*, London, Middx., Eng.
Harris, *par.*, Lewis I., Outer Hebrides, Scot.; inc. several sm. islets; tweeds, fishing; p. *4,467*.
Harrisburg, *c.*, *cap.*, Penns., U.S.A.; iron, steel factories, machin., cigarettes, cotton goods; p. (1950) *89,544*.
Harrisburg, *t.*, Ill., U.S.A.; p. (1950) *10,999*.
Harrison or East Newark, *industl. t.*, N.J., U.S.A.; p. (1950) *13,490*.
Harrogate, *t.*, *mun. bor.*, *spa*, W.R. Yorks, Eng.; in valley of R. Nidd, 14 m. N. of Leeds; numerous chalybeate springs; p. (1951) *50,454*.
Harrow, *mun. bor.*, Middx, Eng.; 12 m. N.W. of London; famous Public School; camera mftg.; p. (1951) *219,463*.
Harsova, *t.*, Romania; on R. Danube, N. of Cernovada; p. *3,762*.
Harstad, *ch. t.*, Lofoten Is., N.W. Norway; p. *4,283*.
Hart Fells, *mtn.*, between Peebles and Dumfries, Scot.; alt. 2,651 ft.
Hartebeestpoort Dam, Transvaal, Union of S. Africa; on R. Crocodile (Limpopo), 25 m. W. of Pretoria; supplies water for cultivation, under irrigation, of cotton, maize, tobacco.
Hartford, *cap.*, Conn., U.S.A.; large comm. ctr., seat of Trinity College; small arms, typewriters, elec. machin.; p. (1950) *177,397*.
Hartford City, Ind., U.S.A.; p. (1950) *7,253*.
Hartland Point, Barnstaple Bay, N. Devon, Eng.
Hartlepool, *spt.*, *mun. bor.*, Durham, Eng.; on E. cst., 2 m. N. of W. Hartlepool; fishing; p. (1951) *17,217*.
Hartlepool, W., *spt.*, *co. bor.*, Durham, Eng.; on E. cst., 3 m. N. of estuary of R. Tees; iron inds., shipbldg., light inds., timber; p. (1951) *72,597*.
Hartsville, *t.*, S.C., U.S.A.; cotton, rayon, silk, textiles; p. (1950) *5,658*.
Harvey, *t.*, N.E. Ill., U.S.A.; rolling stock, diesel engines, heavy machin.; p. (1950) *20,683*.
Harwell, *vil.*, Berkshire, Eng.; 12 m. S. of Oxford; Atomic Energy Research Estab; nuclear power research and prod. of radioisotopes.
Harwich, *spt.*, *mun. bor.*, Essex, Eng.; on S. cst. of estuary of R. Stour; packet sta. for Belgium, Netherlands, Denmark; docks, naval base, fisheries; p. (1951) *13,488*.
Harz Mtns., *range* in Hanover and Brunswick, Germany; highest peak the Brocken; 1,142 m. forested slopes rich in minerals; length 57 m.
Haslemere, *mkt. t.*, *urb. dist.*, Surrey, Eng.; 13 m. S.W. of Guildford, on hills of Hindhead and Blackdown; residtl.; lt. inds.; p. (1951) *11,992*.
Haslingden, *t.*, *mun. bor.*, Lancs, Eng.; on Rossendale Fells, 3 m. S. of Accrington; cotton, stone quarrying, engin.; p. (1951) *14,505*.
Hasselt, *t.*, prov. Limbourg, Belgium; gin distilleries; p. (estd. 1957) *34,486*.
Hassi Messoud, Algeria, Africa; lge. oilfield; 24 inch pipe-line to Bougie.
Hastings, *t.*, *co. bor.*, E. Sussex, Eng.; on S. cst., midway between Beachy Head and Dungeness; seaside resort; one of the Cinque Ports; p. (1951) *65,506*.
Hastings, *t.*, Mich., U.S.A.; p. (1950) *6,096*.
Hastings, *t.*, Minn., U.S.A.; p. (1950) *6,560*.
Hastings, *t.*, N.I., N.Z.; on Hawkes Bay, nr. Napier; p. (estd. 1958) *29,300*.
Hastings, *t.*, Nebraska, U.S.A.; p. (1950) *20,211*.
Hastings-on-Hudson, *t.*, N.Y., U.S.A.; residtl.; mnfs. copper, chemicals; p. (1950) *7,565*.
Hatay (formerly **Sanjak of Alexandretta**), ceded to Turkey by France 1939; p. (1945) *273,350*.
Hatfield, *t.*, Herts, Eng.; on Great North Road, 19 m. N. of London; one of "New Towns" designated 1948 growing around old t. of Bishops Hatfield; light engin., aircraft; p. (estd. 1959) *17,500*.
Hathras, *t.*, Aligarh dist., W. Uttar Pradesh, India; sugar, cotton, carved work; p. *39,784*.
Hatteras, *C.*, N.C., U.S.A.; stormy region.
Hattiesburg, *t.*, Miss., U.S.A.; p. (1950) *29,474*.
Hattingen, *t.*, N. Rhine-Westphalia, Germany; S.E. of Essen; machin., textiles; p. (estd. 1954) *20,300*.
Hatvan, *mkt. t.*, Hungary; E. of Budapest; p. *16,020*
Haubourdin, *t.*, Nord, France; nr. Lille; p. (1954) *12,095*.
Haugesund, *spt.*, S. Norway; on S.W. coast, 35 m. N. of Stavanger; ch. ctr. of herring fishery; canning inds.; p. *18,119*.
Hauraki, *G.*, E. cst. N.I., N.Z.
Hautmont, *t.*, Nord, France; p. (1954) *15,978*.
Haut-Rhin, *see* **Rhin-Haut.**
Haute-Garonne, *see* **Garonne-Haute.**
Haute-Loire, *see* **Loire-Haute.**
Haute-Marne, *see* **Marne-Haute.**
Haute-Saône, *see* **Saône-Haute.**
Haute-Savoie, *see* **Savoie-Haute.**
Haute-Vienne, *see* **Vienne-Haute.**
Hautes-Alpes, *see* **Alpes-Hautes.**
Hautes-Pyrénées, *see* **Pyrénées.**
Havana, *prov.*, Cuba; cap. H.; lge. exp. tr.; a. 3,173 sq. m.; p. (1943) *1,235,939*.
Havana, *spt.*, *cap.*, Cuba; ch. c. of the W. Indies; cigars, tobacco, sugar, rum, coffee, woollens, straw hats, iron-ore; p. *750,000*.
Havant and Waterloo, *urb. dist.*, Hants, Eng.; at foot of Portsdown Hill, 6 m. N.E. of Portsmouth; malting, brewing, tanning; p. (1951) *32,453*.
Havel, *R.*, Germany; flowing to R. Elbe (221 m.).
Haverfordwest, *co. t.*, *mun. bor.*, Pembrokeshire, Wales; 6 m. N.E. of Milford Haven; agr. mkt.; Norman cas.; p. (1959) *8,310*.
Haverhill, *t.*, *urb. dist.*, Suffolk, E. Eng.; p. (1951) *4,096*.
Haverhill, *t.*, Mass., U.S.A.; boot factories; p. (1950) *47,280*.
Haverstraw, *t.*, N.Y., U.S.A.; brick-mkg.; p. (1950) *5,818*.
Havre, Le, *spt.*, Seine-Maritime, France; on English Channel at mouth of R. Seine; fine boulevards; ship-bldg., engin., chemicals, ropes, cottons, oil refining; p. (1954) *139,810*.
Havre de Grace, *t.*, Md., U.S.A.; resort; duck shooting; p. (1950) *7,809*.
Hawaii, *I.*, lgst. and most attractive of the Hawaiian gr.; mountainous, highest peak Mauna Kea, alt. 13,820 ft.; Mauna Loa has lgst. active volcano in the world extending about 60 m. and over 13,600 ft., whilst Maiua Haleakala has lgst. pit crater; forested, cane sugar, pineapples, coffee, hides, bananas, molasses, flowers; a. 4,016 sq. m.; p. (1950) *7,683*.
Hawaiian Is. (**Sandwich Is.**), Pac. Oc., *st.*, U.S.A. (1959); a. 6,423 sq. m.; cap. Honolulu; p. (1958) *575,771*.
Hawarden, *t.*, *rural dist.*, Flint, N. Wales; cas.; steel plant; p. (rural dist 1951) *34,659*.
Hawash, *R.*, Ethiopia, flows E. of Shoa frontier; length 500 m.
Hawera, *t.*, N.I., N.Z.; p. (1951) *5,340*.
Hawes Water, *L.*, Westmorland, Eng. (2½ m.).
Hawick, *burgh*, Roxburgh, Scot.; on R. Teviot, 18 m. S.W of Kelso; hosiery, tweed and woollens; p. (1951) *16,718*.
Hawke's Bay, *prov. dist.*, N.I., N.Z.; on E. cst.; cap. Napier; a. 4,260 sq. m.; p. (estd. 1958) *106,500*.
Hawkesbury, *R.*, N.S.W., Australia; length 330 m.
Hawkesbury, *t.*, Ontario, Canada; p. *6,263*.
Haworth, *t.*, W.R. Yorks, Eng.; nr. Keighley; home of the Brontës.
Hawthorne, *t.*, S.W. Cal., U.S.A.; residtl.; in gas- and oil-producing area; p. (1950) *16,316*.
Hawthorne, *bor.*, N.J., U.S.A.; paint, glass, textiles, dyewks.; p. (1950) *14,816*.
Hay, *R.*, Alberta, Canada; flows into G. Slave Lake.
Hay, *urb. dist.*, Brecknock, Wales; on R. Wye; p. (1951) *1,452*.
Hay, *t.*, N.S.W., Australia; situated on R. Murrumbidgee on N. edge of Riverina dist.; collecting ctr. for fruit and wheat grown under

irrigation, for despatch by rail E. to Narandera and Sydney, or by river W. to Adelaide.
Hayange, *t.*, Moselle, France; ironwks.; p. (1954) *11,060*.
Hayden, *Mt.*, or Grand Teton peak, Rockies, Wyo., U.S.A.; alt. 13,600 ft.
Haydock, *t.*, *urb. dist.*, Lancs, Eng.; coal-mining; p. (1951) *11,838*.
Hayes and Harlington, *urb. dist.*, Middx, Eng.; 10 m. W. of London; residtl.; elec. goods, gramophones, aeroplane mftg.; p. (1951) *65,608*.
Hayle, *t.*, Cornwall, Eng.; nr. St. Ives; engin.; p. *1,026*. [mouth.
Hayling Island, *resort*, Hants, Eng.; E. of Ports-
Haystack, *summit* of the Adirondacks Vt., U.S.A.; alt. 4,919 ft.
Hayward's Heath, *mkt. t.*, Sussex, Eng.; nr. Cuckfield; cattle mkt.; p. *5,400*.
Hazard, *t.*, Ky., U.S.A.; gas, coal, sawmills, steel mills; p. (1950) *6,985*.
Hazaribagh, *t.*, Bihar, India; coal, mica.
Hazebrouck, *t.*, France, Nord; rly. ctr., textiles, grain, livestock; p. (1954) *15,525*.
Hazel Grove and Bramhall, *urb. dist.*, Cheshire, Eng.; p. (1951) *19,659*.
Hazleton, *bor.*, Penns., U.S.A.; anthracite region; coal, iron, textiles, iron and steel mnfs.; p. (1950) *35,491*.
Headingley, *sub.*, Leeds, Yorks, Eng.; mainly residtl.
Healdtown, *mtnous. sta.*, nr. Fort Beaufort, C. of Good Hope, S. Africa.
Heanor, *t.*, *urb. dist.*, Derby, Eng.; 7 m. N.E. of Derby; coal, hosiery, rly. wagons, pottery; p. (1951) *24,395*.
Heard, *I.*, S. Indian Ocean; 280 m. S.E. of Kerguelen I.; Australian possession.
Heathrow, *vil.*, Middx, Eng.; on W. margin of built-up area of London; site of London Airport; arterial road link with London.
Heaton Norris, *industl. t.*, Lancs. Eng.; on R. Mersey; p. *11,000*. [*4,302*.
Hebbronville, *t.*, Texas, U.S.A.; oil; cattle; p.
Hebburn, *t.*, *urb. dist.*, Durham, Eng.; on R. Tyne, 4 m. below Gateshead; shipbldg., engin., and colliery inds.; p. (1951) *23,163*.
Hebden Royd, *urb. dist.*, W.R. Yorks, Eng.; cotton factories, dyewks., heavy engin.; p. (1951) *10,233*.
Hebrides or **Western Is.**, Scot., grouped as Outer and Inner Hebrides; ch. t. Stornoway, Lewis; a. 2,850 sq. m.
Hebron, *t.*, Jordan; 16 m. S.W. of Jerusalem; p. (1946) *23,183*.
Heckmondwike, *t.*, *urb. dist.*, W.R. Yorks, Eng.; p. (1951) *8,648*.
Hede, *t.*, Jämtland, Central Sweden; p. *1,956*.
Hedmark, *co.*, Norway; on Swedish border; a. 10,621 sq. m.; p. (1950) *173,067*.
Hedon, *mun. bor.*, E.R. Yorks, Eng.; p. (1951) *1,991*.
Heerenveen, *commune*, Friesland prov., N. Netherlands; livestock; p. (1951) *24,205*.
Hegoumenitsa, *cap.*, Thesprotia, Epirus, Greece; p. (1951) *1,353*.
Heide, *t.*, Schleswig-Holstein, Germany; ctr. of petroleum dist.; machin., food preserving; p. (estd. 1954) *22,200*.
Heidelberg, *famous univ. t.*, Baden-Württemberg, Germany; on R. Neckar, nr. Mannheim; cas.; tobacco, wood, leather, rly. carriages; rly. junction; p. (estd. 1954) *122,400*.
Heidenheim, *t.*, Baden-Württemberg, Germany; N.E. of Ulm; textiles, machin., metallurgy, furniture; p. (estd. 1954) *41,700*.
Heilbronn, *t.*, Baden-Württemberg, Germany; metal goods, machin., paper, foodstuffs; p. (estd. 1954) *67,900*.
Heilungkiang, *prov.*, N. China; inc. former Sunkiang prov; cap. Harbin; p. (1953) *11,897,309*.
Hejaz, *region*, Saudi Arabia; mainly desert; very poor communications; ch. t. Mecca; a. 150,000 sq. m.; p. *1,000,000* (estimated).
Hekla, *volcano*, Iceland; alt. 5,095 ft.
Helder (**Den Helder**), *t.*, N. Holland, Netherlands; on cst. of Holland, 50 m. N. of Amsterdam, and connected by Helder Canal; arsenal and garrison; p. (1951) *36,209*.
Helena, *t.*, Ark., U.S.A.; on Mississippi R.; shipping ctr. for cotton; p. (1950) *11,236*.
Helena, *cap.*, Mont., U.S.A.; gold, silver, iron, smelting; p. (1950) *17,581*.
Helensburgh, *residtl. burgh*, Dunbarton, Scot.; on N. side of Firth of Clyde at entrance to Gare Loch; metal goods; p. (1951) *8,760*.
Heletz, Negev, Israel; oilwells.
Heligoland, *German I.*, N. Sea, off mouth of Elbe; formerly British.
Helikon, *mtn.*, Greece; between G. of Corinth and L. Kopais; alt. 5,736 ft.
Hell Gate R., Mont., U.S.A.; trib. of Bitter Root R.
Hellendoorn, *commune*, E. Netherlands; textiles; p. *13,721*.
Hellespont, *see* **Dardanelles**.
Hellin, *t.*, Albacete, Spain; sulphur-mines; p. *25,643*.
Helmond, *t.*, N. Brabant, Netherlands; on the Bois-le-Duc Canal; textiles; p. (1951) *36,262*.
Helmstedt, *t.*, Lower Saxony, Germany; E. of Brunswick; coal and potassium mining, textiles, machin.; p. (estd. 1954) *28,300*.
Helmund, *R.*, Afghanistan; falls into L. Hamun; length 650 m.
Helsingborg or **Hälsingborg**, *spt.*, Sweden; on the Sound, opposite Helsingör, Denmark; pottery, brewing, sugar-refining; p. (1951) *71,718*.
Helsingör, *t.*, Sjaelland (Zealand), Denmark; p. *18,930*.
Helsinki (**Helsingfors**), *spt.*, *cap.* Finland; on G. of Finland, harbour ice-bound Jan. to April except for channel opened by ice-breaker; univ.; timber prod., textiles, carpets, etc.; p. (1959) *441,678*.
Helston, *t.*, *mun. bor.*, Cornwall, Eng.; on R. Hel, 8 m. W. of Falmouth; tourist ctr.; fishing, ship repair, mng., quarrying; p (1951) *5,545*.
Helvellyn, *mtn.*, Cumberland, Eng.; 9 m. S.E. Keswick; alt. 3,118 ft.
Hemel Hempstead, *t.*, Herts, Eng.; on S. slopes of Chilterns, 9 m. N. of Watford; one of "New Towns" designated 1947; consists of bulk of mun. bor. of Hemel Hempstead with new growth to E. and S.E.; mun. bor. exists as separate entity; paper, light inds.; p. (estd. 1959) *49,000*.
Hempstead, *t.*, Long I., N.Y., U.S.A.; p. (1950) *29,135*.
Hemsworth, *urb. dist.*, W.R. Yorks, Eng.; 6 m. S.E. of Wakefield; p. (1951) *13,654*.
Henderson, *c.*, Ky., U.S.A.; tobacco, cotton, coal; p. (1950) *16,837*.
Henderson, *t.*, N.C., U.S.A.; cotton, tobacco, mkt. and mnfs.; p. (1950) *10,996*.
Hendon, *mun. bor.*, Middx., Eng.; N.W. sub. to London; many varied light inds.; p. (1951) *155,835*.
Hengyang, *c.*, Hunan, China; on Siang Kiang in foot-hills to S. of Yangtze plain; nr. impt. lead- and zinc-mining dist.; p. (estd. 1946) *181,424*.
Hénin-Liétard, *t.*, Pas-de-Calais, France; p. (1954) *23,673*.
Henley-on-Thames, *mun. bor.*, Oxford, Eng.; 5 m. N.E. of Reading; mkt. gardening, brewing; p. (1951) *7,970*.
Hennebont, *t.*, Morbihan, France; on R. Blavet; p. (1954) *11,279*. [Bay.
Henrietta Maria, *C.*, Ontario, Canada; on Hudson
Henry, *C.*, Va., U.S.A.; at S. entrance to Chesapeake Bay.
Hensbarrow, *upland a.*, Cornwall, Eng.; granite; impt. kaolin-mining dist., kaolin exported by sea from Par. Fowey; rises to over 1,000 ft.; a. 30 sq. m.
Henzada, *t.*, Burma, on R. Irrawaddy; p. *28,542*.
Herat, *cap. c.* of prov. same name, Afghanistan; on Hari Rud; strongly fortified; has been called "the key of India"; crude petroleum and chrome ore in a.; p. (1948) (of prov.) *1,142,343*; (of t.) *75,632*.
Hérault, *dep.*, S. France; wines, fruit, olives, cheese, sheep-rearing; cap. Montpellier; a. 2,402 sq. m.; p. (1954) *471,429*.
Herberton, *t.*, E. Queensland, Australia; on Atherton Plateau, Gr. Dividing Range, 45 m. S.W. of Cairns to which it is linked by rail; tin-mining.
Herculaneum, *buried c.*, Italy; 7 m. E.S.E. Naples; re-discovered in 1709.
Hercules, *t.*, Transvaal, S. Africa; sub. of Pretoria; p. *16,119*.
Heredia, *prov.*, Costa Rica, Central America; cap. Heredia; p. (1950) *51 760*.
Hereford, *co.*, Eng.; on Welsh border; fertile

fruit, cereals, hops cattle, sheep, cider, salmon, limestone; a. 842 sq. m.; p. (1951) *127,092*.
Hereford, *c., mun. bor., co. t.*, Hereford, Eng.; on R. Wye, in ctr. of plain of Hereford; cath.; steel for turbines and aircraft rockets, tiles, engin., timber, cider and preserves; p. (1951) *32,490*.
Herenthals, *commune*, N. Belgium; mftg; p. *12,172*.
Herford, *t.*, N. Rhine–Westphalia, Germany; on R. Werra; cotton, flax, furniture, cigars, confectionery, metallurgy; p. (estd. 1954) *51,800*.
Herisau, *t., cap. can.* Appenzell Ausser–Rhoden, Switzerland; muslin mftg., embroidery, dyeing; p. (1941) *12,789*.
Herkimer, *t.*, N.Y., U.S.A.; dairy ctr.; p. (1950) *9,400*.
Herm, *sm. I.* of Channel Is., English Channel; 4 m. N.W. Sark and N.E. of Guernsey; remarkable shell-beach; a. 320 acres.
Hermon, *mtn.*, Syria; in Anti-Lebanon mtns.; alt. 9,385 ft.
Hermosillo, *t., cap.*, Sonora, Mexico; on Sonora R; impt. tr.; distilling, silver; p. (1940) *30,065*.
Hermoupolis, *spt., cap.*, Cyclades, Greece; p. (1951) *16,953*.
Herne, *t.*, N. Rhine–Westphalia, Germany; nr. Dortmund; coal, iron, machin., chemicals; p. (estd. 1954) *115,900*.
Herne Bay, *t., urb. dist.*, Kent, Eng.; on cst., 62 m. from London; p. (1951) *18,298*.
Herning, *t.*, Jutland, Denmark; comm.; p. *18,140*.
Hernösand, *see* **Härnösand.**
Herrera, *prov.*, Panama, cap. Chitré; p. (1950) *50,095*.
Hersfeld, *c.*, Hessen, Germany; textiles; machin., wood, iron, leather, mineral baths; p. (estd. 1954) *22,800*.
Herstal, *t.*, Belgium; nr. Liége; renowned repeating rifle factories, aero-engines; p. (estd. 1956) *28,801*.
Herten, *t.*, N. Rhine–Westphalia, Germany; coal, machin.; p. (estd. 1954) *43,400*.
Hertford, *co.*, Eng.; undulating parks, woods, wheat, fruit; light inds., elec. engin., pharmaceutics; a. 632 sq. m.; p. (1951) *609,735*.
Hertford, *co. t., mun. bor.*, Hertford, Eng.; on R. Lea, 20 m. N. of London; pharmaceutics, flour milling, rolling stock, diesels, brewing; p. (1951) *14,190*.
'sHertogenbosch, *t.*, Netherlands; on R. Maas; cap. of N. Brabant prov.; p. (1951) *58,471*.
Hessen, *land*, Germany; a. 7,931 sq. m.; cap. Wiesbaden; p. (1950) *4,323,801*.
Hessen Nassau, *former Prussian prov.*, Germany; a. 6,472 sq. m.; cap. Cassel; forested, cereals, tobacco, flax, potatoes, mineral springs, iron, coal, copper.
Heston and Isleworth, *mun. bor.*, Middx, Eng.; sub. W. of London; p. (1951) *106,636*.
Hetch Hetchy Dam, Cal., U.S.A.; on R. Tuolumne 100 m. upstream from St. Joaquin R.; ch. source of irrigation for middle St. Joaquin valley; supplies water and hydro-ele. to San Francisco; height 430 ft., capacity 1,466,000 million gallons.
Hetton, *t., urb. dist.*, Durham, Eng.; 5 m. N.E. of Durham; coal; p. (1951) *18,511*.
Héverlé, *commune*, central Belgium; mkt. gardens; p. (1947) *10,141*.
Hex, *R.*, C. of Good Hope, Union of S. Africa; rises in Lange Berge, flows S.W. to Gr. Berg R. at Worcester; valley gives access to Gr. Karroo and Central African tableland, is used by trunk rly. from Cape Town to Johannesburg.
Hexham, *mkt. t., urb. dist.*, Northumberland, Eng.; on R. Tyne, 20 m. W. of Newcastle; p. (1951) *9,715*.
Heysham, *see* **Morecambe and Heysham.**
Heywood, *t., mun. bor.*, Lancs, Eng.; 3 m. E. Bury; coal, cotton, chemicals; p. (1951) *25,193*.
Hiawassee, *R.*, Tenn., U.S.A.; trib. Tenn. R.
Hibbing, *t.*, Minn., U.S.A.; iron ore; p. (1950) *16,276*.
Hickory, *t.*, N.C., U.S.A.; p. (1950) *14,755*.
Hidalgo, *st.*, Mexico; cap. Pachuca; mining, coffee, sugar, tobacco; a. 8,057 sq. m.; p. (1950) *850,505*.
High Point, *t.*, N.C., U.S.A.; textiles; p. (1950) *39,973*.
High Wycombe, *t., mun. bor.*, Bucks, Eng.; 15 m. N.W. of Windsor; furniture, paper mkg.; p. (1951) *40,692*.
Higham Ferrers, *mkt. t., mun. bor.*, Northants, Eng.; 3 m. E. of Wellingborough; footwear and leather dressing; p. (1951) *3,679*.
Highgate, *residtl. dist.*, London, Eng.; on hill N. of St. Pancras bor.
Highland, Park, *t.*, Mich., U.S.A.; motor cars; p. (1950) *46,393*.
Highland Park, *bor.*, N.J., U.S.A.; non-metallic sta. of U.S. Bureau of Mines; p. (1950) *9,721*.
Highlands of Scotland, *mountainous dists.*, N. of the Grampians.
Hildburghausen, *t.*, Thuringia, Germany; on R. Werra; p. *6,900*.
Hilden, *t.*, N. Rhine–Westphalia, Germany; S.E. of Düsseldorf; textiles, iron, chemicals; p. (estd. 1954) *28,300*.
Hildesheim, *c.*, Lower Saxony, Germany; at foot of Harz Mtns.; cath.; machin., farm implements, textiles, ceramics; p. (estd. 1954) *76,200*.
Hilla, *liwa*, Iraq; on R. Euphrates; nr. ancient Babylon; p. (1956) *274,567*.
Hilleröd, *t.*, N.E. Zealand, Denmark; p. *8,887*.
Hillsboro, *t.*, Texas, U.S.A.; cotton region; p. (1950) *8,363*.
Hillsdale, *c.*, Mich., U.S.A.; p. (1950) *7,297*.
Hillside, *t.*, N.J., U.S.A.; engines; speed boats; drugs; lumber; p. (1950) *21,007*.
Hilo, *c.*, Hawaii; nr. lgst. active volcano in the world, Mauna Loa; alt. 13,600 ft.
Hilversum, *t.*, Netherlands; nr. Utrecht; floorcloth factories, wireless equipment; broadcasting sta.; p. (estd. 1955) *94,000*.
Himachal Pradesh, Union Territory, 1 November 1956; Indian Union; a. 10,904 sq. m.; cap. Simla; p. (estd. 1957) *1,109,466*.
Himalayas, *vast chain of mtns.* along N. border of India; 1,600 m. long; highest peak, Mt. Everest, 29,002 ft.
Himeji, *industl. t.*, S. Honshu, Japan; on shore of Inland Sea, 30 m. W. of Kobe; iron and steel ind., heavy engin.; p. (1950) *212,100*.
Hinckley, *mkt. t., urb. dist.*, on border of Leicester and Warwick, Eng.; hosiery, boots; p. (1951) *39,088*.
Hindenburg, *see* **Zabrze.**
Hindhead, *hilly common and health resort*, Surrey, nr. Haslemere, Eng.
Hindiya Barrage, *dam*, Iraq; across R. Euphrates, 30 m. above Hilla; provides flood control and irrigation in a. between Shatt el Hilla and R. Euphrates.
Hindley, *t., urb. dist.*, Lancs, Eng.; 2 m. S.E. of Wigan; cotton, paint, knitwear, asbestos; p. (1951) *19,414*.
Hindu Kush, *mtn. range* continuing W. of Himalayas; length 350 m.; highest point 20,000 ft.
Hindustan, former name of part of N. India between Himalayas and Vindhya ranges.
Hinkley Point, Somerset, Eng.; civil nuclear power-sta. due 1962.
Hinojosa del Duque, *commune*, S. Spain; copper; agr.; textiles; p. *14,844*.
Hirado, *I.*, off W. cst. Japan; nr. Sasebo; famous for blue and white porcelain.
Hirosaki, *t.*, Honshu, Japan; lacquer ware; p. *51,948*.
Hiroshima, *spt., c.*, central Honshu, Japan; close to the "Island of Light" with its famous Shinto temple; first city to be destroyed by atomic bomb; now partially rebuilt; p. (1950) *258,712*.
Hirschberg, *see* **Jelenia Gora.**
Hirson, *t.*, Aisne, France; on R. Oise; basket wk.; p. (1954) *11,134*.
Hispaniola, Greater Antilles, W. Indies; *lge. I.*, divided between the Haiti and Dominican Reps; a. 29,536 sq. m.
Histon, *vil.*, Cambs, Eng.; 5 m. N. of Cambridge; lge. jam and fruit preserving ind., seeds.
Hitchin, *mkt. t., urb. dist.*, Herts, Eng.; in gap through Chiltern Hills, 35 m. N. of London; light engin., tanning, chemicals, distilling; p. (1951) *19,959*.
Hjelmar Lake, Sweden; S.W. of L. Malar; a. 185 sq. m.
Hjörring, *t.*, Jutland, N. Denmark; textiles, engin., food processing; p. (1947) *13,346*.
Hlaing (Rangoon), *R.*, Burma; flows to G. of Martaban.
Hobart, *c., cap.*, Tasmania, Australia; on R. Derwent; gr. fruit exp.; zinc, cadmium, superphosphates; p. (1958) *105,110*.
Hobbs, *t.*, N.M., U.S.A.; oilwell area; supply ctr.; p. (1950) *13,875*.

Hoboken, *t.*, Antwerp, Belgium; shipbldg.; p. (estd. 1957) *30,552*.
Hoboken, *c.*, N.J., U.S.A.; lge. ocean commerce; p. (1950) *50,676*.
Hobro, *spt.*, Jutland, Denmark; at W. end of Mariager Fjord; p. *7,699*.
Höchst, *t.*, Hessen; Germany; on R. Main; p. *15,791*.
Hochstetter, *mtn.*, S.I., N.Z.; in Southern Alps; alt. 11,200 ft.
Hoddesdon, *t.*, *urb. dist.*, Herts, Eng.; in Lea valley 4 m. S. of Ware; brewing; p. (1951) *13,728*.
Hodeida, *spt.*, Yemen, Arabia; on Red Sea; naval base; p. *50,000*.
Hodmezovarsarhely, *t.*, S.E. Hungary; wheat, fruit, tobacco, cattle; p. *61,739*.
Hof, *t.*, Bavaria, Germany; on R. Saale; textiles, iron, machin., porcelain, brewing; p. (estd. 1954) *60,600*.
Hoffman, *mtn. peak* of the Sierra Nevada, California; alt. 8,108 ft.
Hofuf, *t.*, Hasa, Saudi Arabia; p. *31,500*.
Hog's Back, Surrey, Eng.; chalk ridge; alt. 505 ft.
Hohe Tauern, *Alpine range*, Tyrol, Austria; rugged crystalline rocks; highest point, Grau Glockner, alt. 12,461 ft.
Hohenlimburg, *t.*, N. Rhine–Westphalia, Germany; nr. Dortmund; cas.; textiles, iron, steel; p. (estd. 1954) *24,400*.
Hohenstein-Ernstal *t.*, Saxony, Germany; textiles, metal goods; p. *16,754*.
Hohenzollern, *former prov.*, Germany; Upper Danube; a. 441 sq. m.
Hokiang, *prov.*, China; a. 50,816 sq. m.; cap. Kaimusze; p. (estd. 1947) *1,298,000*.
Hokitikia, *t.*, S.I., N.Z.; on W. cst., 20 m. S. of Greymouth; p. (1951) *2,990*.
Hokkaido, *lge. I.*, Japan, N. of Honshu; a. 34,276 sq. m.; p. (1950) *4,295,567*.
Holbaek, *t.*, Zealand, Denmark; W. of Copenhagen; p. *13,467*.
Holbeach, *mkt. t.*, S. Lincoln, Eng.; in Fens, 7 m. E. of Spalding; agr., brewing; p. (1948) *5,382*.
Holborn, *metropolitan bor.*, London, Eng.; immediately N. of City; p. (1951) *24,806*.
Holderness, *div.*, E.R. Yorks, Eng.; between R. Humber and N. Sea; agr. and pastoral.
Holguin, *t.*, E. Cuba, W. Indies; exp. cattle, maize, tobacco, hardwoods; p. *171,997*.
Holland, *see* **Netherlands**.
Holland, Parts of, *admin. div.* of Lincoln, Eng.; adjoining the Wash; ch. ts. Boston, Spalding; a. 419 sq. m.; p. (1951) *101,545*.
Holland, *t.*, Mich., U.S.A.; p. (1950) *15,858*.
Holland, N., *prov.*, Netherlands; a. 1,081 sq. m.; p. (1947) *1,794,070*.
Holland, S., *prov.*, Netherlands; a. 1,130 sq. m.; p. (1947) *2,308,382*.
Holidaysburg, *bor.*, Penns., U.S.A.; coal, iron ore, limestone; foundries, machine shops; p. (1950) *6,483*.
Holloway, N. dist., Islington bor., London, Eng.
Hollywood, sub. Los Angeles, Cal., U.S.A.; ctr. of film industry.
Holmesdale, Vale of, *geographical sub-region*, Kent, E. Surrey, Eng.; extends along foot of N. Downs escarpment E. from Dorking; drained by Rs. Mole, Darent, Medway, Len, Stour; heavy clay soils; woodland or rich meadowland; dairy farming; some cultivation along N. and S. fringe; ch. ts., Dorking, Reigate, Sevenoaks, Maidstone, Ashford have grown up on gaps through hills to N. and S. of the Vale; length 60 m., average width 1 m.
Holmfirth, *t.*, *urb. dist.*, W.R. Yorks, Eng.; 5 m. S. of Huddersfield; textiles, engin.; p. (1951) *19,073*.
Holroyd, *t.*, N.S.W., Australia; sub. of Sydney, p. *15,915*.
Holstein, former Danish Duchy, now inc. in Schleswig-Holstein *Land* of Germany.
Holston, *R.*, U.S.A.; head of Tenn. R.; flows through Va. and Tenn.; length 300 m.
Holsworthy, *rural dist.*, *mkt. t.*, N. Devon, Eng.; p. (rural dist. 1951) *6,196*.
Holt, *t.*, Denbigh, Wales; on R. Dee, 7 m. S. of Chester.
Holt, *mkt. t.*, N. Norfolk, Eng.; 5. m. S.W. of Sheringham.
Holyhead, *spt.*, *urb. dist.*, Anglesey, Wales; on Holyhead I.; mail packet sta. for Ireland; light engin., woodwkg., clocks; I. is 7½ m. long, width ½ m. to 4 m.; p. (1951) *10,569*.
Holy I., off cst. of Anglesey, Wales.
Holy I., Scot., in F. of Clyde, nr. I. of Arran.
Holy I. (Lindisfarne), off cst. of Northumberland, Eng.
Holyoke, *c.*, Mass., U.S.A.; impt. mftg. ctr., paper, machin.; on Connecticut R.; seat of Mount Holyoke College for women; p. (1950) *54,661*.
Holytown, *t.*, Lanark, Scot.; nr. Glasgow; coal, steel; p. *20,669*.
Holywell, *mkt. t.*, *urb. dist.*, Flint, N. Wales; woollen, rayon and paper inds.; p. (1951) *8,196*.
Holywood, *spt.*, *urb. dist.*, Down, N. Ireland; on S. shore of Belfast Lough; seaside resort; p. (1951) *6,316*.
Holzminden, *t.*, Lower Saxony, Germany; on R. Weser; chemicals, machin., lumber; p. (estd. 1954) *22,600*.
Homberg, *t.*, N. Rhine–Westphalia, Germany; on R. Rhine opposite Duisburg; coal-mining, machin., chemicals; p. (estd. 1954) *32,200*.
Homburg, *t.*, Hessen, Germany; spa, cas.; iron, machin., dyes, leatherwk.; p. estd. 1954) *29,100*.
Homburg, *t.*, Saar; univ.; iron, wood, glass, brewing; p. (estd. 1954) *23,700*.
Home Counties, term applied to the counties adjoining London, *i.e.*, Middlesex, Surrey, Essex, and Kent; sometimes Hertfordshire, Buckinghamshire, and Berkshire are included, and occasionally Sussex.
Homestead, *bor.*, Penns., U.S.A.; ironwks.; p. (1950) *10,046*.
Homs, *t.*, W. Syria; on R. Orontes; ancient Emesa; silk, textiles; p. (1950) *224,094*.
Honan, *fertile prov.*, China; traversed by Yellow R.; cap. Kaifeng; cereals, coal; a. 64,545 sq. m.; p. (1953) *44,214,594*.
Honda, *t.*, Tolima dep., Colombia; oil, coffee p. *12,424*.
Honduras, *rep.*, Central America; mtnous.; bananas, coconuts, coffee, hardwoods; panama hat mkg.; silver and lead mng.; cap. Tegucigalpa, a. 43,227 sq. m.; p. (estd. 1957) *1,768,900*.
Honduras, British, *see* British Honduras.
Hönefoss, *t.*, N.W. Oslo, Norway; p. *3,538*.
Honesdale, *bor.*, Penns., U.S.A.; coal, textiles, shoes, glass; p. (1950) *5,662*.
Honfleur, *spt.*, Caen, France; fine harbour; p. (1954) *8,661*.
Hong Kong, *Brit. I.* and *Crown Col.*, China; at mouth of R. Canton; inc. peninsula of Kowloon and Is.; cap. c. Victoria; total a. 391 sq. m.; univ.; military and sm. naval base; engin., cotton inds., shipbldg.; p. (estd. 1957) *2,677,000*.
Honiton, *mkt. t.*, *mun. bor.*, E. Devon, Eng.; on R. Otter, 16 m. E. of Exeter; trout fishing; p. (1951) *4,614*.
Honolulu, *c.*, *cap.*, Hawaiian Is.; on the I. of Oahu; gd. harbour, fruit, canning, sugar; p. (1950) *245,612*.
Honshu, *lgst. I.* of Japan; oil; a. 88,919 sq. m.
Hood Mt., highest peak Cascade range, Ore., U.S.A.; alt. 11,225 ft.
Hoogeven, *t.*, Drenthe, Netherlands; p. (1951) *21,617*.
Hooghli or **Hughli**, *R.*, W. branch of R. Ganges, India; flows into Bay of Bengal; Calcutta on its banks.
Hook of Holland, *spt.*, Netherlands; packet sta. with steamer connections to Harwich, Eng.
Hooker Mt., Rockies, Brit. Columbia, Canada.
Hoole, *t.*, *urb. dist.*, Cheshire, Eng.; 2 m. N.E. of Chester; mnfs.; p. (1951) *9,054*.
Hoopstad, *t.*, Orange Free State, S. Africa; on Vet R.
Hoorn, *old fishing t.*, N. Holland, Netherlands; on Ysselmeer, 20 m. N. of Amsterdam; cheese and cattle mkts.; birthplace Tasman, discoverer of Tasmania and New Zealand; founder of Batavia; p. (1948) *12,770*.
Hoosack, *mtns.*, part of Green Mtn. range, Mass., U.S.A.
Hoosick Falls, *t.*, N.Y., U.S.A.; paper, elec. goods; agr. implements; p. (1950) *4,297*.
Hopedale, *t.*, Labrador cst., Newfoundland, Canada.
Hopei, *prov.*, China; cap. Tsingyuan; cereals, cotton, iron ore; a. 54,154 sq. m.; p. (1953) *35,984,644*.
Hopetown, *t.*, C. of Good Hope, S. Africa; on Orange R.; p. *2,215*.

Hopewell, *t.*, Va., U.S.A.; synthetic textiles, chemicals, pottery; p. (1950) *10,219*.
Hopkinsville, *c.*, Ky., U.S.A.; p. (1950) *12,526*.
Hoquiam, *spt.*, Wash., U.S.A.; lumber, salmon, tuna fishing, oysters, canning; p. (1950) *11,123*
Hor Mt., Arabia Petrea between Dead S. and G. of Akaba; alt. 4,360 ft.
Horbury, *urb. dist.*, W.R. Yorks, Eng.; nr. Wakefield; p. (1951) *7,966*.
Hordaland, *dist.*, Norway; a. 6,043 sq. m.; ch. t. Bergen; p. (1950) *198,047*.
Horde, *t.*, Germany; nr. Dortmund; coal, iron, steel; p. *35,000*.
Horeb, *mtn.*, Arabia (*see* Sinai).
Horley, *sm. t.*, Surrey, Eng.; on R. Mole, 7 m. S.E. of Dorking.
Hormuz, *I.*, off S. cst. of Persia and nr. Qishm I.; in Hormuz Strait.
Horn, **C.**, most S. point of S. America; noted for severe gales encountered there.
Horn (**North C.**), N. point of Iceland.
Horncastle, *mkt. t.*, *urb. dist.*, Lindsey, Lincoln, Eng.; at confluence of Rs. Bain and Waring at foot of Lincoln Wolds; impt. cattle fairs, malting, corn, horse fairs; p. (1951) *3,809*.
Hornchurch, *t.*, *urb. dist.*, Essex, Eng.; nr. Romford; residtl.; p. (1951) *104,128*.
Hornell, *c.*, N.Y., U.S.A.; rly. car wks.; p. (1950) *15,049*.
Hornsea, *t.*, *urb. dist.*, E.R. Yorks, Eng.; on E. cst., 13 m. N.E. of Hull; seaside resort; p. (1951) *5,324*.
Hornsey, *mun. bor.*, *residtl. dist.*, N. London, Eng.; p. (1951) *98,134*.
Horodenka, *t.*, S.W. Ukraine, U.S.S.R.; linen, brandy; p. (1939) *12,200*.
Horsens, *spt.*, Jutland, Denmark; diesel engines, weaving, elec. goods; p. (1955) *36,567*.
Horsforth, *t.*, *urb. dist.*, W.R. Yorks, Eng.; n Aire valley 4 m. N.W. of Leeds; cloth, tanning, light engin.; p. (1951) *14,105*.
Horsham, *t.*, *urb. dist.*, W. Sussex, Eng.; on R. Arun at W. end of forested dist. of the High Weald; agr., timber, engin., and chemicals; p. (1951) *16,682*.
Horsham, *t.*, Victoria, Australia; on R. Wimmera; pastoral, dairying and agr. dist.; p. (1957) *8,430*.
Horta, *ch. spt.*, Fayal I., Azores, Atl. Oc.; cap. of dist.; fruit, wine, winter resort; p. (1940) *7,000*.
Horten, *spt.*, Norway; nr. Oslo; shipbldg.; p. (1946) *10,775*.
Horton, *R.*, N.W. Terr., Canada; flows into Arctic Ocean.
Horwich, *t.*, *urb. dist.*, S. Lancs, Eng.; on W. edge of Rossendale Fells, 4 m. N.W. of Bolton; bleaching and cotton spinning, calico printing, paper, coal, stone; p. (1951) *15,552*.
Hoshangabad, *t.*, Madhya Pradesh, India; on Narbada R.; p. *10,000*.
Hoshiarpur, *t.*, E. Punjab, India; lacquer wks., inlaid goods; p. (1941) *35,345*.
Hospitalet, *t.*, Spain; p. (1950) *71,580*.
Hot Springs, *c.*, Ark., U.S.A.; health resort; p. (1950) *29,307*.
Houdeng-Goegnies, *commune*, S.W. Belgium; coal, smelting, glasswks.; p. *9,022*.
Houghton-le-Spring, *t.*, *urb. dist.*, Durham, Eng.; 5 m. S.W. of Sunderland; coal; p. (1951) *30,676*.
Houilles, *t.*, Seine-et-Oise, France; p. (1954) *22,974*.
Hounslow, *t.*, Middx, Eng.; sub. W. of London.
Housatonic, *R.*, Conn. and Mass., U.S.A.; empties into Long Island Sound; length 150 m.
Houston, *t.*, *spt.*, Texas, U.S.A.; on Buffalo Bay; rly. ctr., canal to cst., oil refineries, machin.; lge. cotton tr.; p. (1950) *596,163*.
Houston Ship Canal, Texas, U.S.A.; links Houston to head of shallow Galveston Bay and continues through bay to deep water; provides site for heavy inds., cement, paper, fertilisers, oil-refining, etc.; opened 1915; total length 45 m.
Hove, *t.*, *mun. bor.*, E. Sussex, Eng.; on S. cst., continuous with Brighton; residtl; holiday resort; p. (1951) *69,435*.
Howe, **C.**, Victoria; S.E. extremity of Australia.
Howell, *t.*, S.E. Mich., U.S.A.; dairy prod.; p. (1950) *4,353*.
Howrah, *c.*, Bengal, India; faces Calcutta across Hooghli R.; jute, cotton, shipbldg.; p. (1951) *433,630*.
Howth, *hill*, nr. Dublin; alt. 563 ft.
Hoy, *I.*, Orkneys, Scot.
Hoylake, *t.*, *urb. dist.*, Cheshire, Eng.; on N. cst. of Wirral peninsula; residtl.; p. (1951) *30,920*.
Hoyland Nether, *urb. dist.*, W.R. Yorks, Eng.; p. (1951) *15,707*.
Hradec Králové, *t.*, Czechoslovakia; p. (1957) *[55,250*.
Hron, *R.*, Czechoslovakia; trib. of R. Danube.
Hrubieszów, *t.*, E. Poland; nr. Lublin; p. *13,000*.
Hsia-men, *see* **Amoy**.
Hsikwangshan, *industl. t.*, Hunan, China; ctr. of antimony-mining dist., ores smelted locally or at Changsha and Hankow.
Hsingan, *prov.*, China; a. 103,918 sq. m.; cap. Hulun; p. (1947) *1,293,000*.
Huacho, *spt.*, Peru, S. America; p. *16,039*.
Huancavelica, *dep.*, Central Peru; a. 8,297 sq. m.; cap. H.; p. (1947) *300,133*.
Huancayo, *cap.*, Junin, Peru; p. (1947) *33,459*.
Huanuco, *dep.*, Central Peru; a. 15,426 sq. m.; ch. t. Huanco; p. (1947) *309,780*.
Huaras, *ch. t.*, Ancash, Peru; mineral springs, copper, silver; p. (1947) *14,250*.
Huasco, *spt.*, Atacama, Chile; exp. copper, silver, gold, cattle; p. *2,311*.
Hubli, *t.*, Bombay, India; E. of Goa; cotton, silk-weaving; p. (1951) *129,609*.
Hucknall, *industl. t.*, *urb. dist.*, Nottingham, Eng.; 5 m. N. of Nottingham; hosiery, coal; p. (1951) *23,213*.
Huddersfield, *mftg. t.*, *co. bor.*, W.R. Yorks, Eng.; on edge of Pennines, 10 m. S. of Bradford; wool, textiles, chemicals engin.; p. (1951) *129,021*.
Hudiksvall, *spt.*, Sweden; on inlet of G. of Bothnia; timber, wood pulp; p. *8,387*.
Hudson, *t.*, N.Y., U.S.A.; cement, textiles, machin.; p. (1950) *11,629*.
Hudson, *R.*, N.Y., U.S.A.; flows from the Adirondacks to New York Harbour; with valley of Mohawk R. makes gr. highway of tr. between Gr. Lakes and New York; length 350 m.
Hudson Bay, *inland sea*, Canada; communicating by Hudson's Strait (400 m. long) with Davis Strait; salmon, cod; a. 540,000 sq. m.
Hué, *c.*, *cap.*, Annam, Viet-Nam, Indo-China; nr. mth. of Hué R.; royal palace; glass factories; impt. tr.; p. *13,056*.
Huelva, *maritime prov.*, S.W. Spain; copper-mining, vine and olive growing, stock-raising, fisheries, brandy distillery, etc.; a. 3,906 sq. m.; p. (1950) *368,013*.
Huelva, *spt.*, cap. Huelva, Spain; on G. of Cadiz; p. (1950) *63,648*.
Huercal Overa, *t.*, Almeria, S.E. Spain; silver-, lead- and copper-mining; p. *13,030*.
Huesca, frontier *prov.*, N.E. Spain; mtnous.; forested; a. 5,849 sq. m.; p. (1950) *236,232*.
Huesca, *t.*, *cap.*, Huesca prov., Spain; on R. Isuela; cath.; gr. wine and timber tr. with France, pottery, leather, cereals; p. (1949) *23,016*.
Hugh Town, *cap.*, St. Mary's I., Scilly Isles.
Huila, *dep.*, Colombia, S. America; a. 7,990 sq. m.; cap. Neiva; p. (1947) *233,830*.
Huizen, *commune*, W. Netherlands; radio sta.; fishing; p. *7,500*.
Hulan, *t.*, N. Manchuria, China; 20 m. N. of Harbin; tr. ctr.; on Harbin-Aigun rly.; p. *25,000*.
Hull or **Kingston-upon-Hull**, *spt.*, *co. bor.*, E.R. Yorks, Eng.; third pt. of U.K.; at influx of R. Hull, in estuary of the Humber; univ.; impt. mnfs. and gr. shipping tr.; docks, fishing, ship repairing, rope, machin., chemicals, tanning, veg. oils, flour milling, seed crushing, paint, cement; p. (1951) *299,068*.
Hull, *c.*, Quebec, Canada; faces Ottawa across R. Ottawa; sawmills, paper factories; p. (1956) *49,243*.
Humber, *estuary* of Rs. Ouse and Trent, separating Yorks and Lincoln, Eng.; fine waterway; 1–7 m. wide, length 38 m.
Humboldt Bay, *inlet*, Cal., U.S.A.
Humboldt, *mtn. range*, E. Nevada, U.S.A.
Humboldt Current, *see* **Peru Current**.
Hume Reservoir, *artificial lake*, N.S.W., Australia; formed by dam where R. Murray leaves Gr. Dividing Range, just below confluence with R. Mitta Mitta; supplies water for irrigation in upper Riverina dist.; approx. capacity 4,000 million cu. ft.
Hunan, *inland prov.*, China; coal, zinc, tea, wheat, rice, tung oil; cap. Changsha; a. 79,378 sq. m.; p. (1953) *33,226,954*.
Hungary, *rep.*, Central Europe; ch. physical features; central plain of treeless steppes; R. Danube, R. Tisza, Carpathian mtns., L.

Balaton; hot and dry summer, rainfall moderate; race, Magyar; ch. inds.; agr., wheat, maize, potatoes, sugar-beet, horse-breeding, cattle, sheep, pigs; coal, lignite, bauxite; milling, brewing, sugar; communications good; cap. Budapest; a. 35,912 sq. m.; p. (1958) *9,868,000*.

Hungerford, *mkt. t., rural dist.*, Berks, Eng.; on R. Kennet, 6 m. W. of Newbury; p. (rural dist. 1951) *9,411*.

Hunmanby, *t.*, E.R. Yorks, Eng.; S. of Scarborough; bricks and tiles.

Hunsrück, *mtn. a.*, Rhineland-Palatinate, Germany; highest point, 2,677 ft.

Hunstanton, New, *urb. dist.*, Norfolk, Eng.; on S.E. shore of The Wash; seaside resort; p. (1951) *3,414*.

Hunter, *R.*, N.S.W., Australia; rises in Liverpool Range, Gr. Dividing Range, flows S and E. into Tasman Sea at Newcastle; valley of Hunter and ch. trib. Goulburn lead from Newcastle up to Cassilis Gate through Gr. Dividing Range to interior; length, approx. 250 m.

Huntingburg, *t.*, S.W. Ind., U.S.A.; pottery, light engin.; p. (1950) *4,056*.

Huntingdon, *inland co.*, Eng.; a. 366 sq. m.; mkt. gardening, fruit-growing, agr.; p. (1951) *69,273*.

Huntingdon, *co. t., mun. bor.*, Hunts, Eng.; on R. Ouse, 6 m. above St. Ives; birthplace of Oliver Cromwell; canning, engin., processed rubber, confectionery; p. (1951) *5,282*.

Huntingdon, *bor.*, Penns., U.S.A.; engin., paper; p. (1950) *7,330*.

Huntingdon, *t.*, Ind., U.S.A.; on Little R.; rly. and wool wks.; p. (1950) *15,079*.

Huntingdon, *t.*, W. Va., U.S.A.; on Ohio R.; machine wks., lumbering; p. (1950) *86,353*.

Huntly, *mkt. burgh*, Aberdeen, Scot.; at confluence of Rs. Bogie and Deveron; farming, woollens; p. (1951) *4,197*.

Huntly, *t.*, N.I., N.Z.; on Waikato R.; 65 m. S. of Auckland; coal; p. (1951) *3,812*.

Huntsville, *t.*, Ala., U.S.A.; cotton-mills; p. (1950) *16,437*.

Huon, *I.*, 170 m. N. of and *dep.* of New Caledonia, Pacific; very barren group.

Huonville, *t.*, S.E. Tasmania, Australia; fruit, cattle; p. (1947) *5,037*.

Hupeh, *prov.*, China; N. of the Yangtze-Kiang; cap Wuhan; tea, cotton, wheat, coal, paper; a. 71,955 sq. m.; p. (1953) *27,789,693*.

Hurlford and Crookedholme, *ts.*, Ayr, Scot.; nr. Kilmarnock; iron, fireclay, worsteds, coal-mng.

Huron, *L.*, between Canada and U.S.A.; one of the Gr. Lakes of the St. Lawrence basin; a. 23,610 sq. m.; 280 m. long.

Huron, *t.*, S.D., U.S.A.; meat prod.; p. (1950) *12,788*.

Hurstmonceux, *vil.*, nr. Hastings, Sussex, Eng.; cas.; site of Royal Greenwich Observatory.

Hurstpierpoint, *mkt. t.*, Sussex, Eng.; 7 m. N. of Brighton; p. *3,100*.

Hurstville, *sub.*, S. of Sydney, N.S.W., Australia; p. *22,667*.

Hürth, *t.*, N. Rhine-Westphalia, Germany; S.W. of Cologne; lignite-mining, machin., chemicals; impt. elec. power sta.; p. (estd. 1954) *37,400*.

Husi, *mftg. t.*, Romania; tobacco, wine; p. *16,605*.

Husum, *spt.*, Schleswig-Holstein, Germany; rly. junction; p. (estd. 1954) *24,500*.

Hutchinson, *c.*, Kan., U.S.A.; p. (1950) *33,575*.

Hutt, *t.*, N.Z.; p. (estd. 1958) *90,600*.

Huy, *t.*, Belgium; on R. Meuse; nr. Liége; vine-growing dist.; p. (1947) *13,064*.

Huyton with Roby, *urb. dist.*, Lancs, Eng.; sub. of Liverpool; p. (1951) *55,783*.

Hwai Ho (Huai Ho), *R.*, N. China; rises in Tungpeh Shan, flows E. across N. China plain into Hungtse Hu, thence N.E. into Yellow Sea or S.E. into Yangtze-Kiang; subject to disastrous floods and changes of course.

Hwang Hai (Yellow Sea), arm of the Pac. Oc. between Korea and China; branches into the Gs. of Chihli (Pohai) and Liaotung; greatest width 400 m., length 600 m.

Hwang Ho (Yellow R.), China; rises nr. source of Yangtze-Kiang, Tibet, flows through N.W. China into G. of Chihli (Pohai); length 2,610 m.

Hyde, *industl. mkt. t., mun. bor.*, Cheshire, Eng.; on R. Tame, 5 m. S.E. of Manchester; textiles, clothing, engin., leathercloth, rubber, paper prod.; p. (1951) *31,498*.

Hyderabad, *former st.*, absorbed into Andhra Pradesh 1 Nov. 1956; rice, cotton, wheat; a. 82,313 sq. m.; p. (1951) *18,652,964*.

Hyderabad, *ch. t.*, of A.P. India; on R. Musi; walled t. and impt. comm. ctr.; p. (1951) *1,085,722*.

Hyderabad, *t.*, Sind, Pakistan; on R. Indus; arsenal; silks, gold and silver wk., pottery; p. (1951) *241,801*.

Hydra, *I.*, Greece; off Morea; a. 26 sq. m.; p. *3,693*.

Hyères, *winter health resort*, Var, France; nr. Toulon; vines, oranges, flowers, fruit; p. (1954) *29,061*.

Hyères, Iles d', *sm. archipelago of Is.*, off French Riviera cst.

Hytne, *t., mun. bor.*, Kent, Eng.; on S. cst., 3 m. W. of Folkestone; one of the Cinque Ports; Royal school of musketry; p. (1951) *9,218*.

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Iasi, *see* Jassy.

Iba, *spt., mun.*, cap. of Zambales prov., Luzon, Philippine Is.; uranium, lumbering; p. *8,299*.

Ibadan, *t.*, Yoruba, cap. of Western prov., Nigeria, W. Africa; 60 m. N. of Lagos; silk, tobacco, cotton; univ. college established 1947; p. (estd. 1958) *500,000*.

Ibagué, *cap.*, Tolima, Colombia, S. America; cotton, tobacco, sugar; p. (1947) *27,448*.

Ibarra, *t.*, Ecuador, S. America; at foot of Volcano of Imbabura; p. (1938) *13,454*.

Iberian Peninsula, S.W. peninsula of Europe; containing sts. of Spain and Portugal; derived from the Iberian people who lived along the R. Ebro (Iberus); a. 229,054 sq. m.; p. *35,470,953*.

Iberville, *t.*, Montreal, Canada; light engin.; p. *3,454*.

Ibicui, *t.*, S. Paraguay; iron ore; p. *14,350*.

Ica, *cst. dep.*, Peru; cap. Ica; a. 9,796 sq. m.; p. (1947) *155,794*.

Iceland, *I.*, N. Atl. Oc.; 130 m. E. Greenland; independent rep.; barren and mtnous., with ice-covered plateaus and volcanoes; glacier fields cover 5,000 sq. m.; highest peak, Oraēfa Jōkull, alt. 6,950 ft.; main ind. fishing; cap. Reykjavik; a. 39,709 sq. m.; p. (1957) *166,831*.

Ichang, *pt.*, Hupeh, China; on Yangtze-Kiang; cotton, rice, oil; large tr.; p. *107,940*.

Ichinomiya, *t.*, S.E. Honshu, Japan; ancient Shinto shrine; textiles, pottery; p. (1947) *53,376*.

Ichow, *c.*, Shantung, China; at foot of Shantung highlands, 80 m. N.E. of Tungshan (Suchow); silk ind.; p. (estd.) *100,000*.

Icknield Way, *ancient highway* in S. Eng.; from nr. Bury St. Edmunds, through Wantage to Cirencester and Gloucester.

Icod, *commune*, N.W. Tenerife, Canary Is.; agr., silk; p. *13,263*.

Ida, *mtn.*, Central Crete, Greece; famous in Greek mythology; 8,058 ft.

Idaho, *mtn. st.*, U.S.A.; part of Rocky Mtns. in st.; rich mineral region; cap. Boise City; a. 83,557 sq. m.; p. (1950) *588,637*.

Idaho Falls, *t.*, Idaho, U.S.A.; p. (1950) *19,218*.

Idar-Obestein, *t.*, Rhineland-Palatinate, Germany; gem cutting, jewellery; p. (estd. 1954) *25,800*.

Idle, *mftg. t.*, W.R. Yorks, Eng.; in Aire valley, 3 m. N. of Bradford; woollens, motor cars; p. *7,900*.

Idle, *R.*, Notts, Eng.; trib. to R. Trent.

Idrija, *t.* N.W. Jugoslavia; ancient cas.; mercury mines; cinnabar; p. *10,317*.

Ifni, *Spanish prov.*, Atlantic cst., N. Africa; a. 741 sq. m.; cap. Sidi Idni; p. *35,000*.

Igarka, *sm. t.*, Siberia, R.S.F.S.R.; on R. Yenesei, 400 m. from its mouth; nickel-mines, lumber-mills; p. (1939) *18,000*.

Iglesias, *t.*, Sardinia, Italy; N.W. of Cagliara; cath.; p. *23,575*.

Igualada, *t.*, Barcelona, Spain; leather, textiles; ctr. of wine-producing dist.; p. *13,438*.

Iguassu, *R.*, S. Brazil; famous falls.

Iisalmi, *t.*, Finland; E. of Kokkola; p. *25,000*.

Ijmuiden, *t.*, W. Netherlands; on cst. at mouth of N. Sea Canal; fishing; gasification plant 1956; p. (1948) *27,939*.

Ijsselmeer (Lake Ijssel), Netherlands; shallow expanse of water, formerly Zuider Zee; separated from N. Sea by Wierengen–Friesland Barrage (length 19 m.) constructed 1932; active land reclamation in progress round margins; a. (1952) 1,055 sq. m.; when reclama-

tion has been completed, water a. will be reduced to 408 sq. m.

Ilagan, *cap.*, Isabela prov., Luzon, Philippines; tobacco; p. *23,000*.

Ilan, *treaty pt.*, E. Manchuria, China; furs; p. *50,000*.

Ilchester, *t.*, Somerset, Eng.; on R. Yeo; N.W. of Yeovil; nr. birthplace of Roger Bacon; p. *485*.

Iletsk, *t.*, Kazakh. S.S.R., on R. Ilek, trib. of R. Ural; S. of Chkalov; rock salt; p. *13,010*.

Ilford, *mun. bor.*, Essex, Eng.; E. sub. of London on R. Roding; bordering on Hainault Forest; paper-mills, elec. and radio equipment, films and photoplate wks.; p. (1951) *184,707*.

Ilfracombe, *t.*, *urb. dist.*, N. Devon, Eng.; on cst. of Bristol Channel; seaside resort; p. (1951) *9,218*.

Ilhavo, *spt.*, Beira Litoral, Portugal; glass, porcelain, fisheries; p. *16,335*.

Ilhéus, *spt.*, Baia, Brazil; p. *15,566*.

Ili, *R.*, Central Asia; rises in Tien Shan and flows into L. Balkhash; length 850 m.

Ilia (**Elis**), *prefecture*, S. Greece; cap. Pyrgos; p. (1940) *189,729*.

Ilion, *t.*, N.Y., U.S.A.; firearms; office equipment; p. (1950) *9,363*.

Ilkeston, *t.*, *mun. bor.*, Derby, Eng.; 7½ m. W. of Nottingham; coal, iron, engin., locknit fabrics, needles, plastics; p. (1951) *33,674*.

Ilkley, *t.*, *urb. dist.*, *spa*, W.R. Yorks, Eng.; on R. Wharfe 15 m. N.W. of Leeds; local mkt.; p. (1951) *17,265*.

Ill, *R.*, E. France; rises in Jura Mtns., flows N. through Mulhouse, Colmar, Strasbourg, enters Rhine 12 m. below Strasbourg; length 135 m.

Illawara, *dist.*, N.S.W., Australia; forming belt of land between S. tableland and cst.; very fertile; dairy farming; coal seams; ch. ts., Kiama, Wollongong, Bulli, Geringong.

Ille-et-Vilaine, *dep.*, N.W. France; on English Channel; a. 2,699 sq. m.; agr.; cap, Rennes; p. (1954) *586,812*.

Illimani, Mt., nr. La Paz, Bolivia; 21,184 ft.

Illinois, *st.*, U.S.A.; named after its principal R.; a large trib. (360 m.) of Mississippi R.; cap. Springfield; lgst. t. Chicago; a. 56,400 sq. m.; p. (1950) *8,712,176*.

Illogan, *vil.*, Cornwall, Eng.; N.W. of Redruth; tin, copper; p. (par.) *8,300*.

Illyria, *region*, mainly Jugoslavia, stretching along Adriatic Sea from Trieste in N. to Albania in the S. and inland as far as Rs. Danube and Morava.

Ilmen, *L.*, S. of Novgorod, Russia; a. 360 sq. m.; fisheries.

Ilmenau, *t.*, Thuringia, Germany; at N. base of Thüringer Wald, S.S.E. of Gotha; porcelain, toys, glass; p. (estd. 1954) *19,500*.

Ilminster, *t.*, *urb. dist.*, Somerset, Eng.; 10 m. S.E. of Taunton; cutstone, concrete, collars, radio valves; p. (1951) *2,610*.

Ilobasco, *c.*, Salvador, Central America; cattle, coffee, sugar, indigo; p. *21,225*.

Iloilo, *cap.*, prov. of Iloilo, Panay, Philippines; coconut oil; p. (1948) *110,122*.

Ilorin, *t.*, N. Nigeria, Brit. W. Africa; on Lagos–Kano rly.; agr. and caravan ctr.; p. (1946) *54,686*.

Ilsley, *t.*, Berks, Eng.; 11 m. S. of Abingdon; sheep mkts. and fair.

Iluka, *spt.*, N.S.W., Australia; on Clarence R., N. of Sydney.

Imabari, *t.*, *spt.*, N.W. Shikoku, Japan; on shore of Inland Sea; mnfs. cotton textiles, paper, canned fruits; p. (1947) *55,557*.

Imbabura, *prov.*, Ecuador; a. 2,414 sq. m.; cap. Ibarra; p. (1950) *146,893*.

Imbros, *Turkish I.*, Ægean Sea; fertile fruit-growing dist.

Immingham, *pt.*, Lindsey, Lincoln, Eng.; on S. cst. of Humber, 8 m. N.W. of Grimsby; lge. docks; p. *2,200*.

Imola, *t.*, Italy; S.E. of Bologna; cath.; glass, pottery; p. *37,000*.

Imperial Valley, S. Cal., U.S.A.; extends 30 m. S.E. from Salton Sea to Mexican bdy.; mainly below sea-level; hot, arid climate; cotton, dates, wheat under irrigation; water brought from Colorado R. by Imperial Canal (Laguna Dam) and All-American Canal (Imperial Dam) nr. Yuma; total irrigated a. (1938) 700 sq. m.

Imphal, *ch. t.*, Manipur, India; p. *80,000*.

Inari L., *extensive L.*, Lappi, Finland; outlet into Barents Sea; a. 685 sq. m

Inca, *t.*, I. of Majorca, Spain; p. *10,547*.

Ince-in-Makerfield, *urb. dist.*, Lancs., Eng.; nr. Wigan; coal, cotton, engin., wagon-bldg.; p. (1957) *20,080*.

Inchgarvie, *islet*, F. of Forth, Scot.; forms central support of the two gr. spans of Forth Bridge.

Inchkeith, *fortfd. I.*, F. of Forth, Fife, Scot.

Inchon, *spt.*, S. Korea; on W. cst.; exp. soya beans, rice; p. (1949) *265,767*.

Indan, *mun.*, Luzon, Philippine Is.; rice; p. *11,240*.

Independence, *t.*, Mo., U.S.A.; on prairie, S. of Missouri R.; p. (1950) *39,963*.

Independence, *t.*, Iowa, U.S.A.; p. (1950) *4,865*.

Independence, *t.*, Kan., U.S.A.; p. (1950) *11,335*.

India, *peninsula subcontinent*, Asia; now subdivided into the Dominion of the Union of India, the Dominion of Pakistan, the Dominion of Ceylon; ch. mtns.: Himalayas (Everest 29,002 ft.), E. and W. Ghats, Sulaimain range, Hindu Kush, Karakoram; Ganges Plain, Thar desert; ch. Rs.: Indus, Ganges, Brahmaputra; climate: monsoonal; vegetation: dense forests in region of high rainfall; sal, teak; elsewhere savannah or jungle, bamboo; coconuts on cst.; variety of races; inds.: agr., rice, wheat, millet, sugar-cane, cotton, jute, tea, rubber, linseed, cattle, sheep, goats; forests, timber; minerals: coal, petroleum, manganese, lead, gold, silver; mnfs.: cottons, jute, milling, engin., machin., brass, carpets; communications: good rail and sea; total a. 1,606,742 sq. m.; total p. (1951) approx. *433,000,000*.

India (**Indian Union**), *free and independent rep.*, within the Commonwealth; consisting of 14 States and 6 Union Territories administered by the Central Government; ch. ts.: Delhi and Bombay; mnfs.: metal wks., jute, cotton, tea, rice, sugar, rubber; a. *1,139,000* sq. m.; p. (1954) *376,750,000*.

India, French, possessions of France in India were the four settlements, Karikal, Mahé, Pondicherry, and Yanaon; now integrated in India.

India, Portuguese, consists of Gôa, (Pangim), Angediva São Jorge and Morcegos Is., on Malabar cst.; Daman (*Port.* Damão), Dadarā and Nagar-Aveli on G. of Cambay, and Diu with Gogola and Simbor on S. cst. of Bombay; salt wks., coconuts, fish, spices, manangese; cap. Gôa (Pangim); a. 1,537 sq. m.; p. (1940) *624,177*.

Indian Harbour, Labrador cst., nr. Hamilton Inlet, Canada.

Indian Ocean extends from S. of Asia and E. of Africa to the C. of Good Hope and C. Leeuwin in Australia, separated from the Pacific by the Malay Archipelago and Australia; a. 29,340,000 sq. m.

Indian Territory, since 1907 part of the st. of Okla., U.S.A.; Indian reservations have an a. of 5 sq. m.

Indiana, *st.*, between Kentucky and Michigan, Illinois and Ohio, U.S.A.; agr., coal, limestone, clay, petroleum; cap. Indianapolis; a. 36,291 sq. m.; p. (1950) *3,934,224*.

Indianapolis, *cap.*, Ind., U.S.A.; on White R.; impt. rly. ctr.; meat packing; p. (1950) *427,173*.

Indianola, *t.*, W. Miss., U.S.A.; cotton mkt.; processing plants; p. (1950) *4,369*.

Indigirka R., Yakut, U.S.S.R.; flows into Laptev Sea.

Indo-China, Asia; federation in French Union until end of hostilities July 1954. Consists of the three sts. of Viet-Nam, Cambodia and Laos; rice, rubber, pepper, hides; coal, zinc, tin; a. 286,000 sq. m.; p. *27,030,000*.

Indonesia, *rep.* (comprising Java, Sumatra, Borneo, Celebes, 15 minor Is., thousands of smaller ones); climate: tropical, abundant rainfall; vegetation: equatorial forest; race: Malay; agr.: rice, maize, sweet potatoes, sugar-cane, coffee, tea, tobacco, oil palms, cinchona spices, rubber; petroleum, tin; communications poor; cap. Jakarta (Batavia); p. (1955) *77,987,879*.

Indore, *t.*, Madhya Pradesh, Indian Union; in valley of R. Narbada; cotton-mills; p. (1951) *310,859*.

Indre, *dep.*, Central France; agr. and industl.; cap. Châteauroux; a. 2,666 sq. m.; p. (1954) *247,436*.

Indre-et-Loire, *dep.*, Central France; to the N.W.

of Indre; agr., vines, silk factories; cap. Tours; a. 2,377 sq. m.; p. (1954) *364,706*.

Indus, *R.*, Pakistan; rises in Tibet, and flows through Kashmir, Punjab, Sind, to the Arabian Sea; length 1,800 m.

Inebolu, *spt.*, Anatolia, Turkey; nr. Kastamonu, on cst. of Black Sea; tr. in mohair and wool; p. *10,000*.

Infanta, *mun.*, Luzon, Philippine Is.; p. *20,331*.

Ingersoll, *t.*, Ontario, Canada; N.E. of Hamilton; p. *5,000*.

Ingleborough, *mtn.*, near Settle, Yorks, Eng.; limestone; underground caves, stalactites, stalagmites; alt. 2,373 ft.

Ingleton, *vil.*, W.R. Yorks, Eng.; at foot of Ingleborough; ctr. for geologist and tourist; p. (par.) *2,400*.

Inglewood, *mun. bor.*, Victoria, Australia; mining; p. *1,500*.

Inglewood, *c.*, S.W. Cal., U.S.A.; chinchilla farms; furniture; light engin.; p. (1950) *46,185*.

Ingolstadt, *t.*, Bavaria, Germany; on Danube, nr. Munich; cas.; machin., cars, tobacco; p. (estd. 1954) *43,300*.

Inhambane, *spt.*, Mozambique; exp. sugar, copra, oil-seeds; p. *20,000*.

Inishmore, *lgst. of Aran Is.*, Galway, Ireland; 30 m. S.W. of Galway; fishing; p. *1,800*.

Inkerman, *t.*, Crimea, U.S.S.R.; nr. E. extremity of Sevastopol harbour; battle 1854.

Inkpen Beacon, *hill*, Hampshire, Eng.; W. end of N. Downs, 7 m. S.W. of Newbury; highest point reached by chalk hills in England; alt. 975 ft.

Inkster, *t.*, S.E. Mich., U.S.A.; residtl.; p. (1950) *16,728*.

Inland Sea, Japan; length 250 m., breadth 10–40 m.; ch. spts.: Hiroshima, Okayama, Kobe.

Inn, *R.*, traversing Switzerland, the Austrian Tyrol and Bavaria; trib. of R. Danube; the ancient Œnus; enters R. Danube at Passau; length 320 m.

Innerleithen, *burgh and health resort*, Peebles, Scot.; on R. Tweed, 5 m. S.E. of Peebles; woollen cloth and knitwear; p. (1951) *2,361*.

Innisfail, *t.*, Queensland, Australia; ch. sugar-producing ctr. of Australia; p. *4,000*.

Innsbruck, *cap.*, the Tyrol, Austria; on R. Inn; commands N. approach to Brenner Pass; univ.; military stronghold; p. (1951) *94,599*.

Inowroclaw, *t.*, N. Poland; nr. Bydgoszcz; rock-salt, iron pyrites; tr. in agr. prod.; p. *36,000*.

Insein, *dist.*, Lower Burma; a. 1,914 sq. m.; p. *331,145*; *cap.* I.; p. *20,487*.

Insterburg, *see* **Tchernjachowsk**.

Interlaken, *t.*, Bernese Oberland, Berne, Switzerland; on R. Aar, between Ls. Thun and Brienz; tourist resort; p. (1941) *3,771*.

International Falls, *t.*, N. Minn., U.S.A.; rly. ctr.; paper; p. (1950) *6,269*.

Inverallochy, *fishing vil.*, Aberdeen, Scot.; on cst. of Buchan peninsula nr. Fraserburgh.

Inveraray, *burgh, co. t.*, Argyll, Scot.; nr. head of Loch Fyne; herring fishing; p. (1951) *503*.

Inverbervie, *burgh*, Kincardine, Scot.; on E. cst., 8 m. S. of Stonehaven; flax, tow spinning, flock, furniture; p. (1951) *885*.

Invercargill, *c.*, *spt.*, S.I., N.Z.; on S.E. cst.; sawmills, meat-freezing plants; p. (estd. 1958) *37,000*.

Inverell, *t.*, N.S.W., Australia; 383 m. N. of Sydney; p. (1958) *8,080*.

Invergordon, *burgh, spt.*, Ross and Cromarty, Scot.; on N. side of Cromarty Firth, 12 m. N.E. of Dingwall; naval pt.; p. (1951) *1,514*.

Inverkeithing, *burgh*, Fife, Scot.; on N. side of F. of Forth, nr. Dunfermline; shipbldg.; p. (1951) *3,703*.

Inverkip, *par., vil.*, Renfrew, Scot.; 6 m. S.W. of Greenock; par. contains Gourock; wat. pl.; p. (1951) *17,288*.

Inverness, *co.*, Scot.; mountainous and well wooded; rising to Ben Nevis 4,406 ft.; Caledonian Canal crosses co.; little cultivation; deer forests and grouse moors, fishing, sheep breeding, distilleries; a. 4,351 sq. m.; p. (1951) *84,924*.

Inverness, *burgh, co. t.*, Inverness, Scot.; on Moray Firth nr. N.E. end of Caledonian Canal; distilleries, light engin.; fisheries and agr.; p. (1951) *28,115*.

Inverurie, *burgh*, Aberdeen, Scot.; on R. Don, 14 m. N.W. of Aberdeen; rly. ctr., wool fair; p. (1951) *5,054*.

Investigator I., off cst. of Eyre Peninsula, S. Australia.

Inyokern, *t.*, E. Cal., U.S.A.; naval ordnance research sta.; p. *12,000*.

Ioannina (**Janina**), *prefecture*, Epirus, Greece; ch. t. Ioannina; p. (1951) *154,568*.

Ioannina (**Janina**), *t.*, Epirus, Greece; nr. Albanian frontier; embroidery; p. (1951) *33,268*.

Iona, *I.*, off cst. of Mull, Argyll, Scot.; early Scottish Christian ctr.; restored abbey; St. Columba's burial place; ancient burial place of Scottish kings.

Ionian Is., *gr.* in Mediterranean, belonging to Greece, formerly under British protection; comprising Kerkyra, (Corfu), Kephallenia, Zákynthos, Levkás, Ithake, Paxos and Ktherá; suffered from severe earthquakes in Aug. 1953; total a. 752 sq. m.; p. (1951) *228,119*.

Ionian Sea, Mediterranean; between Greece on E; Italy and Sicily on W.

Iowa, *st.*, U.S.A.; prairie cty; over 1,000 ft. above sea-level; watered by Mississippi and Missouri; farming, dairying, maize, wheat, oats, potatoes; coal; cap. Des Moines; a. 56,290 sq. m.; p. (1950) *2,621,073*.

Iowa City, Iowa, U.S.A.; farming, stockbreeding; p. (1950) *27,212*.

Ipoh, *t.*, Perak, Malaya; tin; p. *80,874*.

Ipswich, *co. t., co. bor.*, Suffolk, Eng.; at head of estuary of R. Orwell; agr. implements, brewing, clothing, printing; p. (1951) *104,788*.

Ipswich, *t.*, N.E. Mass., U.S.A.; textiles, printing; p. (1950) *4,952*.

Ipswich, *c.*, S.E. Queensland, Australia; coal, woollens; p. (1957) *41 700*.

Iquique, *c.*, *pt.*, Tarapaca, Chile; iodine and nitrate of soda tr.; p. (1952) *39,576*.

Iquitos, *ch. t.*, Loreto, Peru; shipyards, docks, rubber, cotton, tobacco; p. (estd. 1950) *42,01*

Iraklion (**Heraklion**), *prefecture*, Crete; cap. Iraklion; p. (1940) *168,717*.

Iraklion (**Candia**), *cap.*, Crete; central position on N. cst. at foot of gently sloping, terraced hill slopes; wine, olive oil, fishing; p. (1940) *42,357*.

Iran, *see* **Persia**.

Irapuata, *c.*, central Mexico; agr. ctr.; p *32,337*

Iraq, *rep.* (since July 1958), S.W. Asia; approx. co-extensive with ancient Mesopotamia; ch. Rs.: Tigris, Euphrates; climate, hot, rainless in summer, cool in winter, scanty rainfall; races: Arabs, Kurds; language, Arabic; ch. crops: dates, wheat, maize, barley, beans, cotton; impt. oilfields; communications: rail, Mosul–Baghdad–Persian G.; cap. Baghdad; a. 116,600 sq. m.; p. (1957) *6,538,109*.

Irbit, *t.*, Sverdlovsk region, U.S.S.R.; mkt., famous fair; p. *12,000*.

Ireland, 2nd. lgst. I., Brit. Is.; ch. physical features: L. Neagh in N.E., Rs. Shannon, Boyne, Blackwater, Barrow, Nore, Suir, Liffey; ch. mtn. groups—all near cst.—Mourne Mtns., Wicklow Mtns., Mtns. of Kerry; peat bogs over considerable areas, large areas grassland; climate, mild and damp; vegetation, chiefly meadowland; communications, rail and canal; a. 32,531 sq. m.; greatest length 280 m., width 180 m.; p. (approx.) *4,265,530*.

Ireland, Republic of (**Eire**), *sov. ind. st.* covering 26 of the 32 cos. of Ireland inc. the 3 provs. of Leinster, Munster and Connaught (Connacht) together with 3 of the cos. (Cavan, Monaghan and Donegal), of the former. prov. of Ulster. Ceased to be member of Brit. Commonwealth in 1949; agr.: potatoes, turnips and other root crops, oats, barley, hay, cattle, sheep, pigs, horses; fisheries; mnfs.: grain milling, flour, dairy produce, bacon, brewing, tobacco, clothing, etc.; religion, R.C.; cap. Dublin; a. 26,600 sq. m.; p. (1956) *2,894,822*.

Irian, Indonesian name for Netherlands New Guinea.

Iriga, *mun.*, Luzon, Philippine Is.; hemp, copra, agr.; p. *30,005*.

Iringa, *t.*, Tanganyika; coffee, cattle, fruit; p. *5,000*.

Irish Sea, Brit. Is.; between Gr. Britain and Ireland, connecting N. and S. with Atl. Oc. 200 m. long; 50–140 m. wide; greatest depth 140 fathoms; a. 7,000 sq. m.

Irkutsk, *t.*, R.S.F.S.R.; on R. Angara; on Trans-Siberian Rly.; engin., sawmilling, petroleum refining, chemicals; p. (1959) *365,000*.

Irlam, *t., urb. dist.*, Lancs, Eng.; steel, engin., tar, soap, glycerine, margarine; p. (1951) *15,063*.
Iron County, Utah, U.S.A.; contains vast reserves of iron ore; not yet developed due to inaccessibility.
Iron Gate, Romania; famous rapids in R. Danube.
Iron Knob, *t.*, S. Australia; S.W. of Port Augusta; iron-ore.
Iron Mountain, *t.*, Mich., U.S.A.; former iron mining ctr.; p. (1950) *9,679*.
Ironton, *c.*, Ohio, U.S.A.; machin.; coal, iron, fireclay; p. (1950) *16,333*.
Ironwood, *t.*, Mich., U.S.A.; iron-mining, lumbering; p. (1950) *11,466*.
Irrawaddy, *R.*, Burma; flows S. to Bay of Bengal; navigable for lge. steamers 900 m.; irrigation wks.; length 1,300 m.
Irtysh, *R.*, Siberia, U.S.S.R.; trib. of R. Ob; two-thirds navigable; crossed by Trans-Siberian Rly. at Omsk; length 2,500 m.
Irun, *t.*, N.E. frontier, Spain; nr. San Sebastian; tanning and brandy distillery; paper mills, iron; Roman remains; p. *14,638*.
Irvine, *burgh, spt.*, Ayr, Scot.; nr. mouth of R. Irvine, 7 m. W. of Kilmarnock; hosiery, lt. engin., bottle, chemical wks.; p. (1951) *14,741*.
Irvington, *t.*, N.J., U.S.A.; p. (1950) *59,201*.
Irvington, *t.*, N.Y., U.S.A.; residtl.; light engin.; p. (1950) *3,657*.
Irwell, *R.*, S. Lancs, Eng.; flows past Manchester to the Mersey; length 30 m.
Isarco, *R.*, N. Italy; rises nr. Brenner Pass, flows S. into R. Adige at Bolzano; used by main rail and road routes from N. Italy to Austria; length 50 m.
Ischia, *I.*, in G. of Naples, Italy; saline baths; cap. I.; a. 26 sq. m.; p. *30,000*.
Ischl, *t.*, Austria; wat. pl., saline baths; p. *14,004*.
Isdud (Ashdod), *ancient Philistine c.*, Israel; 20 m. S. of Jaffa.
Ise Bay, *inlet*, S. Honshu, Japan; flanked by ch. textiles mftg. region of Japan containing 5 million people centred on Nagoya; length 40 m., width 15–20 m.
Iselle, *t.*, N.W. Italy; S. terminal of Simplon Pass and tunnel.
Isère, *dep.*, S.E. France; drained by Rs. Isère and Rhône; cap. Grenoble; mtnous.; cereals; wine, butter cheese; iron, coal, lead, silver, copper; gloves, silks; a. 3,178 sq. m.; p. (1954) *626,116*.
Isère, R., S.E. France; rises in W. Alps (Grande Sassière), flows W. into R. Rhône nr. Valence; used to generate hydro-elec.; used, with trib. R. Arc, by main rly. from France to N. Italy through Mt. Cenis (Fréjus) Tunnel.
Iserlohn, *t.*, N. Rhine–Westphalia, Germany; iron, steel, metalwks.; needles; p. (estd. 1954) *47,400*.
Isernia, *t.*, Campobasso, Italy; mnfs.; p. *16,437*.
Iseyin, *t.*, W. Prov., Nigeria, Brit. W. Africa; p. (1946) *48,470*.
Isfahan (ancient Aspadana), *prov.*, Persia; cap. I., former cap. of Persia, on R. Zaindeh; carpet mftg.; woollen and cotton cloth and yarns mftg.; matches; p. (1956) *254,876*.
Ishikari, *t.*, Hokkaido, Japan; on cst. of Otaru Bay, 10 m. N. of Sapporo; ctr. of second lgst. coalfield in Japan; sm. petroleum production.
Ishim, *t.*, R.S.F.S.R.; on R. Ishim, S. of Tobolsk; famous fair, one of the most impt. for agr. produce in Siberia; p. *10,000*.
Ishpeming, *c.*, Mich., U.S.A.; machin., gold, silver, iron, marble; p. (1950) *8,962*.
Isis, *R.*, head stream of R. Thames, Eng.; so named until its confluence with Thames at Dorchester, Oxfordshire.
Iskenderon, *spt.*, Hatay, Turkey; pt. and rly. terminus; p. (1950) *22,946*.
Isla, *R.*, Perth and Forfar, Scot.; trib. of R. Tay; length 40 m.
Islay, *I.*, Inner Hebrides; Argyll, Scot.; 13 m. W. Kintyre; a. 235 sq. m.; farming, dairying, distilleries.
Isle of Grain, *rural a.*, Essex; flat promontory once separated from mainland by a tidal estuary; lge. oil refinery.
Isle Royale, *I.*, in L. Superior, Mich., U.S.A.; length 40 m.
Isleworth, *see* **Heston and Isleworth.**
Islington, *metropolitan bor.*, London, Eng.; N. of City; industl. and residtl.; p. (1951) *235,645*.
Islip, *summer resort*, Long I., N.Y., U.S.A.; p. (1950) *5,254*.
Ismailia, *t.*, Egypt, at mid-point of Suez Canal on L. Timsah, 45 m. N.N.W. of Suez; has rail connections with Cairo, Suez and Port Said; p. (1947) *68,338*.
Isna (Esneh), *t.*, Upper Egypt; caravan ctr.; barrage; p. (1947) *18,458*.
Isonzo, *R.*, Illyria, Italy; flows into Adriatic Sea.
Isparta, *t.*, Turkey; N. of Antalya; p. *17,292*.
Israel, *indep. Jewish rep.*, since 1948; part of former Palestine mandate; cap. Jerusalem, impt. ts. Tel Aviv, Haifa; mainly agr.: grains, vegs., olives, citrus-fruit prod.; heavy and light inds., esp. processed foods, textiles, wearing apparel, pharmaceuticals; little mineral wealth except for potash and other chemicals from Sea of Galilee and Dead Sea; a. 8,050 sq. m.; p. (1958) *2,016,100*.
Issoire, *commune*, Puy-de-Dôme, France; old church; p. (1954) *8,541*.
Issoudun, *t.*, Indre, France; leather, parchment, woollens, farm implements; p. (1954) *12,945*.
Issy, *t.*, France; on R. Seine; sub. of Paris; p. (1954) *47,369*.
Issyk-kul, *L.*, Kirgizia, U.S.S.R.; alt. 4,476 ft.; a. 250 sq. m.; drained by R. Chu.
Istanbul (Constantinople), *ch. spt.*; former cap., Turkey; S. entrance of the Bosporus; Turkish t. (Stamboul) and Christian subs. (Galata and Pera) sep. by the "Golden Horn"; the ancient Byzantium; magnificent mosque of St. Sophia; p. (1955) *1,214,616*.
Istria, *peninsula*, N. Adriatic Sea; formerly Italian, now divided between Jugoslavia and Italy; agr., olives, vines, oranges, maize; rural p. mainly Slavs, ts. mainly Italian.
Ita, *c.*, S. Paraguay; cattle, agr.; leather; p. *16,892*.
Itabira, *t.*, Minas Geraes st., Brazil; on Brazilian Plateau, 60 m. N.E. of Belo Horizonte; lgst. deposits of iron ore in Brazil.
Itabuna, *c.*, E. Brazil; coffee, tobacco; p. *15,868*.
Italy, *rep.*, S. Europe; peninsula 750 m. long and 100–120 m. broad; many Is. (ch. Sardinia, Sicily); mtns. in N. (Alps) and in ctr. and S. (Apennines); ch. R. Po; climate, Mediterranean; wheat and other cereals; vines, olives, fruit; cattle, sheep; sulphur, iron and iron pyrites, mercury, lead, zinc; Carrara marble; hydro-elec. power, and little coal; mnfs.; cottons, silks, sugar, glass, furniture, olive oil; fisheries; cap. Rome; a. 116,235 sq. m.; p. (1956) *49,600,000*.
Itasca, *L.*, a source of Mississippi R., Minn., U.S.A.; alt. 1,575 ft.
Itatiaia, *mtn.*, highest mtn. in Brazil; 9,255 ft.
Itaugua, *t.*, S.W. Paraguay; lace mkg.; p. *11,300*.
Itchen, *R.*, Hants, Eng.; flows to Southampton Water; length 25 m.
Ithaca, *t.*, N.Y., U.S.A.; on Cayuga L.; seat of Cornell Univ.; elec. clocks; p. (1950) *29,257*.
Ithake, *one of the Ionian Is.*, Greece; a. 37 sq. m.; ch. t. Ithake; severe earthquake, 1953.
Itzehoe, *t.*, Schleswig-Holstein, Germany; on Stor R.; wood, cement, machin.; p. (estd. 1954) *36,800*.
Ivanovo, *t.*, R.S.F.S.R.; N.E. of Moscow; textiles, iron and chemical wks.; p. (1959) *332,000*.
Ivigtut, *Danish settlement*, S.W. Greenland; cryolite.
Iviza, *I.*, Balearic gr. in the W. Mediterranean; Spanish; cath., fortress.
Ivory Coast, *aut. rep.* within Fr. Community, W. Africa; climate, tropical; race, Negro; maize, coffee, rubber, mahogany; dense forests; cap. Abidjan; a. 184,174 sq. m.; p. (1957) *2,483,000*.
Ivrea, *t.*, Italy; on the Dora Baltea, nr. Turin; silks, cotton mnfs.; p. *14,473*.
Ivry-sur-Seine, *t.*, France; on R. Seine, sub. of Paris; organs, chemicals, iron and steel; p. (1954) *47,765*.
Iwamizawa, *t.*, W. Hokkaido, Japan; rly. junction; coalfield; p. (1947) *41,198*.
Iwanai, *spt.*, S.W. Hokkaido, Japan; copper, coal, sulphur; fisheries; p. (1947) *20,394*.
Iwo, *t.*, Nigeria, Brit. W. Africa; nr. Ibadan; p. (1953) *100,000*.
Ixmiquilpan, *t.*, Hidalgo st., Mexico; silver; p. *1,543*.
Ixtlan, *t.*, Jalisco st., Mexico; comm. and industl.; p. *4,720*.
Izegem, *commune*, N.W. Belgium; linen, tobacco; p. *15,111*.

Izhevsk, *t.*, R.S.F.S.R.; steel, engin.; p. (1959) *283,000.*
Izieux, *t.*, Loire, France; nr. St. Etienne.
Izmail, *former prov.* of Bessarabia, Romania; ceded to U.S.S.R. in 1940, and now part of Ukrainian S.S.R.
Izmail, *t.*, U.S.S.R.; on R. Danube; cereals, wool, hides; p. (1939) *24,000.*
Izmid, *t.*, Turkey; E. end of Sea of Marmara; cereals, tobacco.
Izmir (Smyrna), *c.*, Turkey; at head of G. of Smyrna, Anatolia; exp. figs, raisins, tobacco, carpets, rugs, etc.; very ancient and historic c.; ch. comm. ctr. of the Levant; p. (1955) *286,310.*
Izúcar, *t.*, Puebla, Mexico; nr. Popocatepetl; p. *7,065.*
Izúum, *t.*, Ukrainian S.S.R.; on R. Donetz; engin.

J

Jabbok, *R.*, Syria, trib. of R. Jordan; length 45 m.
Jablonec, *t.*, N. Bohemia, Czechoslovakia; on R. Neisse; artificial jewellery; p. (1947) *23,112.*
Jaboatoa, *c.*, E. Brazil; sub. of Recife; p. *13,102.*
Jaca, *t.*, N. Spain; at foot of Pyrenees; p. *7,703.*
Jachymov, *t.*, N.W. Bohemia, Czechoslovakia; uranium-mines, pitchblende, lead, silver, nickel, cobalt; p *6,806.*
Jackson, *c.*, Mich., U.S.A.; on Grand R.; locomotives, motor-car accessories; p. (1950) *51,088*
Jackson, *t.*, cap. Miss., U.S.A.; cotton tr.; p. (1950) *98,271.*
Jackson, *t.*, Tenn., U.S.A.; univ.; cotton, cottonseed oil, engines, sewing-machines; p. (1950) *30,207.*
Jackson, *t.*, Ohio, U.S.A.; foundries, gas wells; p. (1950) *6,504.*
Jacksonville, *t.*, Fla., U.S.A.; on St. John's R.; timber, cotton, cigars; fish, fruit; phosplates; p. (1957) *228,000.*
Jacksonville, *t.*, Texas, U.S.A.; rly. ctr.; fruit, vegetables, cotton; p. (1950) *8,607.*
Jacksonville, *c.*, Ill., U.S.A.; woollens, rly. wks.; p. (1950) *20,387.*
Jacobabad, *frontier sta.*, Sind, Pakistan; one of hottest places in the Indian sub-continent; p. (1941) *15,748.*
Jacobina, *t.*, Baia, Brazil; on R. Itapicura; p. *4,389.*
Jacobsdal, *t.*, Orange Free State, S. Africa; on Riet R.
Jacobstadt, *see* **Yekabpils.**
Jacques-Cartier, *R.*, Quebec, Canada; trib. of St. Lawrence.
Jacuhy, *R.*, S. Brazil; rises in S. edge of Brazilian Plateau, enters Atl. Oc., through lagoon, Lagoa dos Patos; length 350 m.
Jade, or **Jahde**, *estuary*, N. Sea, Germany; fine harbour and entrance to pt. of Wilhelmshaven.
Jaen, *prov.*, S. Spain; mines, wine, garden produce, leather, weaving; a. 5,209 sq. m.; p. (1950) *765,697.*
Jaen, *t.*, *cap.*, Jaen, S. Spain; N. of Granada; p. (1950) *61,610.*
Jaffa-Tel Aviv, *t.*, *spt.*, Israel; orange-growing dist.; p. (1946) *284,780.*
Jaffna, *t.*, *spt.*, N. Ceylon; p. (1953) *77,218.*
Jagdalpur, *t.*, Madhya Pradesh, India; p. *10,128.*
Jagersfontein, Orange Free State, S. Africa; diamonds; p. *2,978.*
Jahrum, *t.*, Fars, Persia; tobacco, dates; p. *15,000.*
Jaipur, *terr.*, Rajasthan, India; iron, copper, marble; a. 15,610 sq. m.; p. (1941) *3,040,876.*
Jaipur, *cap. c.*, Rajasthan; comm. ctr.; p. (1951) *291,130.*
Jakarta (Batavia), *t.*, *cap.*, Java, Indonesia; comm. ctr.; iron, tanning, chemicals, textiles; p. *533,015.*
Jalalabad, *t.*, S. Kabul R., Afghanistan; cane sugar; p. (estd. 1948) *14,756.*
Jalapa, *dep.*, S.E. Guatemala; maize, beans; cap. Jalapa; a. 797 sq. m.; p. (1940) *124,855.*
Jalapa, *cap.*, Veracruz st., Mexico; p. (1940) *46,827.*
Jalgaon, *t.*, E. Khandesh dist., Bombay, India; cotton, linseed; p. (1951) *68,412.*
Jalisco, *Pacific st.*, Mexico; well timbered, agr., mining; cap. Guadalajara; a. 31,149 sq. m.; p. (1950) *1,746,239.*
Jallieu, *commune*, Isère, S.E. France; light mnfs.; p. (1954) *5,241.*
Jalna, *t.*, N.W. Hyderabad, India; E. of Aurangabad; p. *17,000.*
Jalon, *R.*, Spain; rises in Iberian Mtns., flows N.E. into R. Ebro nr. Zaragoza; valley forms main rly., road route from Madrid to Ebro Valley.
Jaluit, *I.*, Marshall Is., Pa., Oc.
Jamaica, *principal I.*, T.W.I., intern. self-gov. Br. col.; divided into three cos., Middlesex, Surrey and Cornwall; mountainous, highest peak (in Blue Mtns.) 7,420 ft.; exp. sugar, rum, spices, coffee; cap. Kingston; a. 4,411 sq. m.; p. (1957) *1,608,407.*
Jamalpur, *t.*, N.E. Bihar, Indian Union; p. (1941) *30,346.*
Jamalput, *t.*, N.E. Bengal, Pakistan; p. (1941) *23,077.*
Jambes, *commune*, S. Belgium; sub. of Namur; glass, engin.; p. *7,954.*
James (or **Powhattan**), *R.*, Va., U.S.A.; flows from Blue Ridge to Chesapeake Bay; length 450 m.
James Bay, S. part of Hudson Bay, Canada; length about 1,250 m.
James W. Ellsworth Land, Antarctica; claimed by U.S.A.
Jamestown, *c.*, N.D., U.S.A.; cattle; food processing; p. (1950) *10,697.*
Jamestown, *spt.*, *cap.*, St. Helena I.; p. (1946) *1,547.*
Jamestown, *c.*, N.Y., U.S.A.; summer resort and mftg.; p. (1950) *43,354.*
Jamestown, *t.*, *dist.*, Va., U.S.A.; nr. mouth of James R., where first English permanent settlement was founded 1607.
Jammer Bay, *bay*, W. cst. of Vendsyssel, Jutland, Denmark.
Jammu and Kashmir, *st.*, N. India; traversed by ranges of the Himalayas; in Jhelum valley is the lovely "Happy Valley," vale of K.; rich agr. dists.; also noted for textile prod.; cap. Srinagar; winter cap. Jammu; a. 92,780 sq. m.; p. (estd. 1957) *4,410,000.*
Jamshedpur, *t.*, Bihar, India; W. of Calcutta Tata iron and steel wks.; p. (1951) *218,162.*
Jämtland, *co.*, Sweden; a. 19,967 sq. m.; p. (1950) *144,024.*
Janesville, *t.*, Wis., U.S.A.; in agr. region; textiles, machin.; p. (1950) *24,899.*
Janina, *see* **Ioannina.**
Janiuay, *t.*, Panay, Philippines; fine woven fabrics.
Jan Mayen I., between Spitzbergen and Iceland, Arctic Ocean; belongs to Norway; seal and whale fisheries; government weather-forecast sta.; a. about 144 sq. m.
Japan, *cty.*, E. Asia; ch. Is. Shikoku, Hokkaido, Honshu, Kyushu; mountainous, largely volcanic, 18 active volcanoes; subject to disastrous earthquakes; only one-tenth of total surface is agr. land; climate varies according to latitude, in N. temperate, in S. sub-tropical, warm summers, abundant rainfall; vegetation, broad-leaved forest and meadows, coniferous forest; fine harbours, good communications; ch. inds.; agr., rice, cereals, mulberry and silk, tobacco, cotton, tea; coal, iron, copper; lumber; fisheries; textiles, silks, cottons, woollens; shipbldg., engin., machin., paper; oil from Honshu; cap. Tokyo; a. 147,611 sq. m.; p. (1957) *91,100,000.*
Japan, Sea of, portion of Pac. Oc. between Korea, U.S.S.R. and Japan.
Japan Current, *see* **Kuroshio.**
Jappen I., Geelvink Bay, New Guinea, Indonesia.
Japura, *R.*, Colombia, Brazil, S. America; rising in the Andes of Colombia, and flowing through Brazil to R. Amazon; length 1,300 m.
Jarocin, *t.*, Poland; S. of Poznan; p. *11,818.*
Jaroslaw, *mftg. t.*, Galicia, Poland; on R. San; garrison; p. *19,376.*
Jarrahi, *R.*, S.W. Persia; flows into Persian G.
Jarrow, *t.*, *mun. bor.*, Durham, Eng.; on S. bank of R. Tyne, 7 m. below Gateshead; shipbldg., steel and tube wks.; oil storage; birthplace of Venerable Bede; p. (1951) *28,541.*
Jaslow, *commune*, Rzeszow, Poland; oil wells; p. *12,000.*
Jasper, *t.*, E. Texas, U.S.A.; cattle, agr., lumber; p. (1950) *4,403.*
Jassy (Iasi), *t.*, Romania; former cap. Moldavia; in vineyard dist.; textiles, chemicals; p. (1956) *112 989.*
Jászbereny, *t.*, Hungary; on R. Zagyva; p. *31,070.*

Jativa, *t.*, Valencia, Spain; wine, oil, fruit; p. *18,263*.
Jau, *c.*, São Paulo st., S.E. Brazil; coffee; p. *18,655*.
Jauf, *t.*, Nejd, Saudi Arabia; p. exceeds 10,000.
Jauja, *t.*, Junin, Central Peru; E. of Lima; p. *8,276*.
Jaunpur, *t.*, Uttar Pradesh, India; on R. Gumti; perfumes; p. (1941) *32,569*.
Java, *ch. I.*, Indonesia; mtns. (many volcanic); loftiest peak, 12,057 ft.; agr., rubber, tobacco, sugar, coffee, tea; oil palms, cinchona, spices; coal, tin, gold, silver; teak forests; petroleum; densely populated; cap. Jakarta; a. 50,390 sq. m.; p. (inc. Madura) (1930) *41,718,364*.
Javari (Yavari), *R.*, forms bdy. between Peru and Brazil; trib. of R. Amazon.
Java Sea, part of the Pac. Oc. between N. cst. Java, Borneo and Sumatra.
Jawalapur, *t.*, Uttar Pradesh, India; on R. Ganges.
Jawor (Jauer), *t.*, Lower Silesia, Poland; p. *12,114*.
Jaworzno, *industl. t.*, Poland; nr. Cracow; coal; p. *17,000*.
Jaxartes R., *see* **Syr Darya**.
Jayuya, *mun.*, central Puerto Rico, W. Indies; sugar, tobacco, cotton; p. *14,589*.
Jeanerette, *t.*, S. La., U.S.A.; sugar, pecan nuts, rice; p. (1950) *4,692*.
Jeanette, *bor.*, Penns., U.S.A.; natural-gas region; p. (1950) *16,172*.
Jebba, *t.*, Nigeria, W. Africa; on R. Niger.
Jebel Aulia, *vil.*, Sudan; S. of Khartoum; proposed site for dam across White Nile R.
Jebel ed Druz, *terr.*, S.E. of Hauran, Syria; ch. t. Es Suweida.
Jebel-Hauran, high tableland of Syria; alt. 6,000 ft.
Jebel Serbal, *mtn.*, Sinai peninsula, Egypt; alt. 6,760 ft.
Jebl-us-Siraj, *t.*, Afghanistan; cement wks.
Jedburgh, *burgh*, Roxburgh, Scot.; on R. Jed, 12 m. S.W. of Kelso; abbey ruins, tweeds, woollens, rayon; p. (1951) *4,083*.
Jefferson, *c.*, Wis., U.S.A.; p. (1950) *3,625*.
Jefferson, *t.*, Texas, U.S.A.; near oilfield; cattle, grain; p. (1950) *3,164*.
Jefferson City, *cap.*, Mo., U.S.A.; on R. Missouri, 100 m. W. of St. Louis; shoes, tiles, farm implements; p. (1951) *25,099*.
Jeffersonville, *mftg.*, Ind., U.S.A.; on Ohio R.; p. (1950) *14,685*.
Jehol, former *prov.*, China; divided 1955 among Hopei and Liaoning provinces and Inner Mongolian Region; p. (1953) *5,160,822*.
Jelenia Góra (Hirschberg), *t.*, Lower Silesia, Poland, German before 1945; spa, rly. junction; p. (estd. 1939) *35,000*.
Jelep-la, *high pass*, leading from Sikkim, N. India, to Tibet; alt. 14,390 ft.
Jelgava (Mitau), *t.*, Latvia, U.S.S.R.; on R. Aa; linen, soap; p. (1935) *34,099*.
Jemappes, *industl. t.*, Hainaut, Belgium; on the Haine R.; coal, iron; French victory over Austria 1792; p. (1947) *14,573*.
Jena, *t.*, Thuringia, Germany; on R. Saale; univ.; observatory; glass, books, pianos, optical mftg. (Zeiss); p. (estd. 1954) *83,100*.
Jenkins, *t.*, Ky., U.S.A.; on coalfield; p. (1950) *6,921*.
Jenkintown, *bor.*, Penns., U.S.A.; residtl.; p. (1950) *5,130*.
Jennings, *t.*, La., U.S.A.; agr.; oil wells; p. (1950) *9,663*.
Jenolan Caves, N.S.W., Australia; in Blue Mtns., 20 m. S.W. of Katoomba; lge. natural caves in limestone, stalactites, stalagmites.
Jeremie, *spt.*, S.W. Haiti; p. *6,000*.
Jerez de la Frontera, *t.*, Andalusia, Spain; 14 m. N.E. of Cadiz; sherry; p. (1950) *107,770*.
Jerez de los Caballeros, *commune*, S.W. Spain; marble, tr. ctr. for agr. region; p. *16,154*
Jericho, *vil.*, Jordan Valley, Jordan; estd. through recent excavations as oldest t. in the world (6000 B.C.); p. *5,000*.
Jersey, *I.*, lgst. of Channel Is., 13 m. W. of Fr. cst; potatoes, tomatoes, green veg., fruit, cattle; tourist resort; cap. St. Helier; a. 45 sq. m.; p. (1954) *55,288*.
Jersey City, *spt.*, N.J., U.S.A.; opp. New York on Hudson R.; canning, iron, steel, tobacco, chemicals; rly. ctr.; p. (1950) *299,017*.
Jerusalem, *c.*, Holy Land; 2,660 ft. above sea-level, between Dead Sea and Mediterranean; the "Holy City" of the Jews and sacred c. of Christians and Mohammedans; since 1950 c. divided between Israel and Jordan; cap. of Israel; "Old City" in Jordan and considered 2nd. cap. of Jordan; Hebrew univ.; varied inds.; p. (estd. 1951) *150,000* (Israel only).
Jervis Bay, *Commonwealth terr.*, acquired as site for port for Canberra by Federal Government of Australia 1909; a. 28 sq. m.; p. *360*.
Jesi, *t.*, Ancona, Italy; cath.; p. *23,600*.
Jesselton, *impt. spt.*, cap. of N. Borneo; on W. cst.; rubber; p. (1951) *11,704*.
Jessup, *t.*, Penns., U.S.A.; coal-mng.; p. *9,270*.
Jhansi, *t.*, Uttar Pradesh, India; p. (1941) *103,254*.
Jhelum, *R.*, W. Punjab, Pakistan; most W. of the five Rs. of the Punjab; flows from Kashmir to join the Chenab.
Jibuti, *cap.*, Fr. Somaliland; impt. transit tr. between Ethiopia and the outer world; p. *17,000*.
Jičín, *t.*, N.E. Bohemia, Czechoslovakia; mkt.; p. *11,034*.
Jidda, *spt. t.*, Hejaz, nr. Mecca; p. about *40,000*.
Jihlava, *t.*, Moravia Czechoslovakia; timber, grain, textiles; p. (1957) *34,934*.
Jimena de la Frontera, *t.*, Spain; nr. Cadiz; p. *10,123*.
Jimma, *t.*, *prov.*, Ethiopia; ch. prod. Jimma coffee; connected by road with Addis Ababa.
Jinja, *t.*, Uganda Protectorate, Brit. E. Africa; on N. shore of L. Victoria where R. Nile drains from L. over Ripon Falls; hydro-elec. power scheme; rly. bridge, opened 1931, allowed extension of rly. across Nile to Kampala.
Jipijapa, *c.*, W. Ecuador, S. America; straw hats; p. (1938) *8,000*.
João Pessóa, *cap.*, Paraíba st., Brazil; p. (1950) *120,857*.
Joazeiro, *t.*, Baia, Brazil; on São Francisco R.
Joban, *dist.*, N.E. Honshu, Japan; third lgst. coalfield in Japan; ch. t. Fukushima.
Joda, Orissa, India; ferromanganese plant.
Jodhpur, *t.*, Rajasthan, Indian Union; p. (1951) *180,717*.
Joënsuu, *t.*, on chain of Ls., S.E. Finland; p. *6,854*.
Joeuf, *t.*, Meurthe-et-Moselle, France; p. (1954) *11,034*.
Jogjakarta, *c.*, Java; 40 m. S. of Semarang; connected with Jakarta by rail; citadel, with palace; p. *137,000*.
Johanna, *I.*, of the Comoro gr. in Mozambique Channel; p. *12,870*.
Johannesburg, *t.*, Transvaal, S. Africa; univ.; gold-mining ctr. of Witwatersrand; tobacco, brewing, ironfounding, printing; p. (1951) *880,014* (inc. *359,539* whites).
John o' Groat's House, *place* nr. Duncansby Head, Caithness, Scot.
Johnsonburg, *bor.*, Penns., U.S.A.; chemicals, paper, iron and steel; p. (1950) *4,567*.
Johnson City, *t.*, N.Y., U.S.A.; leather, chemicals, paper; p. (1950) *19,249*.
Johnson City, N.E. Tenn., U.S.A.; mkt., iron, textiles; p. (1950) *27,864*.
Johnston, *t.*, Providence, Rhode I., U.S.A.; p. (1950) *12,725*.
Johnstone, *mftg. burgh*, Renfrew, Scot.; on R. Black Cart, nr. Paisley; iron, brass, machine tools, textile ind.; p. (1951) *15,661*.
Johnstown, *t.*, N.Y., U.S.A.; glove mftg.; p. (1950) *10,923*.
Johnstown, *t.*, Penns., U.S.A.; on Conemaugh R.; immense steel wks.; p. (1950) *63,232*.
Johore, *st.*, Fed. of Malaya; at S. end of peninsula; forested; rubber, rice, copra, pineapples; a. 7,330 sq. m.; p. (1957) *925,919*.
Johore Bahru, *cap.*, Johore prov., Malaya; across the Strait from Singapore; p. (1940) *38,826*.
Joinville, *t.*, Seine, France; p. (1954) *15,657*.
Jökulsa, *R.*, flowing into Axar Fjord, Iceland.
Joliet, *t.*, Ill., U.S.A.; rly. and mftg. ctr.; p. (1950) *51,601*.
Joliette, *t.*, Quebec, Canada; woollens, paper, tobacco; p. (1941) *12,749*.
Jonesborough, *t.*, Ark., U.S.A.; p. (1950) *16,310*.
Jönköping, *co.*, Sweden; cap. Jönköping; a. 4,447 sq. m.; p. (1950) *271,475*.
Jönköping, *t.*, cap. Jönköping, Sweden; paper, carpets, matches; p. (1951) *44,685*.

Jonquière, *t.*, S. Quebec, Canada; lumber, rly., shops; p. (1941) *13,769*.
Jonzac, *t.*, Charente-Maritime, France; on R. Seugne; p. (1954) *3,575*.
Joplin, *t.*, Mo., U.S.A.; lead-mining; p. (1950) *38,711*.
Jordan, *kingdom*, bounded by Israel, Syria, Saudi Arabia and Iraq; agr. but lge. areas of desert; phosphate deposits and potash; cap. Amman; a. 34,750 sq. m.; p. (1952) *1,329,174*.
Jordan, *R.*, famous in Bible history; flowing S. from Anti-Lebanon along a sinuous course, mostly below sea-level to the Dead Sea, its rapidity and variant depth render it unnavigable, and no t. of any importance has ever been built on its banks; length 120 m.
Jorullo, *volcano*, Michoacan st., Mexico; alt. 4,265 ft.
Jos, *t.*, central Nigeria; on Bauchi Plateau, 60 m. S.W. of Bauchi; impt. tin-mines; on branch line linking with E. Nigerian rly. system to Pt. Harcourt.
Jotunheimen, *mtn. region*, central Norway; Goldhopiggen, alt. 8,097 ft., Glittertind, alt. 8,048 ft.
Joyce's Country, *mtnous. dist.*, Galway, Ireland.
Juan de Fuca Strait, between Vancouver I. and Washington st., U.S.A.
Juan Fernandez, *rocky I.*, S. Pac. Oc.; belonging to Chile; a. 38 sq. m.; famous for Alex. Selkirk (Robinson Crusoe), 1704–9.
Juba, *R.*, E. Africa; flows to Indian Ocean, nr. the Equator.
Juba, *cap.*, Equatorial Prov., Sudan; p. *10,000*.
Jubbulpore, *t.*, Madhya Pradesh, India; carpets, cottons; oil mills; p. (1941) *140,227*.
Juby, *C.*, Rio de Oro., N.W. Africa.
Jucar, *R.*, E. Spain; rises in Serrania de Cuenca, flows S.E. to G. of Valencia, Mediterranean Sea; length 250 m.
Juchitan, *t.*, S.E. Mexico; mkt. for rich agr. region; p. (1950) *14,550*.
Judaea, *div.* of Palestine in the Roman period.
Judenburg, *t.*, Styria, Austria; on R. Mur; p. *10,929*.
Juggernaut, *see* Puri.
Jugoslavia, *Federal People's Rep.*, comprising former terrs. of Serbia, Montenegro, Croatia, Dalmatia, Bosnia, Herzegovina and Slavonia; farming, wheat, maize, barley, rye, oats, fruits, plums; sheep, cattle, pigs, goats; timber, coal, iron, copper, lead, cement, chromium, salt, bauxite; cap. Belgrade; a. 98,386 sq. m.; p. (estd. 1958) *18,189,000*.
Juiz de Fora, *mftg. t.*, E. Brazil; textiles, lumber; p. *85,000*.
Jujuy, *prov.*, Argentina; cap. Jujuy; a. 16,859 sq. m.; p. (estd. 1958) *247,800*.
Julian Alps, *mtn. range*, Venetia, Carinthia, Carniola and Croatia; highest peak, Triglav, 9,394 ft.
Julianehaab, *sta.*, Greenland; N.W. of C. Farewell.
Jullundur, *t.*, E. Punjab, India; cotton and silk mnfs.; p. (1951) *168,816*.
Jumet, *t.*, Belgium; nr. Charleroi; mftg. and mining; p. (estd. 1957) *29,674*.
Jumilla, *t.*, Murcia, Spain; exp. fabrics; p. *21,165*
Jumna, *R.*, N. India; ch. trib. of R. Ganges; rises in the Himalayas and flows past Delhi and Agra to Allahabad; length 860 m.
Junction City, Kan., U.S.A.; p. (1950) *13,462*.
Jundiai, *t.*, S.E. Brazil; rly. junction, cotton mnfs.; p. (1947) *29,891*.
Juneau City, *cap. mining settlement*, Alaska, U.S.A. gold; fisheries; p. (1950) *5,818*.
Jungfrau, *peak*, Bernese Oberland, Switzerland; height 13,642 ft.; electric rly. from Kleine Scheidegg to Jungfraujoch.
Juniata, *R.*, Penns., U.S.A.; flows to the Susquehanna at Petersburg.
Junin, *inland dep.*, Peru; traversed by the Andes; copper, silver, lead; ch. t. Huancayo; a. 22,814 sq. m.; p. (1947) *423,636*.
Jura, *mtns.*, Switzerland and France; highest peak Crête de la Neige; alt. 5,654 ft.; length 180 m., width up to 30 m.
Jura, *dep.*, E. France; named from the mtns.; many vineyards; forests, cereals, watches, toys; a. 1,951 sq. m.; p. (1954) *220,202*.
Jura, *I.*, Argyll, Scot.; off W. cst.; a. 146 sq. m.
Jurua R., trib. of R. Amazon.
Juticalpa, *t.*, Honduras, C. America; farming, mining; p. *10,990*.
Jutland, *peninsula*, Denmark; intensive agr. and poultry farming; a. 11,411 sq. m.; p. (1947) *1,826,056*.
Jyväskylä, *t.*, central Finland; mkt.; pulp and paper; p. (1950) *30,680*.

K

K², *see* **Godwin-Austen, Mt.**
Kabankalan, *mun.*, Negros Occidental, Philippine Is.; agr.; p. *29,315*.
Kabansk, *t.*, E. Siberia, U.S.S.R.; nr. L. Baikal; agr. and industl.
Kabardinian, A.S.S.R., Transcaucasia, U.S.S.R.; mtns., Mt. Elbruz 18,463 ft.; a. 3,600 sq. m.; maize, sunflowers, sheep and cattle.
Kabinda, *t.*, Angola, W. Africa; on W. cst., 30 m. N. of Congo estuary; p. *1,000*.
Kabul, *prov.*, Afghanistan; p. (1948) *2,817,234*.
Kabul, *cap.*, Afghanistan; on R. Kabul, S. of the Hindu Kush; 6,900 ft. above sea; univ.; matches, wool; p. (estd. 1948) *206,208*.
Kabul, *R.*, flowing through Afghanistan to the R. Indus at Peshawar, Pakistan; length 270 m.
Kachin, *st.*, Burma; comprising former Myitkyina and Bhamo dists.
Kadi, *t.*, Bombay, India; spinning, brass and copper wk.; p. *14,000*.
Kadine, *t.*, S. Australia; 10 m. E. of Wallaroo; rly. junction; ctr. of fruit-growing dist.
Kadiyevka, *t.*, Ukrainian S.S.R.; coal, iron and steel, synthetic rubber; p. (1959) *180,000*.
Kaduna, *t.*, N. Nigeria; cap. of Northern Provs.; impt. rly. junction with main rlys. to Lagos, Pt. Harcourt; p. *10,000*.
Kaffraria, *extensive dist.*, C. of Good Hope, S. Africa; comprising Griqualand E., Tembuland, Transkei, and Pondoland.
Kafue, *R.*, N. Rhodesia; famous gorge.
Kagoshima, *spt.*, at S. end of Kyushu I., Japan; p. (1950) *229,462*.
Kahoolawe, *I.*, Hawaiian Is.; a. 45 sq. m.; uninhabited.
Kaiapoi, *t.*, S.I., N.Z.; on the Waimakariri R., 14 m. by rail from Christchurch; woollens; p. (1951) *2,246*.
Kaieteur Falls, Brit. Guiana, S. America; located where R. Potaro leaves Guiana Highlands; among world's highest falls (741 ft.).
Kaifeng, *c.*, *cap.*, Honan, China; on Hwang-Ho R.; one of the most ancient cities in the empire; cottons; p. (estd. 1936) *303,422*.
Kaikoura, *t.*, S.I., N.Z.; on E. cst., 80 m. N.E. of Lyttelton; in this region are the Kaikoura ranges, in which the highest peaks are Taipugenuku (9,465 ft.) and Alarm (9,400 ft.).
Kaiping, *t.*, Hopeh, N. China; on border of Manchuria, 80 m. N.E. of Tientsin; second lgst. coal-mining a. (Kailan mines) in China; coal exported through Chinwangtao.
Kairouan, *holy c.* of the Moslems, Tunisia N. Africa; 80 m. S.S.E. of Tunis; founded *c.* A.D. 670; mosque; p. (1946) *32,299*.
Kaiserslautern, *t.*, Rhineland Palatinate, Germany; nr. Mannheim; iron, textiles, machin., tobacco, wood; p. (estd. 1954) *68,400*.
Kaiser Wilhelm's Land, *Australian Dependency*, Antarctica.
Kaishu, *cap.* of Kokai prov., W. Korea; p. *29,688*.
Kaiyvan, *t.*, S. Manchuria; on rly., mkt., soya-beans; p. *34,380*.
Kajaani, *t.*, on Oulu L., Finland; p. *8,732*.
Kakamega, *t.*, Kenya, Brit. E. Africa; 30 m. N. of Kisumu; ctr. of gold-mining dist.
Kalabaka, *t.*, Greece; N. of Trikkala; p. *3,690*.
Kalafat, *t.*, Romania; on R. Danube, opposite Vidin.
Kalahari Desert, *gr. infertile tract* of S. Central Africa, between the R. Orange and the Zambesi; mainly in Bechuanaland Protectorate; alt. 3,700 ft.; a. 20,000 sq. m.; inhabited chiefly by Bushmen.
Kalamata, *t.*, Peloponnese, Greece; nr. Sparta; silk ind., figs, currants, olive oil exp.; p. (1951) *38,663*.
Kalamazoo, *t.*, Mich., U.S.A.; rly. ctr., engin.; college; p. (1950) *57,704*.
Kalamita Bay, Black Sea; W. cst. Crimea, U.S.S.R.
Kalat or **Khelat**, *st.*, Baluchistan, Pakistan; a. 53,995 sq. m.; p. (1951) *283,000*.

Kalgan, *see* **Wanchuan.**

Kalgoorlie, *t.*, W. Australia; on Transcontinental rly. route 350 m. E. of Perth; semi-desert conditions; famous gold-mng. a.; p. (1957) *9,965.*

Kalimnos (**Caymnos**), *I.* and *prefecture* Dodecanese, Greece; cap. Kalimnos; p. (1940) *24,393.*

Kalinin, *t.*, R.S.F.S.R.; on trib. of R. Volga; cath.; engin., textiles, chemicals; p. (1959) *261,000.*

Kaliningrad, *prov.*, R.S.F.S.R., U.S.S.R.; cap. K.

Kaliningrad (formerly **Königsberg**), *t.*, formerly E. Prussia, now U.S.S.R.; on R. Pregel; cath.; fine bldgs.; machin., wood-pulp, chemicals, sugar-beet; tea ctr.; p. (1959) *202,000.*

Kalispell, *t.*, Mont., U.S.A.; mkt. for agr. region, lumber; p. (1950) *9,737.*

Kalisz, *t.*, Poland; on R. Prosna; linen factories; p. (1950) *55,140.*

Kalk, *t.*, N. Rhine–Westphalia, Germany; iron and chemical wks.

Kalmar, *co.*, S. Sweden; cap. Kalmar; a. 4,485 sq. m.; p. (1950) *236,847.*

Kalmar, *spt.*, Sweden; on E. cst.; match and tobacco factories, busy tr.; p. (1951) *27,049.*

Kalocsa, *t.*, Hungary; on R. Danube; cath., palace; wine; p. *12,000.*

Kaluga, *t.*, R.S.F.S.R.; on R. Oka; leather, engin., hydro-elec.; p. (1959) *133,000.*

Kalushin, *t.*, Ukrainian S.S.R.; mines salt, potassium; p. *14,699.*

Kalyan, *spt.*, Thana, Bombay, India; p. (1941) *26,291.*

Kama, *R.*, U.S.S.R.; trib. of R. Volga, which it joins S. of Kazan; length 1,400 m.

Kamaishi, *t.*, *spt.*, N.E. Honshu, Japan; serves Kamaishi–Sennin iron-ore field, lgst. worked deposits and reserves in Japan; impt. iron and steel ind.; imports coal, iron ore, machin.; p. (1947) *26,200.*

Kamaran I., Red Sea; under Aden admin.; quarantine sta. for pilgrims travelling to Mecca from the E.; a. 22 sq. m.; p. about *2,200.*

Kamchatka, *peninsula*, E. Siberia, U.S.S.R.; mtns. with volcanoes (Klyuchevsk, alt. 16,512 ft.); mineral wealth, fisheries on cst., climate cold, wet and foggy; cap. Petropavlovsk on E. cst., good roadstead; a. 465,637 sq. m.; p. *6,500.*

Kamen, *t.*, Westphalia, Germany; coal, leather, metals; p. *11,686.*

Kamenets Podolski, *t.*, Ukrainian S.S.R.; brewing, tobacco; p. (1954) *50,000.*

Kamensk, *dist.*, Moldavian S.S.R.; U.S.S.R.

Kamensk, *t.*, R.S.F.S.R.; on N. Donets R.; chemicals; p. (1954) *60,000.*

Kamensk Uralsk, *t.*, R.S.F.S.R.; bauxite, aluminium, iron, steel, engin.; p. (1959) *141,000*

Kamet, *mtn.*, N. Garhwal dist., Himalayas; alt. 25,477 ft.; until 1953 (Everest) highest mtn. climbed (Smythe, 1931).

Kamloops, *c.*, B.C., Canada; on Thompson R.; formerly known as Fort Thompson; on transcontinental rlys.; supply ctr. for mining and grazing dist.; p. (1951) *8,099.*

Kampala, *cap.*, Uganda, Brit. E Africa; ch. comm. ctr. of colony; p. *40,000.*

Kampar, *t.*, Perak, Fed. of Malaya; p. *17,449.*

Kampen, *t.*, Overyssel, Netherlands; on R. Yssel; p. (1951) *24,382.*

Kamp-Lintfort, *t.*, N. Rhine–Westphalia, Germany; Cistercian abbey; coal-mng.; p. (estd. 1954) *28,600.*

Kampot, *spt.*, Cambodia; pepper; p. *3,000.*

Kamyshin, *mftg. t.*, R.S.F.S.R.; on R. Volga; textiles; p. (1959) *55,000.*

Kan Kiang, *R.*, S. China; rises in Nan Shan, flows N. into L. Poyang; valley provides route for main road from Kiangsi prov. to Kwangtung prov. over Meiling Pass.

Kanawha, *R.*, W. Va., U.S.A.; rises in Allegheny Mtns., flows S.W. to Hinton, then turns N.W. across Allegheny Plateau into R. Ohio; lower course runs through ch. mining a. of W. Va. coalfield nr. Charleston; length 350 m. approx.

Kanazawa, *t.*, Kaga, Honshu, Japan; silks and pottery; p. (1947) *231,450.*

Kanchenjunga, *mtn.*, on Nepal-Sikkim bdy., N.E. India; 3rd highest mtn. in world; alt. 28,146 ft.

Kandahar, *prov.*, S. Afghanistan; mountainous; cap. K.; p. (1948) *1,063,496.*

Kandahar, *c.*, former cap., Afghanistan; alt. 3,400 ft.; 370 m. from Herat; p. (1948) *77,186.*

Kandersteg, *t.*, Bernese Oberland, Switzerland; health resort.

Kandy, *t.*, Ceylon; in ctr. of I., 75 m. from Colombo at alt. 3,000 ft.; resort in hot season; tea and cocoa; p. (1953) *57,539.*

Kane, *bor.*, Penns., U.S.A.; natural-gas region; p. (1950) *5,706.*

Kangaroo I., S. Australia; eucalyptus.

Kankakee, *t.*, Ill., U.S.A.; farm implements; machin.; p. (1950) *25,856.*

Kannopolis, *t.*, N.C., U.S.A.; textiles; p. (1950) *28,448.*

Kano, *c.*, N. Nigeria, W. Africa; gr. emporium for the whole Sudan region; impt. airport and rly. terminus; p. (1953) *130,000.*

Kanpur, *see* **Cawnpore.**

Kansas, *st.*, U.S.A.; called the "Sunflower State"; prairie; farming, maize, wheat; cattle, dairying, pigs; coal, petroleum, natural gas, lead, meat-packing, flour-milling; cap. Topeka; a. 82,276 sq. m.; p. (1950) *1,905,299.*

Kansas City, Mo., U.S.A.; on right bank of R. Missouri; gr. livestock mart; p. (1950) *456 622*; adjoins Kansas City, Kansas; meat-packing ctr.; p. (1950) *129,553.*

Kansu, *prov.*, China; inc. former Ningsia prov.; cap. Lanchow; cereals, poppy; a. 151,161 sq. m.; p. (1953) *12,928,102.*

Kanye, *t.*, Bechuanaland Protectorate, S. Africa; cap. of Bangwaketsi tribe; p. *12,000.*

Kaohsiung, *spt.*, Formosa (Taiwan); on S.W. cst.; exp. rice, sugar, oil refining; p. (1957) *275,600.*

Kapfenberg, *commune*, Austria; iron, chemicals, paper; resort; p. (1951) *23,843.*

Kara-Bogaz, *lag. G.* on E. cst. of Caspian Sea, Turkmen S.S.R; very high salinity, impt. deposits of Glauber's salt used in local chemical ind.; a. 7,000 sq. m.

Karachev, *t.*, R.S.F.S R.; hemp factories and oil wks.; p. *10,000.*

Karachi, *spt.*, *cap.*, Pakistan; on the Indus delta; thriving tr. wheat and hides; airport; p. (1951) *1,126,417.*

Karafuto, *see* **Sakhalin.**

Karaganda, *t.*, Kazakh S.S.R.; town built on impt. coalfield; engin.; p. (1959) *398,000.*

Karakorum Mtns., separating E. Turkestan from Kashmir; highest peak K² (Godwin-Austen) 28,250 ft.

Kara-Kum, *see* **Qara Qum.**

Kara Sea, Arctic Ocean; E. of Novaya Zemlya; navigation open July–Sept.

Karatsu, *spt.*, N.W. Kyushu, Japan; coal; p. (1947) *46,442.*

Karbala, *t.*, Iraq; N.W. of Hilla; ctr. of pilgrimage; sacred c. of Shiites; p. (1947) *122,719.*

Karcag, *t.*, E. Hungary; tortoiseshell goods; p. *24,565.*

Karelo–Finnish S.S.R., U.S.S.R., incorporated into R.S.F.S.R. July '56; cap. Petrozavodsk; rich in timber, minerals, precious metals; a. 69,720 sq. m.; p. (estd. 1956) *600,000.*

Karenni Sts., Burma; between Siam and Lower Burma, drained by Salween R.; comprising Kantarawaddy, Bawlake and Kyebogyi; a. 4,280 sq. m.; p. *70,493.*

Kariba, *t.*, S. Rhodesia, on Zambesi R.; lgst. hydro-elec. power-sta. in Africa; p. *10,000* (incl. *2,400* Europeans).

Karikal, *former Fr. prov.*, united with India 1954; on E. cst., 150 m. S. of Madras; p. (1948) *70,541.*

Karkonosze (**Riesengebirge**), *mtn. range*, between Polish Silesia and Bohemia; highest peak Sniezka (Schneekoppe), 5,275 ft.

Karlovac, *t.*, Croatia, Jugoslavia; S.W. of Zagreb; chemicals; p. (1953) *31,842.*

Karlovy Vary, *t.*, *wat. pl.*, Czechoslovakia; on R. Ohre; health resort; p. (1957) *42,639.*

Karlskrona, *ch. naval sta.*, Sweden; on the S. cst.; p. (1951) *30,997.*

Karlsruhe, *t.*, Baden-Württemberg, Germany; machin., chemicals, hardware, ceramics; rly. junction; outport on Rhine; atomic-energy reactor projected (1957); p. (estd. 1954) *211,900.*

Karlstad, *t.*, Sweden; on N. shore L. Vänern; ironwks. and match factories; p. (1951) *35,651.*

Karnak, *vil.*, Upper Egypt; on Nile, the site of ancient Thebes; ruined temples.

Karpathos, *Greek I.*, Mediterranean Sea; between Rhodes and Crete, one of the Dodecanese; p. *8,747.*

Karroos, Gr. and Little, extensive treeless plateau between mtn. ranges covered by scrub, C. of Good Hope, S. Africa.
Kars, *c.*, Turkey; formerly Russian; woollens, carpets; p. (1945) *22,264*.
Karsakpai, *t.*, Kazakh S.S.R., U.S.S.R.; on R. Sary Su, 400 m. W. of L. Balkhash; smelting of copper using ore from Dzhezkazgan, coal from Karaganda.
Karvina, *t.*, Silesia, Czechoslovakia; coal, iron, chemicals; p. (1957) *44,190*.
Kasai, *R.*, Angola and Belgian Congo, Central Africa; rises in Bihé Plateau (Angola) and flows over 1,200 m. into R. Congo 120 m. above Leopoldville; navigable from R. Congo upstream to Pt. Francqui, where connection made with Katanga rly.
Kasanlik, *t.*, Central Bulgaria; captured at the surrender of the Sipka Pass 1878 from the Turks; famous for attar of roses.
Kashan, *prov.*, Persia; between Isfahan and Qum; cap. c. K.; carpets; p. (prov.) 1,000,000; p. (c.) (1956) *45,998*.
Kashgar (Shutu), *comm. c.*, Sinkiang, China; leather; textiles; p. (estd. 1945) *50,000*.
Kashgar, *R.*, E. Turkestan; flowing 500 m. to the R. Yarkand.
Kashing, *t.*, N. Chekiang, E. China; on Grand Canal; mkt. and tr. ctr.; p. (estd. 1935) *102,329*.
Kashmir, *see* **Jammu and Kashmir.**
Kassala, *prov.*, Sudan; a. 134,450 sq. m.; p. (estd. 1951) *788,200*.
Kassel, *t.*, Hessen, Germany; on R. Fulda; cas.; iron, machin., cars, wood; route ctr.; p. (estd. 1954) *181,400*.
Kastamonu, *t.*, Karasu, Turkey; cap. of Turkish I. same name; great comm. ctr.; fruit, cotton, mohair; p. (1945) *12,565*.
Kastoria, *t.*, N. Greece; E. of Vérroia; p. (1951) *9,977*.
Katahain, *mtn.*, N. of Bangor, Maine, U.S.A.; alt. 5,385 ft.
Katanga, *prov.*, Belgian Congo; copper, radium, uranium, cattle; a. 180,000 sq. m.; p. *1,178,029*.
Katmandu, *cap.*, Nepal; on Vishnumati R., 75 m. from Indian frontier; p. *150,000*.
Kathiawar, *peninsula*, Bombay st., India.
Katoomba, *see* **Blue Mountains.**
Katowice (Stalinogród), *industl. c., cap.*, Upper Silesia, Poland; ironwks. and coal-mines; p. (1957) *206,000*.
Katrine, Loch, S.W. Perth, Scot.; on R. Teith, 8 m. long; principal source of Glasgow water supply; beautiful scenery.
Kattegat, arm of North Sea linked with Baltic; separates Denmark (Jutland) from Sweden; 40-70 m. wide.
Kauai, *I.*, Hawaiian Is.; a. 555 sq. m.; p. (1950) *29,838*.
Kaunas (Kovno), *t.*, Lithuanian S.S.R.; on R. Niemen; old-time cap.; univ.; metal goods, chemicals, textiles; p. (1959) *214,000*.
Kavajë, *t.*, on Adriatic Sea, Albania; p. *7,000*.
Kavalla, *prefecture*, Macedonia, Greece; ch. t. Kavalla; p. (1940) *135,789*.
Kavalla, *t.*, Kavalla, Greece; on Bay of Kavalla; gr. tobacco-preparing and exp. ctr.; p. (1940) *49,667*.
Kawasaki, *c.*, Honshu, Japan; S. sub. of Tokyo; pilgrims; engin.; p. (1950) *319,226*.
Kayes, *t.*, Sudanese Rep., W. Africa; on Senegal R.; p. *19,000*.
Kayseri, *t.*, Turkey; S.E. of Ankara; p. (1945) *57,698*.
Kazakhstan, *constituent rep.*, U.S.S.R.; cap. Alma-Ata; steppe with stock-raising; lge. desert areas, being made fertile by irrigation; grain in N.; coal at Karaganda; minerals; a. 1,072,797 sq. m.; p. (1959) *9,301,000*.
Kazan, *t.*, R.S.F.S.R.; impt. tr. ctr. for E. U.S.S.R., Turkestan Bokhara and Iran; cath., univ.; engin., chemicals, synthetic rubber, textiles, oil refining, paper; p. (1959) *643,000*.
Kazan Retto (Volcano Is.), *gr. of Is.*, Pac. Oc.; S. of Ogasawara Is. and of Japan.
Kazerun, *t.*, S.W. Persia; oranges, cotton, opium; (1956) *30,659*.
Kazvin, *t.*, Navistain, Persia; good transit tr.; p. (estd. 1950) *80,000*.
Keady, *t.*, *urb. dist.*, Armagh, N. Ireland; 10 m. S. of Armagh; p. (1951) *1,463*.
Kearny, *t.*, N.J., U.S.A.; mnfs.; p. (1950) *39,952*.
Kearsley, *urb. dist.*, Lancs, Eng.; chemicals and paper, cotton; p. (1951) *10,675*.
Kecskemet, *industl. t.*, Hungary; nr. Budapest; p. (estd. 1957) *64,000*.
Kedah, *st.*, Fed. of Malaya; rice, rubber, coconuts; a. 3,660 sq. m.; cap. Alor Star; p. (1957) *701,486*.
Keeling Is., *see* **Cocos Is.**
Keen, *mtn.*, nr. Ballater, Forfar and Aberdeen, Scot.; alt. 3,077 ft.
Keene, *c.*, N.H., U.S.A.; mnfs.; p. (1950) *15,638*.
Keeper, *mtn.*, Tipperary, Ireland; alt. 2,265 ft.
Keewatin, *dist.*, N.W. Terr., Canada; chiefly "barren lands"; a. 228,160 sq. m.
Kei Is., *gr.*, off Coast of New Guinea, Indonesia; rice and pearl fishing; p. *50,648*.
Keighley, *t.*, *mun. bor.*, W.R. Yorks., Eng.; in Aire valley, 15 m. N.W. of Leeds; engin., textiles; p. (1951) *56,938*.
Keith, *burgh*, Banff, Scot.; on Isla R.; mftg. inds.; in agr. dist.; p. (1951) *4,365*.
Kelantan, *st.*, Fed. of Malaya; rice, coconuts, rubber; a. 5,720 sq. m.; cap. Kota Bharu; p. (1957) *505,171*.
Kellogg, *c.*, N.E. Idaho, U.S.A.; lead-mines; p. (1950) *4,913*.
Kells, *mkt. t.*, *urb. dist.*, Meath, Ireland; on R. Blackwater; p. *2,141*.
Kelowna, *t.*, B.C., Canada; p. (1951) *8,517*.
Kelso, *burgh*, Roxburgh, Scot.; at confluence of Rs. Teviot and Tweed; fishing tackle; p. (1951) *4,119*.
Kelvin, *R.*, Scotland, flows S.W. to Clyde at Partick; length 21 m.
Kemerovo, *t.*, R.S.F.S.R.; S.E. of Tomsk; iron, chemicals, coal, textiles; p. (1959) *277,000*.
Kemi (Kymmene), *dep.*, Finland; a. 3,537 sq. m. cap. K.; p. (1940) *628,300*.
Kempsey, *t.*, N.S.W., Australia; p. (1958) *8,000*.
Kempston, *urb. dist.*, Bedford, Eng.; on R. Ouse, 3 m. S.W. of Bedford; p. (1951) *8,641*.
Kempten, *t.*, Bavaria, Germany; nr. L. Constance; Benedictine Abbey; textiles, furniture, paper, rly. junction; p. (estd. 1954) *40,100*.
Ken, *R.*, N. India, flows to the Jumna; length 230 m.
Kena, *see* **Qena.**
Kendal, *mkt. t.*, *mun. bor.*, Westmorland, Eng.; on R. Kent; engin., footwear, pencils; p. (1951) *18,543*.
Kendallville, *c.*, N.E. Ind., U.S.A.; light engin.; p. (1950) *6,119*.
Kenilworth, *mkt. t.*, *urb. dist.*, Warwick, Eng.; 4 m. S.W. of Coventry; ruined cas.; lt. engin., agr. repair wk.; p. (1951) *10,738*.
Kenmare, *rural dist.*, *t.*, Kerry, Ireland; p. (1946) *9,007*.
Kenmore, *t.*, N.Y., U.S.A.; p. (1950) *20,066*.
Kennebec, *R.*, Maine, U.S.A.; flows to Atlantic; length 200 m.
Kennet, *R.*, Wilts and Berks, Eng.; trib. of R. Thames; followed by main rly. London to W. of England; length 44 m.
Kennington, S., *sub.*, London, Eng.
Kenosha, *t.*, Wis., U.S.A., on W. shore of L. Michigan; mnfs.; p. (1950) *54,368*.
Kensal Green, *dist.*, Middx, Eng.; sub. N.W. London.
Kensington, *metropolitan bor.*, W. London, Eng.; mainly residtl.; contains K. Palace and Gardens; p. (1951) *168,054*.
Kent, *maritime co.*, S.E. Eng.; agr., stock-raising, hops and cherries; co. t. Maidstone; a. 1,525 sq. m.; p. (1951) *1,563,286*.
Kentish Town, *residtl. industl. dist.*, N.W. London, Eng.
Kenton, *t.*, Ohio, U.S.A.; onions; quarries, foundries; novelty mnfs.; p. (1950) *8,475*.
Kent's Cavern, *cave*, nr. Torquay, Devon, Eng.; 650 ft. long.
Kentucky, *E. central st.*, Mississippi basin, U.S.A.; agr., mining, mnfs.; cap. Frankfort; largest c. Louisville, at falls of Ohio R.; a. 40,395 sq. m.; p. (1950) *2,944,806*.
Kentucky, *R.*, U.S.A.; flows from Cumberland Mtns. to the Ohio R.; length 350 m.
Kenya, *Brit. col., prot.*, E. Africa; coastal strip (prot.) flat, interior (col.) elevated and peopled by Whites; climate varies according to elevation; vegetation, tropical; forests on coastal belt, semi-desert and grasslands on uplands; races chiefly Bantu Negroes, Indians and Arabs; agr., maize, sugar, coconuts, sisal, cotton, coffee, pyrethrum; cattle, sheep; bamboo, pencil

cedar, hardwoods; gold; cap. Nairobi; a. 224,960 sq. m.; p. (1956) *6,150,000* (inc. *30,000* Europeans).
Kenya, Mt., *volcanic pk.*, Kenya; 17,040 ft.
Keokuk, *industl., c.*, S.E. Iowa, U.S.A.; on Mississippi at foot of Des Moines rapids; p. (1950) *16,144*.
Keos (Chios), Ægean Is., Greece; cap. Keos; p. (1940) *78,428*.
Kephallenia (Cephalonia), one of the Ionian Is., Greece; currants, olive oil; cap. Argostolion; devastated by earthquake 1953; a. 315 sq. m.; p. (1951) *47,311*.
Kepno, *t.*, Central Poland; p. *7,810*.
Kerala, *st.*, India; new st. formed 1 Nov. 1956, comprising Travancore, Cochin and Malabar; a. 15,035 sq. m.; p. (estd. 1957) *13,549,118*.
Kerch, *spt.*, Ukrainian S.S.R.; p. (1959) *99,000*.
Kerguelen, *French archipelago*, dependency of Madagascar, S. of Indian Ocean; whaling and fishing sta.; a. 1,400 sq. m.
Keriya, *t.*, Chinese Turkestan; nr. Khotan; tr. ctr.; p. *12,250*.
Kerki, *t.*, S.E. Turkmen, S.S.R., U.S.S.R.; caravan and tr. ctr.; p. *7,000*.
Kérkyra (Corfu), the most N. of Ionian Is., Greece; a. 274 sq. m.; mountainous; p. (1951) *105,226*.
Kérkyra, *spt., cap.*, Kérkyra I., Greece; wine, fruits, olives; p. (1940) *33,508*.
Kermadec Is., S. Pac. Oc., gr. belonging to New Zealand, 600 m. N.N.E. of New Zealand; a. 13 sq. m.; meteorological sta. on Sunday I. (lgst of gr.); p. *28*.
Kerman, *prov.*, Persia; on Persian G.; cap. Kerman; carpet mftg.; p. (1956) *62,175*.
Kermanshah, *c.*, cap. Kermanshah prov., Persia; S. of Kurdistan; ch. prod. wool; p. (1956) *125,181*.
Kern, *L.*, S. Cal., U.S.A.; once ctr. of inland drainage in S. of Central Californian Valley, 20 m. W. of Bakersfield; now permanently dry; feeding rs. diverted for irrigation.
Kerrville, *t.*, Texas, U.S.A.; cattle, cotton, mkt., resort; p. (1950) *7,691*.
Kerry, *maritime co.*, Munster, Ireland; a. 1,816 sq. m.; cap. Tralee; p. (1956) *121,823*.
Kesteven, *administrative div.*, Lincoln, Eng.; ch. ts. Grantham, Stamford and Sleaford; a. 724 sq. m.; p. (1951) *131,566*.
Keswick, *mkt. t., urb. dist.*, Cumberland, Eng.; on Greta R.; at N. end of L. Derwentwater; tourist ctr.; woollens; p. (1951) *4,868*.
Ketchikan, *t.*, Alaska, U.S.A.; halibut, salmon; pulp, lead, zinc; p. (1950) *4,623*.
Ketrzyna (Rastenburg), *t.*, N.E. Poland; nr. Olsztyn; p. *8,000*.
Kettering, *mkt. t., mun. bor.*, Northants, Eng.; at foot of Northampton Heights, nr. Wellingborough; iron, steel, boots, shoes; p. (1951) *36,799*.
Kevelaer, *t.*, Rhine prov., Germany; p. *9,000*.
Kew, *sub.* London, Surrey, Eng.; on R. Thames opp. Brentford; contains Kew Gardens. (Kew Observatory is in Old Deer Park, Richmond.)
Kewanee, *t.*, N.W. Ill., U.S.A.; agr.; coal, engin.; p. (1950) *16,821*.
Keyport, *bor.*, N.J., U.S.A.; fishing; shipyards; mftg.; p. (1950) *5,888*.
Key West, *c.*, Fla., U.S.A.; on sm. I. same name about 100 m. from the mainland; naval sta., and cigar factories; nearest U.S.A. pt. to the Panama Canal; p. (1950) *26,433*.
Khabarovsk, *t.*, R.S.F.S.R.; on Amur R.; cath.; oil refining, aircraft engin., sawmilling; p. (1959) *322,000*.
Khairpur, *st.*, N. of Sind, Pakistan; a. 6,050 sq. m.; p. (estd. 1951) *320,000*.
Khalkidhiki (Chalcidice), *prefecture*, Macedonia, Greece; cap. Poliyicos; p. (1951) *75,801*.
Khalkis, *t.*, Evvoia (Euboea), Greece; p. (1951) *26,097*.
Khamgaon, *t.*, Berar, Madhya Pradesh, India; cotton; p. *20 000*.
Khanaqin, *t.*, Iraq; nr. E. frontier; oil-fields, refinery; p. *5,000*.
Khandwa, *t.*, Madhya Pradesh, India; S. of Indore; cotton, oil-pressing; p. *27,000*.
Khania (Canea), *prefecture*, I. of Crete; cap. Khania; p. (1951) *127,624*.
Khania (Canea), *sm. fishing spt.*, Khania pref., I. of Crete; in sheltered bay on N.W. cst.; p. (1951) *35,237*.
Khanka Lake, *L.*, on Manchurian border, U.S.S.R.
Khar, *sm. fertile prov.*, Persia; the ancient Choara.
Kharan, *dist.*, Baluchistan, Pakistan; a. 18,508 sq. m.; p. (estd. 1951) *54,000*
Kharkov, *c.*, Ukrainian S.S.R.; on R. Donets; univ., cath.; rly ctr., farm implements, engin., paper, chemicals; p. (1959) *930,000*.
Khartoum, *prov.*, Sudan; a. 5,700 sq. m.; p. (1947) *329,000*.
Khartoum, *cap.* Sudan; at confluence of White and Blue Niles; univ.; ivory, gum, ostrich feathers; p. (estd. 1956) *87,000*.
Khartoum North, *t.*, Sudan; p. (1947) *30,850*.
Khasi Hills, Assam, N.E. India; form abrupt S. edge to middle Brahmaputra valley; very heavy monsoon rains on S.-facing slopes; lower slopes forested; middle slopes constitute impt. tea-growing region; rise to over 6,000 ft.
Khaskovo, *t.*, Bulgaria; woollens, carpets, silk, tobacco; p. *27,294*.
Khelat, *see* **Kalat**.
Kherson, *t.*, Ukrainian S.S.R.; 10 m. up R. Dnieper from Black Sea; in grain-growing dist.; oil refining, engin., textiles; p. (1959) *157,000*.
Khingan, Gr. and Little, *mtn. ranges*, Mongolia and Manchuria; separating the plateau from the plains.
Khios, *I.*, Ægean Is., Greece; wines, figs, fruits, marble; cap. Khios; p. (1951) *66,549*.
Khiva, *originally vassal st.* of Russia; now part of Uzbekistan, U.S.S.R.
Khiva, *t.*, Kara Kalpak, Uzbekistan, U.S.S.R.; silks, cottons, carpets; p. *19,866*.
Kholm, *see* **Chelm**.
Khorramshahr, *spt., cap.*, Khuzistan, W. Persia; tr., oil; p. (1956) *43,840*.
Khotin, *formerly prov.*, Bessarabia, Romania, ceded to U.S.S.R. 1940 and now part of Ukrainian S.S.R.
Khurasan, *prov.*, Persia; W. of Afghanistan; ch. prod. wool; cap. Meshed; p. (estd. 1956) *1,300,000*.
Khurja, *t.*, Uttar Pradesh, India; cotton, pottery; p. *25,000*.
Khyber, *difficult mtn. pass*, between W. Punjab, Pakistan and Afghanistan; followed by route from Peshawar to Kabul, traversed by Alexander the Great and by two British expeditions.
Kiama, *t.*, N.S.W., Australia; agr.; coal; artificial harbour; p. (1947) *2,426*.
Kiang-si, *inland prov.*, China; S. of the Yangtze-Kiang; cap. Nanchang; rice, wheat, tea, silk, cotton; a. 66,600 sq. m.; p. (1953) *16,772,865*.
Kiangsu, *maritime prov.*, China; exp. much silk; a. 42,085 sq. m.; cap. Chinkiang; p. (1953) *41,252,192*.
Kiaochow Bay, *inlet* on S. side of Shantung Peninsula, China.
Kicking Horse Pass, *mtn. pass*, over the Rocky Mtns., B.C., Canada; used by Canadian Pacific Rly.
Kidderminster, *t., mun. bor.*, Worcester, Eng.; on R. Stour 4 m. above its confluence with R. Severn; carpets, engin., sugar-beet refining, textile machin., elec. vehicles, drop forgings; p. (1951) *37,423*.
Kidsgrove, *mfig. t., urb. dist.*, "Potteries," Staffs., Eng.; 3 m. N.W. of Stoke-on-Trent; chemicals, metal wks., rayon, silk and nylon spinning, precast concrete, ceramics; p. (1951) *16,231*.
Kidwelly, *mun. bor.*, Carmarthen, Wales; on cst., 7 m. N.W. of Llanelly; coal; p. (1951) *3,007*.
Kiel, *spt.*, cap. Schleswig-Holstein, Germany; univ.; Baltic naval pt.; shipbldg. and allied inds., elec. goods, textiles, fishing; p. (estd. 1954) *259,600*.
Kiel Canal (**Kaiser-Wilhelm-Kanal**), Germany; 61 m. long, connects N. Sea with the Baltic; opened in 1895, reconstructed 1914.
Kielce, *co.*, Central Poland; minerals, agr.; cap. K.; a. 17,000 sq. m.; p. (estd. 1950) *1,674,268*.
Kielce, *t.*, Central Poland; tr. ctr., metal inds., sawmills, glass and food processing factories; dates from 12th cent.; p. (1950) *62,113*.
Kiev, *c., cap.*, Ukraine, U.S.S.R.; on R. Dneiper; once cap. of Muscovite Empire; cath.; machin., grain, in vicinity of rich mineral deposits, engin.; p. (1959) *1,102,000*.
Kigoma, *impt. tr. t.*, Tanganyika, Africa; W. terminus of the Central Rly. on L. Tanganyika; p. *14,000*.
Kikladhes, *see* **Cyclades**.
Kilauea, *volcano*, Hawaii; lgst. active crater in the world; 2 m. diameter; alt. 4,088 ft.

Kilbarchan, *par.*, Renfrew, Scot.; S.W. of Glasgow; textiles; p. (1951) *8,193*.
Kilbride, W., *par.*, Ayr, Scot.; nr. Ardrossan; (1951) *4,243*.
Kilburn, *sub.*, N.W. London, Eng.
Kildare, *inland co.*, Leinster, Ireland; a. 654 sq. m.; p. (1956) *65,927*.
Kildare, *mkt. t.*, *cap.*, Kildare, Ireland; cath.; close by is the famous racecourse, the Curragh of Kildare; p. (1951) *2,286*.
Kilimanjaro, *volcanic mtn.*, Tanganyika, E. Africa; highest peak in the continent; alt. 19,321 ft.
Kilindini, *spt.*, Kenya; adjoins Mombasa; the finest harbour on E. cst. of Africa.
Kilkenny, *inland co.*, Leinster, Ireland; cap. Kilkenny; pastoral farming, coal, black marble; a. 796 sq. m.; p. (1956) *64,148*.
Kilkenny, *t.*, cap. Kilkenny, Ireland; on R. Nore; local mkt.; p. (1951) *10,572*.
Kilkieran Bay, *lge. intricate indentation*, Galway, Ireland.
Kilkis, *prefecture*, Macedonia, Greece; cap. Kilkis; p. (1951) *88,928*.
Killarney, *t.*, *urb. dist.*, Kerry, Ireland; local mkt. and tourist ctr.; p. (1951) *6,298*.
Killarney, Is. of, Lower, Middle and Upper, celebrated for their beauty; attractive tourist resorts.
Killiecrankie, Pass of, Scot.; on R. Garry; at S. approach to Drumochter Pass; used by main rly. Perth to Inverness.
Kill van Kull, channel between N.J. and Staten I., N.Y., c., U.S.A.
Killybegs, *t.*, Donegal, Ireland; on Donegal Bay.
Killyleagh, *t.*, on Stangford L., Down, N. Ireland; p. (1951) *1,461*.
Kilmalcolm, *par.*, Renfrew, Scot.; on Gryfe Water; p. (1951) *4,651*.
Kilmarnock, *rly. ctr.*, *burgh*, Ayr, Scot.; on R. Irvine, 11 m. N.E. of Ayr; carpet factories, textile and ironwks.; p. (1951) *42,120*.
Kilmore, *t.*, Victoria, Australia; 30 m. N. of Melbourne; in impt. gap between Grampian Mtns. and Australian Alps.
Kilo-Moto, *goldfield*, Belgian Congo, Central Africa; in N.E. of colony, 50 m. W. of L. Albert; linked by motor road to R. Congo (Stanleyville) and L. Albert (Kasenyi).
Kilosa, *t.*, Tanganyika Terr., E. Africa; on rly.; p. *4,500*.
Kilpatrick, New, *par.*, Dunbarton, Scot.; on left bank of R. Clyde; p. (1951) *54,931*.
Kilpatrick, Old, *par.*, Dunbarton, Scot.; on bank of R. Clyde, 9 m. N.W. of Glasgow; lowest ferry across Clyde; p. (1951) *49,248*.
Kilrenny and Anstruther, *burgh*, Fife, Scot.; at entrance to Firth of Forth; fishing, hosiery, oilskin mnfs.; p. (1951) *2,991*.
Kilrush, *spt.*, *urb. dist.*, S.W. Clare, Ireland; on R. Shannon; p. (1951) *3,154*.
Kilsyth, *burgh*, Stirling, Scot.; at S. foot of Campsie Fells, 10 m. W. of Falkirk; whinstone quarries, coal-mining; p. (1951) *9,915*.
Kilwinning, *burgh*, N. Ayr, Scot.; 5 m. E. of Ardrossan; p. (1951) *6,553*.
Kimberley, *c.*, C. of Good Hope, S. Africa; 20 m. from R. Vaal; diamond-mining dist.; p. (1951) *62,212*.
Kimberley, *goldfield dist.*, W. Australia.
Kimberly, *t.*, B.C., Canada; on R. Kootenay in deep valley between Selkirk Range and Rocky Mtns.; site of Sullivan Mine, one of world's lgst. lead-zinc mines; ores smelted at Trail.
Kimry, *t.*, E. Kalinin, R.S.F.S.R.; nr. Volga Reservoir; leather; shoe ind.; p. *25,000*.
Kincardine, *maritime co.*, E. Scot., between Forfar and Aberdeen; agr. and fishing; co. t. Stonehaven; a. 383 sq. m.; p. (1951) *47,341*.
Kinder Scout, *mtn.*, N. Derby, Eng.; highest point of the Peak dist.; alt. 2,088 ft.
Kindu, *t.*, Belg. Congo, Central Africa; on R. Congo; p. *10,628*.
Kineshma, *t.*, U.S.S.R.; N.W. of Gorki; p. (1959) *84,000*.
Kineton, *mkt. t.*, Warwick, Eng.; nr. Stratford-on-Avon.
King George's Sound, W. Australia; nr. Albany; fine harbour and bay.
Kinghorn, *burgh*, Fife, Scot.; on Firth of Forth, 3 m. S. of Kirkcaldy; p. (1951) *2,337*.
Kingsbridge, *mkt. t.*, *urb. dist.*, S. Devon, Eng.; at head of Kingsbridge estuary, 10 m. S.W. of Dartmouth; p. (1951) *3,153*.
Kingsbury, *dist.*, Middlesex, Eng.; N.W. sub. of London; on R. Brent; p. *16,636*.
Kingsclere and Whitchurch, *mkt. t.*, *rural dist.*, N. Hants, Eng.; on R. Test, 10 m. S.W. of Basingstoke; p. (rural dist. 1951) *18,530*.
Kings Langley, *t.*, Herts, Eng.; 5 m. N. of Watford; paper, light engin.
King's Lynn, *spt.*, *mun. bor.*, Norfolk, Eng.; on R. Ouse, 3 m. above its mouth; fishing, agr machin., canning, chemical fertilisers, shoes; p. (1951) *26,173*.
King's Norton (with Northfield), *industl. t.*, Worcester, Eng.
King's River, Cal., U.S.A.; flows from Sierra Nevada to L. Tulare.
Kingsport, *t.*, N.E. Tenn., U.S.A.; varied mnfs.; p. (1950) *19,571*.
Kingston, *c.*, Ontario, Canada; on E. end of L. Ontario; old fort and thriving pt.; p. *30,126*.
Kingston, *cap.*, Jamaica, W. Indies; p. (1957) *161,858*.
Kingston, *t.*, N.Y., U.S.A.; tobacco mftg.; p. (1950) *28,817*.
Kingston, *t.*, Penns., U.S.A.; p. (1950) *21,096*.
Kingston-upon-Hull, *see* **Hull**.
Kingston-upon-Thames, *co. t.*, *mun. bor.*, Surrey, Eng.; on R. Thames, 12 m. W. of London Bridge; residtl.; with Royal Park; aircraft parts; p. (1951) *40,168*.
Kingstown, *see* **Dun Laoghaire**.
Kingstown, *spt.*, *cap.*, St. Vincent, T.W.I.; cath., botanic gardens; p. (1956) *6,500*.
Kingsville, *t.*, Texas, U.S.A.; in ranching area; agr., light inds.; p. (1950) *16,898*.
Kingswood, *urb. dist.*, Gloucester, Eng.; nr. Bristol; elec. vehicles, motor cycles, boots, brushes, tools; p. (1951) *18,921*.
Kington, *mkt. t.*, *urb. dist.*, N.W. Hereford, Eng.; 12 m. W. of Leominster; p. (1951) *1,890*.
Kingussie, *burgh*, Inverness, Scot.; between Cairngorm Mtns. and Monadhliath Mtns., on R. Spey; summer resort; p. (1951) *1,067*.
King William I., off Boothia peninsula in Arctic Ocean, Canada.
King William's Town, *t.*, C. of Good Hope, S. Africa; on Buffalo R., nr. E. London; p. *6,165*.
Kinhwa, *c.*, Chekiang, China; in fertile, intensively cultivated basin, 85 m. S.W. of Hangchow p. (estd. 1947) *211,140*.
Kinibalu, *mtn.*, North Borneo; alt. 13,455 ft.
Kinlochleven, *vil.*, Argyll, Scot.; at head of Loch Leven; hydro-elec. power sta., aluminium smelting; p. *3,757*.
Kinnaird Head, *promontory*, nr. Fraserburgh, on N.E. Aberdeen cst., Scot.
Kinross, *sm. inland co.*, Scot.; between Fife and Perth; hilly; oats, potatoes, sheep, cattle; a. 78 sq. m.; p. (1951) *7,418*.
Kinross, *co. burgh*, Kinross, Scot.; on Loch Leven, 16 m. N.E. of Alloa; coal, linen mnfs.; p. (1951) *2,495*.
Kinsale, *spt.*, *urb. dist.*, on K. Harbour, Cork, Ireland; p. (1946) *2,086*.
Kinta Valley, S.E. Perak, Malaya; very impt. deposits of alluvial tin.
Kintyre, *peninsula*, Argyll, Scot.; length 40 m., greatest breadth 11 m.; S. point the Mull of Kintyre.
Kioga, *L.*, Uganda Protectorate, Brit. E. Africa; on R. Nile midway between L. Victoria and L. Albert; very shallow, fringed with marsh; some land reclamation.
Kiölen or **Kjölen**, *mtn. range*, Scandinavia; highest point Mt. Sulitelma; alt. 6,150 ft.
Kirgiz Steppes, *gr. plains and uplands*, Kirghizia S.S.R., U.S.S.R.: N. of the Caspian and Aral Seas, inhabited by the wandering Mongolian Tatar race numbering nearly *3,000,000*.
Kirghizia, *constituent rep.*, U.S.S.R.; S.W. of Siberia; livestock breeding, mineral resources; a. 75,900 sq. m.; cap. Frunze; p. (1959) *2,063,000*.
Kirin, *prov.*, China; S. of the Sungari R. and N. of Korea and the Liaotung Peninsula; cap. Kirin, a. 34,616 sq. m.; (1953) *11,290,073*.
Kirin, *cap.*, Kirin, Manchuria, N. China; on Sungari R. at outlet of Sungari reservoir; impt. position on rly. from Changchun to pt. of Rashin; lumbering; p. (estd. 1946) *239,325*.
Kirkburton, *urb. dist.*, W.R. Yorks, Eng.; S.E. of Huddersfield; woollens; p. (1951) *17,961*.
Kirkby in Ashfield, *t.*, *urb. dist.*, Notts, Eng.;

10 m. N.W. of Nottingham; coal; p. (1951) *20,131*.
Kirkby Moorside, *mkt. t.*, *rural dist.*, N.R. Yorks, on R. Dove; Eng.; (1951 rural dist.) p. *4,785*.
Kirkby Stephen, *mkt. t.*, Westmorland, Eng.; on R. Eden, 7 m. S.E. of Appleby; p. *1,542*.
Kirkcaldy, *spt. t.*, *burgh*, Fife, Scot.; on N. side of F. of Forth; shipping; linoleum, potteries, linen bleaching, engin.; p. (1951) *49,037*.
Kircudbright, *maritime co.*, S.W. Scot.; abutting on Irish Sea and Solway Firth; chiefly agr.; a. 909 sq. m.; p. (1951) *30,742*.
Kirkcudbright, *co. burgh*, Kirkcudbright, Scot.; on Kirkcudbright Bay, Solway Firth, 25 m. S.W. of Dumfries; agr., hosiery; p. (1951) *2,498*.
Kirkenes, *t.*, Finnmark, N. Norway; on S. arm of Varanger Fjord, nr. Norway–U.S.S.R. bdy.; iron-ore mines.
Kirkham, *t.*, *urb. dist.*, Lancs., Eng.; between Preston and Blackpool; cotton weaving; p. (1951) *6,874*.
Kirkintilloch, *burgh*, Dunbarton, Scot.; on Forth and Clyde Canal; iron, coal-mining; p. (1951) *14,824*.
Kirkland Lake, *sm. t.*, Ontario, Canada; on rly. nr. Quebec–Ontario bdy., 45 m. N. of Cobalt; ctr. of impt. gold-mining dist.
Kirkstone Pass, *mtn. pass*, Westmorland, Eng.; used by main road between Ullswater and Windermere Lakes.
Kirksville, *industl. t.*, Mo., U.S.A.; p. (1950) *11,110*.
Kirkuk, *t.*, Iraq; mart for Arab horses; lge. oilfield with pipelines to Tripoli, Haifa and Banias; p. (1956) *89,917*.
Kirkwall, *burgh*, Pomona I., Orkneys, Scot.; off the N.E. Scottish cst.; p. (1950) *4,348*.
Kirkwood, *sub.*, St. Louis, Mo., U.S.A.; p. (1950) *18,640*.
Kirov, *t.*, R.S.F.S.R.; on trans-Siberian Rly.; textiles, engin., sawmilling; p. (1959) *252,000*.
Kirovabad, *t.*, W. Azerbaydzhan S.S.R.; copper, manganese mines; textiles, petroleum, p. (1959) *116,000*.
Kirovgrad, *t.*, Urals; copper; p. (1954) *50,000*.
Kirovograd, *t.*, Ukrainian S.S.R.; engin.; p. (1959) *127,000*.
Kirovsk, *t.*, R.S.F.S.R.; on Kola peninsula; apatite, nephelite, chemicals; p. (1954) *50,000*.
Kirriemuir, *burgh*, Angus, Scot.; on N. margin of Strathmore, 5 m. W. of Forfar; jute weaving, oat milling; p. (1951) *3,570*.
Kiruna, *t.*, N. Sweden; inside Arctic Circle, 170 m. N.W. of Lulea; linked by rly. to Narvik (Norway); impt. deposits of iron ore; p. *11,700*.
Kiselevsk, *t.*, W. Siberia, R.S.F.S.R.; p. (1959) *130,000*.
Kishinev, *cap.* Moldavian S.S.R., U.S.S.R.; vineyards, etc.; p. (1959) *214,000*.
Kislovodsk, *t.*, R.S.F.S.R.; spa; p. (1959) *79,000*.
Kissimee R., Fla., U.S.A., flows to L. Okeechobee; length 90 m.
Kissingen, *wat. pl.*, Bavaria, Germany; p. *15,006*.
Kistna, *R.*, S. India; rises in W. Ghats, flows E. across Deccan plateau into Bay of Bengal; lower valley and delta under intensive rice cultivation; densely populated; length 850 m.
Kisumu, *spt.*, *cap.*, Nyanza prov., Kenya, Brit. E. Africa; at head of Kavirondo G. on L. Victoria; original W. terminus of rly. from Mombasa; still handles bulk of cotton from Buganda and coffee from N. Tanganyika for transhipment E. by rail.
Kitchener, *c.*, Ontario, Canada; p. (1956) *59,562*.
Kittanning, *bor.*, Penns., U.S.A.; on Allegheny R.; p. (1950) *7,731*.
Kittatinny Mtns. or Blue Mtns., *range* in Penns. and N.J., U.S.A.; a continuation of the Appalachian system.
Kitwe, *t.*, N. Rhodesia; contiguous to mine township of Nkana, ctr. of copperbelt; p. (incl. Nkana) *80,000* (incl. *10,000* Europeans).
Kiukiang, *c.*, *former treaty pt.*, Kiangsi, China; Yangtze-Kiang; p. (estd. 1946) *137,106*.
Kiungchow, *c.*, *cap.*, Hainan Is., China; on N. cst.; former treaty pt.; p. *46,000*.
Kivu, *L.*, Central Africa; N. of L. Tanganyika by which it is joined by Russisi R.; length 55 m.; a. 1,100 sq. m.
Kizil-Irmak (or Red River), the lgst. R. of Turkey in Asia; rises in Kisil Dagh, flows to Black Sea via Sivas; l. 600 m.
Kjölen, *see* Kiölen.
Kladno, *mng. t.*, Czechoslovakia; 10 m. N.W. of Prague; coal, iron, steel, engin.; p. (1957) *49,701*.
Kladzko (Glatz), *t.*, Lower Silesia, Poland, German before 1945; on R. Nisa (Neisse); rly. junction; p. (estd. 1939) *22,814*.
Klagenfurt, *t.*, *cap.*, Carinthia, Austria; white-lead, tobacco and silk factories; p. (1951) *62,792*.
Klaipeda (Memel), *spt.*, Lithuanian S.S.R.; nr. N. extremity Kurisches Haff; exp. timber, textiles, chemicals, paper; p. (1959) *89,000*.
Klamath, *L.*, Cal. and Ore., U.S.A., discharges by K. R. (275 m.) to Pacific.
Klamath Falls, *t.*, Ore., U.S.A.; p. (1950) *15,875*.
Klang, *t.* Selangor, Malaya; coffee, rubber; p. *33,506*.
Klatovy, *t.*, S.W. Bohemia, Czechoslovakia; mkt.; rose-growing a., textiles; p. *14,088*.
Klerksdorp, *t.*, S. Transvaal, S. Africa; gold, diamonds; p. *18,289*.
Kleve, *t.*, N. Rhine–Westphalia, Germany; nr. Netherlands frontier; foodstuffs, leather, machin., tobacco; p. (estd. 1954) *27,700*.
Klondyke, *R.*, Yukon, Canada; small trib. of Yukon in gold-mine region.
Kluczbork (Kreuzburg), *t.*, Upper Silesia, Poland; N.E. of Opole; p. *10,000*.
Knaresborough, *mkt. t.*, *urb. dist.*, W.R. Yorks., Eng.; on Nidd R. 3 m. N.E. of Harrogate; p. (1951) *8,393*.
Knighton, *mkt. t.*, *urb. dist.*, Radnor, Wales; on R. Teme; p. (1951) *3,245*.
Knockmealdown Mtns., cos. Waterford and Tipperary, Ireland; highest point 2,609 ft.
Knossos, *ruined c.*, *cap.* of ancient Crete; S.E. of Candia; ctr. of Cretan Bronze Age culture, *c.* 1800 B.C.
Knottingley, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Aire, 12 m. S.E. of Leeds; engin., glass, tar distilling, chemicals, shipbldg.; p. (1951) *9,989*.
Knoxville, *c.*, Tenn., U.S.A.; univ.; textiles; coal-mining, iron, copper, marble; p. (1950) *124,769*.
Knoxville, *t.*, Iowa, U.S.A.; p. (1950) *7,625*.
Knutsford, *mkt. t.*, *urb. dist.*, Cheshire, Eng.; 6 m. N.E. of Northwich; p. (1951) *6,619*.
Kobe, *t.*, *spt.*, Honshu, Japan; at E. end of Inland Sea; shipbldg., silk-weaving; gr. tr.; p. (1950) *765,435*.
Koblenz (Coblenz), *t.*, Rhineland Palatinate, Germany; at confluence of Rs. Rhine and Moselle; fine buildings, wine, paper, machin., leather, ceramics; p. (estd. 1954) *72,300*.
Kocaeli, *spt.*, Turkey; on G. of Sea of Marmara.
Kodiak I., N. Pac. Oc.; the lgst. I. of W. Alaska; (90 m. long); fur-trading, extensive salmon fishing, canning; ch. settlement St. Paul, on Chiniak R.; p. *864*.
Koesfeld, *t.*, N. Rhine, Germany; p. *12,934*.
Kofu, *c.*, Honshu, Japan; silk, vegetables, grapes; p. (1950) *121,645*.
Kohat, *t.*, N.W. Pakistan; on trib. of Indus; military t.; p. (1941) *44,277*.
Koh-I-Baba Mtns., Afghanistan, spur of the Hindu Kush; highest point 17,640 ft.
Kokand, *t.*, Uzbek S.S.R.; textiles, chemicals, engin.; p. (1959) *105,000*
Kokkola (Gamla Karleby), *t.*, Finland; on cst. G. of Bothnia; p. *10,555*.
Kokomo, *c.*, Ind., U.S.A.; on Wild Cat R.; steel, glass, agr. region; p. (1950) *38,672*.
Koko-Nor, *salt L.*, Mongolia, China; a. 2,040 sq. m.; no outlet.
Kola, *peninsula*, R.S.F.S.R.; extension of Lapland.
Kola, *t.*, R.S.F.S.R.; nr. Murmansk, on Kola Peninsula.
Kolar Gold Fields, Mysore, India; p. (1951) *159,084*.
Kolberg, *see* Kolobrzeg.
Kolding, *mkt. t.*, Vejle, Denmark; good harbour; p. *27,660*.
Kolguev, *I.*, Arctic Oc.; at entrance of Cheshsk G., N.E. of Arkhangelsk.
Kolhapur, *t.*, Bombay, India; bauxite; p. (1951) *136,835*.
Kolyma R., flows into E. Siberian Sea, R.S.F.S.R.
Köln, *see* Cologne.
Kolo, *t.*, Poland; on an I. of the Warta; pottery.
Kolobrzeg (Kolberg), *c.*, *spt.* W. Pomerania, Poland, German before 1945; cath.; resort; fishing; p. (1939) *36,616*; (1946) *2,816*.
Kolomyya, *t.*, Ukrainian S.S.R.; oil refining, engin.; p. (estd.) *75,000*.
Kolyvan, *t.*, R.S.F.S.R.; tungsten, copper, silver-lead; p. (estd.) *13,700*.

Komárno, *industl. t.*, Czechoslovakia; on R. Danube; textiles; p. *15,561*.
Komotene, *cap.*, Rhodope, Thrace, Greece; p. (1951) *32,906*.
Komsomolsk, *c.*, R.S.F.S.R.; built by volunteer youth labour, after 1932; heavy industl. development; p. (1959) *177,000*.
Kong, *t.*, Ivory Cst., W. Africa; indigo, kola nuts; p. *15,000*.
Königsberg, *see* **Kaliningrad**.
Konigshütte, *see* **Chorzow**.
Konin, *t.*, Lodz, Poland; mkt., textiles; p. *10,390*.
Konstantinovka, *industl. t.*, Ukraine, S.S.R. U.S.S.R.; in heart of Donbas industl. region, 38 m. N of Stalino; heavy engin., iron and steel, zinc smelting; p. (1959) *89,000*.
Konstanz, *see* **Constance**.
Konya, *I.*, Turkey; well wooded; opium; ch. t. K. (the ancient Iconium); impt. tr.; p. (1945) *667,268*.
Kootenay R. (Flat Bow R.), trib. of the Columbia R. flowing in Mont., U.S.A., and B.C.; length 450 m.
Kopparberg, *co.*, Sweden; a. 11,649 sq. m.; p. (1950) *267,096*.
Korat (Nakhon Ratsina), *walled t.*, Siam; busy tr. and rly. ctr.; p. *12,000*.
Korce (Koritza), *t.*, S.E. Albania; sugar refining, brewing; p. (estd. 1950) *25,000*.
Korčula, *spt.*, on I. of same name off Jugoslavia, birthplace of Marco Polo; p. *6,500*.
Kordofan, *prov.*, Sudan, Africa; a. 146,930 sq. m.; cap. El-Obeid; p. (estd. 1951) *1,671,600*.
Korea, *rep.*, *peninsula*, E. Asia; extending between Yellow Sea and Sea of Japan; annexed by Japan in 1910; after Second World War separated into 2 zones along 38th parallel, N. under Russian influence, the S. under American. **Korea, N.**; a. 46,814 sq. m.; mainly agr.; iron ore, steel ingots, oilwells; ch. t. Pyongyang; p. *8,229,000*. **Korea, S.**; a. 38,452 sq. m.; mainly agr.; tungsten, salt; cap. Seoul; p. (1955) *21,526,374*.
Korneuburg, *t.*, Austria; on R. Danube, N. of Vienna; p. *8,817*.
Korsör, *spt.*, Sjaelland I., Denmark; fine harbour; p. *10,667*.
Kortrijk (Courtrai), *t.*, W. Flanders, Belgium; 25 m. S.W. of Ghent; linen, lace; p. (estd. 1957) *41,779*.
Kos (Cos), *I.*, Dodecanese Is., Greece; ch. t., Kos; p. (1940) *20,982*.
Kosiče, *c.*, Czechoslovakia; Gothic cath.; magnesite, chemicals, textiles; p. (1957) *79,460*.
Koskiusko, *t.*, Miss., U.S.A.; p. (1950) *6,753*.
Koskiusko, *peak*, Australian Alps, N.S.W., Australia; highest peak in Gr. Dividing Range; alt. 7,328 ft.
Koslin, *see* **Koszalin**.
Kosova (Kossovo), *prefecture*, Albania; p. (1930) *49,081*.
Kostroma, *c.*, R.S.F.S.R.; at confluence of Rs. Volga and Kastromo; univ.; textiles; p. (1959) *171,000*.
Kostrzyn (Küstrin), *t.*, Brandenburg, Poland; German before 1945; on R. Oder; machin., wood ind., rly. junction; p. (1939) *23,711*; (1946) *634*.
Koszalin (Koslin), *t.*, Poland Pomerania; German before 1945; N.E. of Szczecin; paper mftg., engin., textiles; p. (1949) *17,115*.
Kotah, *t.*, Rajasthan, India; on R. Chambal; muslins; p. *32,000*.
Köthen, *t.*, Saxony–Anhalt, Germany; N. of Halle; cas.; metallurgy, sugar, machin., chemicals; rly. junction; p. (estd. 1954) *42,600*.
Kotka, *spt.*, on Gulf of Finland; wood pulp; p. (1950) *24,057*.
Kotor (Cattaro), *spt.*, Montenegro, Jugoslavia; p. *5,402*.
Kotri, *t.*, Pakistan; on R. Indus, opposite Hyderabad; barrage 4½ m. N. of the t., started to help irrigate Sind; p. *7,617*.
Kottayam, *t.*, W. Travancore, India; p. (1941) *25,236*.
Kottbus, *industl. t.*, Mecklenberg, Germany; on R. Spree; cloth, machin., brandy; p. *50,432*.
Koulikoro, *t.*, Sudanese Rep., W. Africa; on upper course of R. Niger; mkt. for groundnuts, gum-arabic, sisal; linked by R. to Timbuktu and Gao; rly. terminus; (760 m.) from Dakar.
Kovel, *t.*, W. Ukraine, U.S.S.R.; on R. Turia.
Kovrov, *t.*, R.S.F.S.R.; on Gorki rly. line and R. Klyazma; impt. agr. exp. ctr.; engin., textiles; p. (1959) *100,000*.
Kowloon, *spt.*, S.E. China; on mainland opp. Hong Kong I.; tr. ctr.; p. (estd. 1948) *547,200*.
Kozani, *prefecture*, Macedonia, Greece; cap. Kozani; p. (1951) *177,513*.
Kozhikode formerly **Calicut**, *spt.*, mftg. t., Malabar cst. of Madras, India; exp. coffee, spices; p. (1951) *158,724*.
Kozlev, *t.*, U.S.S.R.; on R. Eyesnoi Voronezh; agr. exp. ctr.
Kragerö, *spt.*, Telemark, Norway; exp. ice, timber, wood-pulp, etc.; p. *3,965*.
Kragujevac, *t.*, central Serbia, Jugoslavia; cath., college, arsenal, garrison; p. (1948) *32,878*.
Kra, Isthmus of, between G. of Siam and Indian Ocean; connects Malaya with Asia mainland.
Krakatao, *volcanic I.*, Strait of Sunda, Indonesia; greater part destroyed by eruption, 1883.
Kraków, *prov.*, Poland; cap. Kraców; a. 6,367 sq. m.; p. (1957) *1,966,000*.
Kraków, *t.*, Poland; machin., chemicals, farm implements; univ.; p. (1957) *469,000*.
Kramatorsk, *c.*, E. Ukraine, U.S.S.R.; new inds.; metallurgy; p. (1959) *115,000*.
Kraslice, *t.*, N.W. Czechoslovakia; nr. German border; p. *13,558*.
Krasnodar, *t.*, R.S.F.S.R.; on R. Kuban; oil refining, engin., textiles; p. (1959) *312,000*.
Krasnovodsk, Turkmen S.S.R.; oil refining, engin.; p. (estd.) *10,000*.
Krasnoyarsk, R.S.F.S.R.; on Trans-Siberian Rly at crossing of R. Yenesei; oil refining, engin., synthetic rubber; p. (1959) *409,000*.
Krasnyy Luch, *t.*, Ukrainian S.S.R.; p. (1959) *94,000*
Krefeld, *t.*, N. Rhine–Westphalia, Germany; ctr. of German silk ind.; steel, machin., chemicals rly. junction; p. (estd. 1954) *188,900*.
Kremenchug, *t.*, Ukrainian S.S.R.; on R. Dnieper; timber, engin., textiles; p. (1959) *86,000*.
Kremenets (Krzemieniec), *t.*, W. part of Ukrainian S.S.R. (Volhynia), U.S.S.R.
Krems, *industl. t.*, Austria; on R. Danube; vinegar, white lead; p. *28,440*.
Kreuzburg, *see* **Kluczbork**.
Kreuznach, *t.*, N. Rhine–Westphalia, Germany; on R. Nahe; metallurgy, leather, optical and chemical inds.; viticulture; mineral baths; p. (estd. 1954) *31,800*.
Kristiansand, *spt.*, Norway; 160 m. S.W. of Oslo; p. (1946) *24,110*.
Kristianstad, *co.*, Sweden; a. 2,485 sq. m.; p. (1950) *258,809*.
Kristianstad, *fortfd. t.*, Sweden; 10 m. from the Baltic; p. (1951) *24,036*.
Kristiansund, *spt.*, W. cst. Norway; p. (1946) *12,853*.
Kristinehamn, *L.*, *pt.*, Sweden; on L. Vänern; mftg.; p. *15,236*.
Krivoi Rog, *t.*, Ukrainian S.S.R.; on R. Ingulats; rich coal and iron dist.; p. (1959) *386,000*.
Krkonose (Riesengebirge), range between Polish Silesia and Bohemia; highest peak Sněžka (Schneekoppe) 5,275 ft.
Kroměříz, *t.*, Moravia, Czechoslovakia; mnfs., engin.; p. *17,781*.
Kronoberg, *co.*, Sweden; a. 3,828 sq. m.; p. (1950) *157,713*.
Kronstadt, *spt.* (*strongly fortfd.*), on I. in G. of Finland; Baltic pt. and naval sta., R.S.F.S R.; scene of naval mutiny which precipitated the Russian Revolution; p. (1954) *50,000*.
Kroonstad, *t.*, O.F.S., S. Africa; on R. Valseh; p. *20,398*.
Kropotkin, *t.*, E. Krasnodar terr., R.S.F.S.R.; grain; engin.; p. (1959), *54,000*.
Krotoszyn, *commune*, Posnan, Poland; rly. junction; industl. development; p. *14,000*.
Krugersdorp, *t.*, Transvaal, S. Africa; named after President Kruger; gold-mining; p. (1946) *75,325*.
Krumlov, *t.*, Bohemia, Czechoslovakia; on N. slopes of Böhmer Wald; graphite-mines.
Krusevac, *t.*, Jugoslavia; mkt.; munitions; p. *11,054*.
Kuala Lumpur, *cap.*, Selangor and administrative cap., Fed. of Malaya; p. (1947) *175,961*.
Kuangchou, *see* **Canton**.
Kuban, *region* of R.S.F.S.R., U.S.S.R.; produces wheat, maize, sunflowers; stock-raising.
Kubango (Okovango), *R.*, flows from Angola into L. Ngami, Bechuanaland.

Kuching, *cap.*, Sarawak, Borneo, E. Indies; p. (1947) *37,954*.
Kuchinoerabu, *I.*, Japan; S. of Kyushu; mtns.
Kuçovë, nr. Berat, Albania; oil prod. and refining; pipe-line connects to Vlonë.
Kudamatsu, *c.*, S.W. Honshu, Japan; oil-refining; p. (1947) *34,045*.
Kufra, *oasis*, Libya.
Kuibyshev, *t.*, R.S.F.S.R.; on R. Volga; at head of central Asian and Siberian rlys.; thriving comm. ctr.; engin., sulphur, paper, oil refining; p. (1954) *750,000*.
Kulm, *see* **Chelmno.**
Kulmbach, *t.*, Bavaria, Germany; textiles, cars, brewing; p. (estd. 1954) *24,100*.
Kulmsee, *see* **Chelmza.**
Kumamoto, *spt.*, W. Kyushu, Japan; p. (1950) *267,506*.
Kumasi, *cap.*, Ashanti, Ghana; p. (1948) *78,483*.
Kumbakonam, *t.*, *sacred c.*, Madras, India; Cauvery delta; silks, cottons; p. *67,000*.
Kumta, *t.*, Bombay, India; on sea cst.; sandalwood; carving.
Kunene (Cunene), *R.*, S.W. Africa; forming bdy. between Angola and Brit. S.W. Africa, and mainly in Portuguese terr.; length 700 m.
Kungur, *t.*, S.E. Molotov reg., R.S.F.S.R.; agr.; leather; kaolin; p. (*1959*) *65,000*.
Kun Lun (Kwen Lun), *mtns.*, Tibet; extend 1,800 m. E. from Pamirs along N. edge of high plateau of Tibet; drained N. into inland drainage basin of Lop Nor; alt. frequently exceeds 18,000 ft.
Kuopio, *dep.*, Finland; a. 13,806 sq. m.; p. (1950) *470,114*.
Kuopio, *t.*, Finland; on L. Kalki; p. (1950) *33,345*.
Kur, *R.*, Transcaucasia, U.S.S.R.; flows to Caspian S.; length 520 m.
Kurdistan (Country of the Kurds), Persia and Turkey.
Kure, *c.*, S.W. Honshu, Japan; spt. and naval base; engin.; p. (1950) *187,775*.
Kurgan, *t.*, R.S.F.S.R.; on the Trans-Siberian Rly. nr. Tobolsk; tr. in cattle and foodstuffs, agr. engin.; p. (1959) *145,000*.
Kuria Muria Is., part of Brit. col. of Aden off S. Arabia, consisting of 5 islands.
Kuril Is., *chain of sm. Is.*, N. Pacific, U.S.S.R.; extending from Kamchatka to Hokkaido; mainly mtns.
Kurisches Haff (Kurštu Martos), *shallow lagoon*, Baltic cst. of Lithuanian S.S.R., U.S.S.R.; receives water of R. Niemen; narrow entrance to Baltic Sea at N. end of lagoon commanded by pt. of Klaipeda (Memel); length, 60 m., maximum width, 20 m.
Kurische Nehrung, *sandspit*, Baltic Sea; almost cuts off Kurisches Haff from Baltic Sea; length, 55 m.
Kuroshio (Japan Current), *ocean current*, flows N.E. along Pacific cst. of Kyushu, Shikoku and S. Honshu, relatively warm water, exerts slight warming influence on this cst. in winter.
Kursk, *region*, adj. N. Ukraine, R.S.F.S.R., U.S.S.R.
Kursk, *t.*, R.S.F.S.R.; in fruit-growing dist., gr. annual fair; engin., textiles, synthetic rubber; p. (1959) *203,000*.
Kustendil, *t.*, Bulgaria; on trib. of R. Struma; fruit-growing dist.
Küstrin, *see* **Kostrzyn.**
Kütahya, *t.*, W. Anatolia, Turkey; on trib. of R. Sakarya; impt. tr.; p. (1945) *19,859*.
Kutaisi, *c.*, Georgian S.S.R.; on R. Rion; chemicals, textiles, barium, engin., p. (1959) *128,000*.
Kutch, *peninsula*, N.W. cst., India, Bombay st., suffered much in famine 1899–1900 also from plague; famous for silver filigree work; p. (1951) *567,606*.
Kutch, Rann of, *desert region* covered with salt, but flooded during monsoons.
Kutchan, *t.*, S.W. Hokkaido, Japan; 45 m. N.W. of Muroran; ctr. of second lgst. iron-ore field in Japan; ore smelted at Muroran.
Kutno, *t.*, Central Poland; nr. Lodz; p. *20,000*.
Kuwait, *sheikdom*, Arabia; on N.W. cst. of Persian G.; impt. oil wells; est. p. *160,000*.
Kuzbas (Kuznetsk Basin), *industl. region*, Siberia, U.S.S.R.; lies just S. of Trans-Siberian Rly. in upper valleys of Rs. Ob and Tom; second lgst. coal output in U.S.S.R., iron and steel mftg., varied heavy metallurgical ind.; ch. ts., Novosibirsk, Stalinsk, Kemerovo, Leninsk-Kuznetsky.
Kwangchow, *spt.*, Kwantung, China; on S. cst. opposite Hainan I.
Kwangsi Chuang, *aut.* region, China; cap. Nanning; sugar, tobacco, rice, indigo, silk; a. 85,452 sq. m.; p. (1953) *19,560,822*.
Kwangtung, *prov.*, China; cap. Canton; rice, tea, sugar, silk; a. 85,447 sq. m.; p. (1953) *34,770,059*.
Kwanto Plain, S.E. Honshu, Japan; lgst. a. of continuous lowland in Japan, extends 80 m. inland from Tokyo; composed of: (1) low, badly-drained alluvial plain devoted to intensive rice cultivation; (2) higher, drier terraces under mulberry, vegetables, tea, tobacco; very dense rural p., especially on lower ground; lge. number of urban ctrs., inc. Tokyo, Yokohama; a. 5,000 sq. m.
Kwanza (Cuanza), *R.*, Angola, W. Africa; rises in Bihé and flows to Atlantic; length 700 m.
Kweichow, *prov.*, S.W. China; cap. Kweiyang; cereals, silk, timber, gold, silver, mercury; a. 68,139 sq. m.; p. (1953) *15,037,310*.
Kwidzyn (Marienwerder), *c.*, E. Prussia; Polish, German before 1945; cath.; cas.; p. (estd. 1939) *20,500*.
Kwinana, *t.*, W. Australia; 12 m. from Fremantle on shores of Cockburn Sound; recent oil refinery and steel plant.
Kyle of Lochalsh, *vil.*, *sm. spt.*, Ross and Cromarty, Scot.; at entrance to Loch Alsh, facing S. end of I. of Skye; terminus of rly. across Highlands from Dingwall; ch. pt. for steamers serving N.W. cst., I. of Skye, Outer Hebrides; p. (1951) *1,525*.
Kyles of Bute, *sound*, between Argyll cst. and N. Bute, Scot.
Kyoto, *c.*, *cap.* Kyoto *prefecture*, Honshu, Japan; univ., temples; former cap. of Japan; p. (1955) *1,204,017*.
Kyrenia, *t.*, Cyprus; on N. cst.; p. *2,960*.
Kythera (Cerigo), *I.*, S. of Peloponnesos, Greece; a. 107 sq. m.
Kyushu, one of the lge. Is. of Japan; W. of Shikoku; mtns.; rice, wheat, tea, hemp, coal, copper; ch. t. Nagasaki; a. 16,247 sq. m.
Kyustendil, *t.*, Bulgaria; nr. Jugoslav border; p. *19,309*.
Kzyl Orda, *R.*, Kazakh S.S.R.; large dam being constructed to irrigate rice plantations.

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La Barca, *t.*, Jalisco st., Mexico; maize, sugar; mkt.; p. (1940) *13,247*.
La Ceiba, *spt.*, Honduras; on Atlantic cst.; p. (1945) *12,185*.
La Coruña, *prov.*, N.W. Spain; cap. La Coruña; a. 3,051 sq. m.; p. (1949) *975,759*.
La Coruña, *spt.*, cap. La Coruña prov., N.W. Spain; fishing; import tr.; p. (1950) *133,844*.
La Crosse, *t.*, W. Wis., U.S.A.; mkt., agr.; light mnfs.; rubber; p. (1950) *47,535*.
La Estrada, *c.*, N.W. Spain; mineral springs; agr., cattle; p. *27,240*.
La Goulette, *spt.*, Tunisia; on cst. 4 m. from Tunis; resort; p. *4,000*.
La Grange, *t.*, Ga., U.S.A.; p. (1950) *25,025*.
La Grange, *t.*, Ill., U.S.A.; p. (1950) *12,002*.
La Guaira, *see* **Guaira, La.**
La Hague, *see* **Hague.**
La Libertad, *dep.*, Peru; a. 10,206 sq. m.; ch. t. Trujillo; p. (1947) *453,523*.
La Madeleine, *t.*, Nord, France; p. (1954) *22,831*.
La Mancha, *see* **Mancha, La.**
La Pampa, *terr.*, Argentina; a. 55,669 sq. m.; cap. Santa Rosa; p. (estd. 1958) *191,700*.
La Paz, *dep.*, Bolivia; traversed by the Andes; cap. La Paz; cocoa, coffee, rubber, minerals; a. 40,686 sq. m.; p. (1950) *948,446*.
La Paz, *t.*, Bolivia, seat of govt., Sucre is legal cap.; impt. comm. ctr.; copper, alpaca wool, cinchona; p. (1957) *339,279*.
La Paz, *t.*, Lower California, Mexico; pearl fishing; p. (1940) *10,501*.
La Plata, *c.*, *spt.*, Argentina; cap. Buenos Aires prov.; univ.; cattle, agr. tr.; p. (estd. 1956) *357,356*.
La Plata, Rio de (R. Plate), *lge. estuary*, between Argentina, Uruguay, S. America; receives

water of Rs. Parana, Uruguay; cst. provides sites for lge. spts. Buenos Aires, La Plata, Montevideo; length 200 m., max. width 50 m.
La Porte, *t.*, Ind., U.S.A.; flour, iron and steel, woollens; p. (1950) *20,414*.
La Puebla, *t.*, Majorca, Balearic Is.; p. *10,147*.
La Rioja, *prov.*, Argentina; a. 33,394 sq. m.; cap. La R.; p. (estd. 1958) *127,300*.
La Rochelle, *t.*, *spt.*, *cap.*, Charante-Maritime, France; glass, sugar, fish; cath.; p. (1954) *58,799*.
La Salle, *c.*, Ill., U.S.A.; coal; p. (1950) *12,083*.
La Serena, *cap.* Coquimbo prov., Chile; cath.; p. (1952) *37,618*.
La Tuque, *t.*, S. Quebec, Canada; R. pt.; lumbering; resort; p. *7,919*.
La Unión, *t.*, Spain; nr. Cartagena; iron, manganese, sulphur; p. *25,000*.
Laaland, *I.*, Danish, Baltic Sea; a. 462 sq. m.; forests; cap. Maribo.
Labe, *R.*, *see* **Elbe**.
Labinsk, *t.*, R.S.F.S.R.; coal, manganese mining; p. (1939) *28,830*.
Labrador, *peninsula*, Newfoundland, Canada; sterile, climate severe, fisheries; cap. Battle Harbour; a. 110,000 sq. m.; p. *5,528*.
Labuan, *Brit. I.*, N.W. Borneo; rubber, rice, coconuts; cap. Victoria; a. 35 sq. m.; p. (estd. 1954) *2,526*.
Laccadive, *Is.*, Arabian Sea; about 200 m. off Malabar cst. joined with Minicoy and Maldive Is. to form Union Territory; India; coir, coconuts; p. of Territory (estd. 1957) *21,035*.
Lachine, *t.*, Quebec, Canada; at head of L. rapids; summer resort, timber, bridge-bldg., wire, rope; p. (1951) *27,410*.
Lachine Canals, Quebec, E. Canada; skirt Lachine Rapids on St. Lawrence R. immediately above Montreal; give access to Montreal from Gr. Lakes for steamers of 14 ft. draught; length 9 m.
Lachlan, *R.*, N.S.W., Australia; trib. R. Murrumbidgee; length 700 m.
Lackawanna, *t.*, N.Y., U.S.A.; on L. Erie; iron and steel; p. (1950) *27,658*.
Laconia, div. of Peloponnesus, Greece; cap. Sparta; p. (1951) *130,939*.
Laconia, *G.*, S. Peloponnesus, Greece.
Laconia, *c.*, N.H., U.S.A.; hosiery, rly. wks.; p. (1950) *14,745*.
Lacroma, *I.*, Jugoslavia; holiday resort, château, monastery.
Lacrosse, *c.*, Wis., U.S.A.; rly. ctr., flour, timber; p. (1950) *47,535*.
Ladakh, *dist.*, of the Upper Indus, Kashmir; agr. in valleys, some gold; cap. Leh (*q.v.*).
Ladoga, *L.*, nr. Leningrad, U.S.S.R. (lgst. in Europe); a. 7,100 sq. m.; drained to G. of Finland by R. Neva.
Ladrones, *see* **Marianas Is.**
Ladybank, *burgh*, Fife, Scot.; 5 m. S.W. of Cupar; rly. wks., malt, linen; p. (1951) *1,149*.
Ladysmith, *t.*, Natal, S. Africa; rly. wks., coal; besieged by Boers 1899–1900; p. *13,064*.
Ladysmith, *t.*, N.W. Wis., U.S.A.; food, lumber; p. (1950) *3,924*.
Lafayette, *c.*, Ind., U.S.A.; univ.; timber, farm implements; p. (1950) *35,568*.
Lafayette, *t.*, La., U.S.A.; timber, cottonseed oil; p. (1950) *33,541*.
Lafayette, *peak*, White mtns. range, N.H., U.S.A.; alt. 5,259 ft.
Lagan, *R.*, N. Ireland; flows into Belfast Lough; length 35 m.
Lagoa dos Patos, *L.*, Brazil; drained by Rio Grande do Sul; length 140 m.
Lagoa Mirim, *L.*, on bdy. between Brazil and Uruguay; drains N.; length 110 m.
Lagos, *spt.*, *cap.*, Nigeria; good natural harbour; exp. palm oil and kernels, cocoa, groundnuts, hides; imports machin., cotton piece goods; rly. wks.; p. (estd. 1958) *337,000*.
Lagos, *t.*, Jalisco, Mexico; p. (1940) *12,490*.
Laguna, *t.*, Tenerife, Canary Is.; fruit ctr.
Laguna, *dist.*, Durango st. Mexico; former L. bed irrigated by R. Nazas and Aguanaval; ch. cotton-growing region in Mexico; ch. t., Torréon; a. 100,000 sq. m.
Laguna Dam, *see* **Imperial Valley**.
Laguna de Terminos, *inlet*, Campeche, Mexico; 70 m. by 40 m.
Laguna Madre, *lagoon*, Texas, U.S.A.; 110 m. by 14 m.
Lahn, *R.*, Germany; enters R. Rhine at Koblenz; length 135 m.
Lahore, *div.*, W. Punjab, Pakistan; ch. t. Lahore; p. (estd. 1951) *5,340,000*.
Lahore, *cap.*, W. Punjab, Pakistan; univ., cath., temples, mosques; textiles, pottery, carpets; p. (1951) *849,476*.
Lahr, *t.*, Baden-Württemberg, Germany; at W. edge of Black Forest; tobacco, cardboard, leather, precision mechanics; p. (estd. 1954) *20,600*.
Lahti, *t.*, S. Finland; p. (1950) *44,759*.
Laibach, *see* **Ljubljana**.
Laichow, *spt.*, Shantung, China; G. of Pohai; p. *60,020*.
Laiyang, *t.*, Shantung, China; nr. Chefoo; p. *51,120*.
Lake Charles, *t.*, La., U.S.A.; oil, rice, timber; holiday resort; p. (1950) *41,272*.
Lake City, *t.*, Fla., U.S.A.; holiday resort; p. (1950) *7,571*.
Lake District, *mountainous dist.*, Cumberland and Westmorland, Eng.; tourist resort, beautiful scenery, inc. Ls. Windermere, Ullswater, Derwentwater, etc.
Lake Forest, *t.*, Ill., U.S.A.; on L. Michigan; p. (1950) *7,819*.
Lake of the Woods, *L.*, E. of Winnipeg, Ontario, Canada; on bdy. between Canada and U.S.A.
Lake Success, *vil.*, N.Y., U.S.A.; temporary H.Q. of U.N.O. since 1946.
Lakeland, *t.*, Fla., U.S.A.; agr., fruit ctr., phosphates; holiday resort; p. (1950) *30,851*.
Lakeview, Ore., U.S.A., uranium mill.
Lakewood, *t.*, N.J., U.S.A.; winter resort; p (1950) *9,970*.
Lakewood, *t.*, Ohio, U.S.A.; sub. of Cleveland; grapes; p. (1950) *68,071*.
Lalin, *t.*, N.W. Spain; agr. ctr., paper, tanning. p. *18,620*.
Lambay, *I.*, off cst. Dublin co., Ireland.
Lambayeque, *dep.*, N. Peru; sugar, cotton tobacco; cap. Chiclayo; a. 4,613 sq. m.; p. (1947) *225,657*.
Lambersart, *commune*, Nord, France; sub. Lille; spinning; p. (1954) *19,092*.
Lambeth, *metropolitan bor.*, London, Eng.; pottery, chemicals; L. Palace, residence of Archbishop of Canterbury; p. (1951) *230,015*.
Lambezellec, *t.*, Finistère, France; tr. ctr.; p. (1946) *19,227*.
Lambourn, *par.*, Berks, Eng.; agr.; training stables; p. *2,316*.
Lamesa, *t.*, N.W. Texas, U.S.A.; cotton, maize, cattle; p. (1950) *10,704*.
Lamia, *cap.*, Phthiotis and Phocis prefecture, Greece; p. (1951) *26,843*.
Lammermuir Hills, E. Lothian, Scot.; highest peak Lammer Law, alt. 1,733 ft.
Lampedusa, *I.*, Mediterranean; S. of Malta.
Lampeter, *mkt. t.*, mun. bor., Cardigan, N. Wales; on R. Teifi; St. David's College; p. (1951) *1,800*.
Lampong, *dist.* at S. extremity Sumatra, Indonesia; a. 11,113 sq. m.; p. (1930) *361,563*.
Lamu, I., off cst. of Kenya Protectorate; p. *3,576* (non-African).
Lanai, one of the Hawaiian Is.; fruit, sugar, cotton, livestock; a. 141 sq. m.; p. *3,360*.
Lanark, *co.*, Scot.; coal, iron, steel, textiles; co. t. Lanark; a. 897 sq. m.; p. (1951) *1,614,125*.
Lanark, *burgh*, *co. t.*, Lanark, Scot.; in Clyde valley 22 m. S.E. of Glasgow; hosiery, chenille fabrics, tanning; p. (1951) *6,219*.
Lancashire, *mftg. dist.*, *industl. co.*, N.W. Eng.; Liverpool most impt. spt.; Manchester ctr. of the world's cotton tr.; mnfs. inc. textiles, engin. prod., chemicals, foodstuffs; coal-mining; co. t. Lancaster; a. 1,875 sq. m.; (p. 1951) *5,116,013*.
Lancaster, *mun. bor.*, *co. t.*, Lancs, Eng.; 6 m. up R. Lune; cas.; linoleum, cotton, artificial silk inds.; p. (1951) *51,650*.
Lancaster, *t.*, Ohio, U.S.A.; in natural-gas region; agr.; flour, machin., glass; p. (1950) *24,180*.
Lancaster, *bor.*, Penns., U.S.A.; agr. ctr.; mnfs. light and heavy iron and steel prod.; p. (1950) *63,774*.
Lancaster, *sound*, N.W. Terrs., Canada; 50 m. wide.
Lanchow, *c.*, *cap.*, Kansu, China; on R. Hwang-Ho; silk, tobacco, grain, tea-tr. ctr.; p. (estd. 1946) *156,468*.

Lanciano, *t.*, Abruzzi e Molise, Italy; wine, fruit, oil, silk, linen; p. *22,450.*

Lancing, *vil.*, Sussex, Eng.; on S. cst., 2 m. E. of Worthing; seaside resort; college; light inds.; p. *13,000.*

Landau, *t.*, Rhineland-Palatinate, Germany; on R. Queich; cigar mftg., wine, iron ind.; here the carriages called Landaus were first made; p. (estd. 1954) *24,800.*

Landes, *dep.*, S.W. France; on Atlantic cst.; agr., vineyards, resin; cap. Mont-de-Marson; a. 3,604 sq. m.; p. (1954) *248,943.*

Landes, Les, *coastal sub-region*, Aquitaine, S.W. France; fringes Bay of Biscay from Pointe de Grave to Biarritz; coastal sand dunes and lagoons backed by low, flat plain of alternate sandy tracts and marsh; reclaimed by drainage and afforestation, now over half a. covered by pine forests; turpentine, timber; length 150 m., maximum width of dune belt 7 m., of plain 40 m.

Landrecies, *t.*, Nord, France; on R. Sambre.

Land's End, extreme S.W. point of Eng. on Cornish cst.

Landshut, *t.*, Bavaria, Germany; on R. Isar; cas.; elec. inds., glass, metallurgy, textiles, coal; rly. junction; p. (estd. 1954) *47,100.*

Landskröna, *spt.*, Sweden; rly. ctr., agr. prod.; sugar, flour, dairy; p. (1951) *25,089.*

Lanett, *t.*, E. Ala., U.S.A.; textile mills; p. (1950) *7,434.*

Langanes, *C.*, N.E. cst., Iceland.

Langebergen, *mtns.*, C. of Good Hope, Union of S. Africa; extend 150 m. E. to W. parallel to S. cst. of Africa; form barrier to access from cst. slain to Little Karroo, broken across by valley of R. Gouritz; max. alt. exceeds 4,500 ft.

Langefjell, *mtn. gr.*, Romsdal, Norway; highest peak 8,101 ft.

Langeland, *I.*, Gr. Belt, Denmark; a. 111 sq m.

Langholm, *mkt. burgh*, Dumfries, Scot.; on R. Esk; 18 m. N. of Carlisle; woollen mills, tanning; p. (1951) *2,403.*

Langley, *industl. dist.*, nr. Birmingham, Worcs., Eng.

Langnau, *t.*, Switzerland; ch. t. of the Emmental; p. *8,300.*

Langreo, *t.*, Asturias, Spain; hilly, agr. and fruit-growing dist., colly. and iron-wks.; p. (1950) *49,140.*

Langres, *fortfd. t.*, Haute-Marne, France; the ancient Andematunnum; cath.; grain, livestock, cutlery, wine; p. (1954) *8,300.*

Languedoc, *prov.*, S. France; wine.

Languedoc, *canal*, S. France; unites Mediterranean with R. Garonne at Toulouse, France.

Lannemazan, *sub-region*, Aquitaine, S.W. France; belt 50 m. wide stretches over 100 m. along foot of Pyrenees W. of Toulouse; consists of immense deltas of glacial gravel deeply cut by tribs. of Rs. Garonne and Adour; valleys liable to severe floods in summer, intervening plateau dry, bare; scantily populated.

Lansdowne, *t.*, *sub.*, Philadelphia, S.E. Penns., U.S.A.; p. (1950) *12,169.*

Lansford, *bor.*, Penns., U.S.A.; p. (1950) *1,487.*

Lansing, *cap.*, Mich., U.S.A.; tr., mnfs. iron goods; cars; chemicals; p. (1950) *92,129.*

Lanzarote, *I.*, Canary Is.; volcanic, mountainous; grapes, cochineal; cap. Arrecife; p. *17,000.*

Laoag, *t.*, N. Luzon I., Philippines; cereals, tobacco, cotton, sugar; p. *40,800.*

Laoighis or **Leix Co.,** Leinster, Ireland; mtns. and bog; inland pasture and tillage; cap. Port Laoighise (Maryborough); a. 664 sq. m.; p. (1956) *47,042.*

Laon, *cap.*, Aisne, France; fort, cath.; metal, linen mftg.; p. (1954) *21,931.*

Laos, *kingdom*, Indo-China, former associate st. of Fr. Union; mtnous. and densely forested; a. 89,320 sq. m.; inhabitants mainly Moslems; cereals, sugar, cotton, cattle, some minerals; admin. cap. Vientiane; p. (estd. 1955) *2,000,000.*

Lapeer, *t.*, E. Mich., U.S.A.; wooden prod.; p. (1950) *6,143.*

Lapland, *terr.*, N. Europe, in Norway, Sweden, Finland and U.S.S.R., extending from the Norwegian cst. to the White Sea; mainly mtn. and moorland, with many lakes; a. 130,000 sq. m.; p. *100,000.*

Lappi (Lappland), *dep.*, N. Finland; a. 36,308 sq. m.; p. (1950) *166,740.*

Laptev Sea (Nordenskiöld Sea), *inlet* of Arctic Ocean; between Severnaya Zemlya and N. Siberian Is., R.S.F.S.R.

Larache, *spt.*, Morocco; on Atl. cst. 40 m. S. of Tangier; cork; p. (1945) *41,286.*

Laramie, *c.*, Wyo., U.S.A.; univ., cattle; p. (1950) *15,581.*

Larbert, *par.*, Stirling, Scot.; brass and copper wares, chemicals, confectionery; p. *13,763.*

Larchmont, *residtl. vil.*, N.Y., U.S.A.; p. (1950) *6,330.*

Laredo, *c.*, Texas, U.S.A.; frontier c. on Rio Grande; iron, steel, oil, bricks, hides, wool; p. (1950) *51,910.*

Largo, *par.*, Fife, Scot.; fishing, holiday resort, coal, corn; Alexander Selkirk, inspirer of Defoe's *Robinson Crusoe*, born here 1676; p. (1951) *2,499.*

Largs, *burgh*, Ayr, Scot.; on F. of Clyde opposite Is. of Bute and Cumbrae; seaside resort, fishing, weaving; battle 1263; p. (1951) *8,606.*

Larissa, *prefecture*, Thessaly, Greece; cap. Larissa; p. (1951) *206,829.*

Larissa, *t.*, Thessaly, Greece; silk, cotton goods; p. (1951) *43,163.*

Laristan, *prov.*, S. Persia; on Persian G.; mainly mtns., camels, silk; cap. Lar.

Lark, *R.*, Cambridge, Eng.; trib. of R. Ouse; length 26 m.

Larkhall, *t.*, Lanark, Scot.; Industl. Estate; foundry, hosiery, silk dye wks.; p. *14,055.*

Larksville, *bor.*, Penns., U.S.A.; coal-mining; p. (1950) *6,360.*

Larnaka, *spt.*, Cyprus; the ancient Citium; grain, cotton, fruit; p. (estd. 1959) *18,000.*

Larne, *spt.*, *mun. bor.*, Antrim, N. Ireland; at entrance to Larne Lough, 18 m. N. of Belfast; linen, flour; seaside resort; p. (1951) *11,976.*

Larvik, *spt.*, Norway; S.W. of Oslo; seaside resort; timber.; p. *9,725.*

Las Bela, *dist.*, Baluchistan, Pakistan; a. 7,132 sq. m.; p. (estd. 1951) *76,000.*

Las Cruces, *t.*, N.M., U.S.A.; agr. with irrigation; lead, fluorspar mining; p. (1950) *12,325.*

Las Palmas, *Spanish prov.*, Canary Is.; comprising Gran Canaria, Lanzarote, Fuerteventura and smaller Is.; bananas, potatoes, tomatoes, fishing; a. 1,565 sq. m.; p. (1950) *375,227.*

Las Palmas, *t.*, Gran Canaria, Canary Is.; cap. of Las Palmas prov.; p. (1950) *138,441.*

Las Tres Marias, *Is.*, off W. cst. Mexico.

Las Vegas, *t.*, Nevada, U.S.A.; p. (1950) *24,624.*

Las Vegas, *t.*, N. Mexico, U.S.A.; E. of Santa Fé; p. (1950) *7,994.*

Las Villas, *prov.*, Cuba; a. 8,264 sq. m.; p. (1943) *938,581.*

Lashio, *t.*, Burma; on R. Salween; end of the Burma Road to China; p. *4,638.*

Lashkar, *see* **Gwalior.**

Lasithi, *prefecture*, Crete; cap. Ayios Nikolaos; p. (1951) *73,748.*

Lasswade, *see* **Bonnyrigg and Lasswade.**

Latacunga, *cap.*, Cotopaxi prov., Ecuador; tr. ctr.; p. (1938) *17,800.*

Latakia, *spt.*, Syria; tobacco, olive oil, sponges; p. (estd. 1950) *100,462.*

Latina, *see* **Littoria.**

Latium, *see* **Lazio.**

Latrobe, *t.*, Tasmania, Australia; on N. cst.

Latrobe, *t.*, S.E. Penns., U.S.A.; p. (1950) *11,811.*

Latronico, *t.*, Potenza, Italy; p. *5,175.*

Latvia, *constituent S.S. rep.*, U.S.S.R., on the Baltic Sea; former independent st.; mainly agr.; cap. Riga; principal spts. Ventspils, Liepaya; a. 24,800 sq. km.; p. (1959) *2,094,000.*

Lauder, *burgh*, Berwick, Scot.; in Lauderdale, 8 m. N. of Melrose; sm. mkt. t.; p. (1951) *623.*

Lauenburg, *see* **Lebork.**

Launceston, *t.*, *mun. bor.*, Cornwall, Eng.; in upper Tamar valley, 18 m. N.W. of Plymouth; agr. mkt.; mng., quarrying, lt. engin.; p. (1951) *4,467.*

Launceston, *c.*, Tasmania, Australia; wool, textiles, fruit; p. (estd. 1955) *50,690.*

Laurel, *t.*, Miss., U.S.A.; p. (1950) *25,038.*

Laurencekirk, *mkt. t.*, *burgh*, S. Kincardine, Scot.; at N.E. end of Strathmore; linen; p. (1951) *1,485.*

Laurens, *t.*, S.C., U.S.A.; cotton, glass; p. (1950) *8,658.*

Laurentide, *escarpment* of Laurentian plateau, E. Canada.
Laurium, *hills, dist.*, Greece; silver and lead.
Laurium (formerly **Calumet**), *vil.*, Mich., U.S.A.; copper; p. (1950) *3,211*.
Lausanne, *cap.*, Vaud, Switzerland; nr. L. Geneva; cath., univ.; rly. junction, iron, chocolate, paper; p. (1950) *106,807*.
Lauterbrunnen, *vil.*, Bern can., Switzerland; highest and most famous of its waterfalls (Staubbach 980 ft.); tourist ctr.; p. *2,958*.
Lautoka, *spt.*, Viti Levu, Fiji Is.; sugar ctr.
Lauven, *R.*, Norway; length 200 m.
Lavagna, *t.*, Genoa, Italy; shipbldg., marble; p. *8,100*.
Laval, *t.*, *cap.*, Mayenne, France; cotton, paper, machin., marble; p. (1954) *34,597*.
Lawrence, *c.*, Kan., U.S.A.; st. univ., paper, machin.; p. (1950) *23,351*.
Lawrence, *c.*, Mass., U.S.A.; on Merrimac R., N.W. of Boston; textiles, paper, footwear, engin.; p. (1950) *80,536*.
Lawrenceburg, *t.*, Tenn., U.S.A.; textiles, cheese, phosphates; p. (1950) *5,442*.
Lawton, *t.*, Okla., U.S.A.; p. (1950) *34,757*.
Laxey, *vil.*, I. of Man; lead-mining.
Lazio, *region*, Italy; a. 6,634 sq. m.; p. inc. Vatican City and Rome; p. (1951) *3,346,918*.
Le Bouscat, *t.*, Gironde, France; p. (1954) *19,558*.
Le Havre, *see* **Havre, Le**.
Le Maire, *strait*, between Staten I. and Tierra del Fuego, S. America.
Le Mans, *cap.*, Sarthe, France; cath.; linen, ironmongery, chemicals, motor cars, aeroplanes; motor-racing; p. (1954) *111,891*.
Le Puy, *t.*, Haute-Loire, France; p. (1954) *23,453*.
Lea, *R.*, Eng.; rises in Chiltern Hills nr. Luton, flows E. and S. into R. Thames; length 46 m.
Lead, *t.*, S.D., U.S.A.; gold, mnfs. jewellery, mining equipment; tourist resort; p. (1950) *6,422*.
Leader Water, *R.*, Scot.; trib. of R. Tweed, which it joins nr. Melrose; length 21 m.
Leadgate, *t.*, Durham, Eng.; 2 m. N.E. of Consett; coal, mftg.
Leadhills, *mng. vil.*, S.W. Lanark, Scot.; lead.
Leadville, *c.*, Col., U.S.A.; in Arkansas valley; mining ctr.; p. (1950) *4,081*.
Leaf, *R.*, flowing into Ungava Bay, Labrador, Canada.
Leam, *R.*, Warwick, Eng.; trib. of R. Avon; length 25 m.
Leamington, *t.*, Ont., Canada; tobacco; p. *5,858*.
Leamington (**Royal Leamington Spa**), *t.*, *mun. bor.*, Warwick, Eng.; on R. Leam, 24 m. S.E. of Birmingham; fashionable spa; gen. (engin.) inds.; p. (1951) *36,345*.
Leatherhead, *t.*, *urb. dist.*, Surrey, Eng.; on R. Mole to N. of gap through N. Downs; boiler mftg., engin.; p. (1951) *27,203*.
Leavenworth, *c.*, Kan., U.S.A.; on Missouri; rly. ctr. and military post, furniture, machin., bricks, coal; p. (1950) *20,579*.
Lebanon, *rep.*, S.W. Asia; mountainous; mainly agr.; sm. inds., cotton and cement; cap. Beirut; a. 3,400 sq. m.; p. (estd. 1953) *1,300,000*.
Lebanon, *mtn. range*, Lebanon st. and N. Israel; highest peaks Dahr-el-Khadeb (10,052 ft.) and Timarum (10,539 ft.).
Lebanon, *t.*, Penns., U.S.A.; coal, iron, steel, mnfs.; rubber, food, tobacco; p. (1950) *28,156*.
Lebork (former German **Lauenburg**), *t.*, Poland; p. *11,000*.
Lebu, *spt.*, Chile; prov. cap.; p. *3,827*.
Lecce, *t.*, Apulia, Italy; cas.; p. (1951) *63,783*.
Lecco, *t.*, Italy; on L. Como; silk, cotton, copper, iron; p. *33,850*.
Lech, *R.*, Germany; trib. of Danube; length 177 m.
Lechhausen, *industl. t.*, Germany; p. *10,660*.
Leczyca, *t.*, Poland; p. *20,996*.
Ledbury, *t.*, *urb. dist.*, Hereford, Eng.; at W. foot of Malvern Hills; mkt., fruit preserving, tanning; p. (1951) *3,689*.
Ledeberg, *t.*, Belgium; nr. Ghent; industl.; p. *11,754*.
Lee, *R.*, Cork, Ireland; flows past Cork c. to Cork harbour; length 50 m.
Lee-on-Solent, *t.*, Hants, Eng.; on Southampton Water; p. *4,000*.
Leeds, *co. bor.*, W.R. Yorks, Eng.; on R. Aire; at E. margin of Pennines; univ.; lge. clothing ind., varied engin. mnfs., furniture, tanning; p. (1951) *504,594*.
Leek, *mkt. t.*, *urb. dist.*, Staffs, Eng.; 6 m. N.E. of Stoke-on-Trent; silk mnfs.; p. (1951) *19,358*.
Leer, *pt.*, Lower Saxony, Germany; nr. confluence of Leda and Ems; iron, machin., textiles; harbour and route ctr.; p. (estd. 1954) *20,800*.
Lees, *urb. dist.*, Lancs, Eng.; cotton; p. (1951) *4,160*.
Leeston, *t.*, S.I., N.Z.; on Canterbury Plain, nr. Christchurch; agr. ctr.; p. (1951) *738*.
Leete's I., Conn., U.S.A.; on Long I. sound.
Leeuwarden, *prov. cap.*, Friesland, Netherlands; agr.; iron, metal goods, bicycles; p. (estd. 1955) *81,000*.
Leeuwin, *C.*, S.W. point of Australia.
Leeward Is., T.W.I.; inc. Antigua, Barbuda, Redonda, Montserrat, Virgin Is., St. Kitts, Nevis, Anguilla, Sombrero; ch. prod., sugar, fruit; Is. cap. St. John's, Antigua; total a. 423 sq. m.; p. (1952) *119,700*.
Leeward Is. (Dutch), part of Neth. Antilles, consisting of St. Maarten (a. 34 sq. m.; p. *1,697*), St. Eustatius (a. 31 sq. m.; p. *945*), Saba (a. 9 sq. m.; p. *1,150*).
Leeward Is. (**French**), E. Pacific, inc. Huahiné Raiatéa, Tahaa, Bora-Bora-Maupiti; p. (1946) *12,445*.
Leghorn or **Livorno**, *prov.*, Italy; a. 133 sq. m., p. (1951) *281,028*.
Leghorn or **Livorno**, *spt.*, *prov. cap.*, Italy; on W cst., 10 m. S. of mouth of R. Arno; shipbldg., glass, wire, olive oil, hats, marble; p. (1951 *140,722*.
Legnago, *t.*, Lombardy, Italy; on R. Adige; fort, sugar, cereals; p. *20,175*.
Legnano, *t.*, Lombardy, Italy; N.W. of Milan; cotton, silk, machin.; p. *29,900*.
Leh, *ch. t.*, Ladakh, Kashmir, India; on R. Indus, caravan ctr.
Lehigh, *R.*, Penns., U.S.A.; trib. of Delaware R.; length 120 m.
Lehighton, *bor.*, Penns., U.S.A.; anthracite; p. (1950) *6,565*.
Leicester, *co. t.*, *co. bor.*, Leics., Eng.; on R. Soar; hosiery, footwear, knitted goods, engin., and elec. goods; p. (1951) *285,061*.
Leicestershire, *co.*, Eng.; mainly agr.; co. t. Leicester; a. 832 sq. m.; p. (1951) *630,893*.
Leicester, *t.*, Mass., U.S.A.; p. (1950) *6,029*.
Leichhardt, W., *sub.* of Sydney, N.S.W., Australia; p. *31,500*.
Leiden (**Leyden**), *t.*, S. Holland, Neth.; printing, textiles, medical apparatus; univ.; p. (estd (1955) *94,000*.
Leigh, *t.*, *mun. bor.*, S.W. Lancs, Eng.; 5 m. S.E. of Wigan; mkt.; coal-mining; silks, cottons, brass, iron; p. (1951) *48,714*.
Leigh-on-Sea, *t.*, Essex, Eng.; on N. cst. of Thames estuary, 2 m. W. of Southend; holiday resort, fishing.
Leigh's L., Wyo., U.S.A.; links with Snake R.
Leighton Buzzard, *t.*, *urb. dist.*, Bedford, Eng.; at N.E. end of Vale of Aylesbury; sand wks., tiles, precast concrete prod., light engin.; p. (1951) *9,023*.
Leine, *R.*, N.W. Germany; trib. of R. Aller; length 130 m.
Leinster, *S.E. prov.*, Ireland; a. 7,620 sq. m.; agr.; p. (1956) *1,336,397*.
Leipa, *t.*, Czechoslovakia; on R. Polzen; industl.; p. *11,560*.
Leipzig, *c.*, Saxony, Germany; at junction of Rs. Pleisse, Elster and Parthe; univ., cath.; comm., publishing, metal, textile, chemical, steel, paper, machin. and elec. inds.; birthplace of Wagner; p. (estd. 1954) *640,000*.
Leiston-cum-Sizewell, *t.*, *urb. dist.*, E. Suffolk, Eng.; on cst., 4 m. E. of Saxmundham; agr. implements; p. (1951) *4,055*.
Leith, *spt.*, Midlothian, Scot.; Edinburgh sub.; shipbldg., timber, whisky; p. *81,618*.
Leith Hill, Surrey, Eng.; nr. Dorking; alt. 993 ft.
Leitmeritz, *see* **Litoměřice**.
Leitrim, *co.*, Connacht, Ireland; agr.; cap. Carrick-on-Shannon; a. 613 sq. m.; p. (1956) *37,028*.
Leix, *co.*, see **Laoighis**.
Leixões, *spt.*, Portugal; at mouth of R. Douro.

Lek (Neder Rijn), *R.*, Netherlands; more northerly of two branches by which Rhine enters N. Sea; leaves main R. 16 m. above Arnhem, flows through Rotterdam, enters N. Sea by three mouths; length 110 m.
Leland, *t.*, Miss., U.S.A.; cotton, vegetables, nuts; p. (1950) *4,736*.
Lema, *Is.*, Sea of Hong Kong in China Sea.
Léman L., *see* **Geneva L.**
Lemgo, *t.*, N. Rhine–Westphalia, Germany; E. of Bielefeld; furniture and textiles; p. (estd. 1954) *12,390*.
Lemnos, *I.* (Greek), Ægean Sea; 20 m. long; fertile valleys; tobacco, fruit, sheep, goats; cap. Kastron; p. *4,000*.
Lemvig, *spt.*, Jutland, Denmark; p. *5,245*.
Lena, *gr. R.*, Siberia, R.S.F.S.R.; rising in mtns. W. of Lake Baikal and flowing N. to the Arctic Ocean; length 2,800 m.
Lena, *commune*, N.W. Spain; iron, coal, mercury; meat packing; p. *15,532*.
Lenin Dam (Dnieper Dam), *see* **Zaporozhe**.
Leninabad, *t.*, Tadzhik S.S.R.; on R. Syr Darya, S. of Tashkent; cottons, silks, fruit-preserving; p. (1959) *77,000*.
Leninakan, *t.*, Armenian S.S.R.; silk, textiles, engin., p. (1959) *108,000*.
Leningrad, *c.*, R.S.F.S.R.; at mouth of R. Neva; cath., palaces, univs.; engin., oil ref., chemicals, textiles, synthetic rubber, steel, paper; founded by Peter the Gr. as St. Petersburg; p. (1959) *2,888,000*, with subs. *3,300,000*.
Leninsk-Kuznetski (Charjui), *t.*, R.S.F.S.R.; heavy engin., power-sta., coal, gold; p. (1959) *132,000*.
Lenkoran, *spt.*, Azerbaydzhan S.S.R.; on Caspian Sea; lumber, fish; p. *11,878*.
Lennox, *ancient Scottish div.*, comprising Dunbarton, parts of Stirling, Perth and Renfrew.
Lennox Hills, *mtn. range*, between Dunbarton and Stirling, Scot.
Lennoxtown, *t.*, Stirling, Scot.; coal-mining, bleaching, print and alum wks.; p. *2,590*.
Lennoxville, *t.*, Quebec, Canada; on St. Francis R.; univ.; p. *1,927*.
Lenoir, *t.*, N.C., U.S.A.; cotton, lumber; tourist resort; p. (1950) *7,888*.
Lens, *t.*, Pas de Calais, France; on canal of same name; ironwks., soap, sugar; p. (1954) *40,753*.
Lentini or **Leontini**, *t.*, Sicily, Italy; on plain of Catania; cereal, oil, wine; p. *23,150*.
Leoben, *old mining t.*, Styria, Austria; walls and tower; p. (1951) *35,319*.
Leominster, *t.*, *mun. bor.*, Hereford, Eng.; 13 m. N. of Hereford; rly. junction, mkt., cider, cattle, agr. tools, glove mkg.; p. (1951) *6,289*.
Leominster, *t.*, Mass., U.S.A.; wood prod., light mnfs.; p. (1950) *24,075*.
León, *t.*, Nicaragua; cath., univ.; footwear, textiles; p. (1947) *40,000*.
León, *t.*, Mexico; textiles, leather, gold, silver; p. (1950) *140,000*.
León, *prov.*, Spain; agr., livestock, coal, iron; cap. León; a. 5,937 sq. m.; p. (1950) *544,779*.
Leonforte, *t.*, Sicily, Italy; sulphur-mines, cattle, oil, wine; p. *19,400*.
Leonidion, *t.*, Greece; on G. of Nauplia; p. *3,452*.
Leonora, *sm. t.*, W. Australia; 140 m. N. of Kalgoorlie; gold-mines.
Léopoldville, *cap.*, Belg. Congo; above the cataracts on R. Congo; founded by Stanley; p. (1950) *208,662*.
Lepaya, *spt.*, Latvian S.S.R.; engin., steel, chemicals; p. (1954) *90,000*.
Lequeitio, *coastal t.*, Spain, nr. Bilbao.
Lercara, *t.*, Sicily, Italy; macaroni, mftg., sulphur-mines; p. *11,000*.
Lerici, *coastal t.*, Italy; nr. Spezia; macaroni mftg.; old cas.
Lérida, *prov.*, Spain; wine, olive oil, livestock, wool, timber; a. 4,656 sq. m.; p. (1950) *324,062*.
Lérida, *t.*, *cap.* of L. prov., Spain; on R. Segre; 2 caths.; textiles, leather, glass; p. (1950) *52,181*.
Lerins, *Is.* (French), in Mediterranean; nr. Cannes.
Leros, *Is.*, Dodecanese, Greece.
Lerwick, *cap.*, Shetland Is., Scot.; on Mainland; fishing; p. (1951) *5,538*.
Les Baux, *commune*, Bouches-du-Rhône, France; bauxite first discovered here; not impt. now.
Les Causses, *see* **Causses, Les.**
Les Landes, *see* **Landes, Les.**
Les Lilas, *commune*, Seine, France; glass, chemicals, metallurgy; p. (1954) *18,590*.
Les Sables d'Olonne, *commune*, Vendée, France; shipbldg.; fish, canning; p. (1954) *17,761*.
Lesbos, *see* **Mytilene I.**
Leskovac, *t.*, Serbia, Jugoslavia; on R. Morava; hemp, flax, tobacco; p. (1953) *24,553*.
Leslie, *burgh*, Fife, Scot.; 7 m. N. of Kirkcaldy; paper, flax, bleaching; p. (1951) *2,612*.
Lesser Antilles, *see* **Antilles**.
Lesser Slave, *L.*, Central Alberta, Canada.
Lesvos (Lesbos), *Greek prefecture* and *I.* in Ægean Sea; cap. Mitilini (Mytilene); p. (1951) *154,795*.
Leszno, *commune*, W. Poland; engin., distilling, tobacco; p. *20,881*.
Letchworth (Garden City), *t.*, *urb. dist.*, Herts, Eng; at foot of Chiltern Hills, 2 m. N.E. of Hitchin; model residtl. and industl. t.; all types of engin., office equipment; p. (1951) *20,321*.
Lethbridge, *t.*, Alberta, Canada; coal, oil; p. (estd. 1958) *31,568*.
Letterkenny, *t.*, Donegal, Ireland; on Lough Swilly; tourist ctr., flax; p. (1951) *3,004*.
Leucadia, *see* **Levkas**.
Levanger, *spt.*, Norway; at N. end of Trondheim Fjord; p. *1,675*.
Levant, French and Italian name for E. cst. of Mediterranean.
Leven, *burgh*, Fife, Scot.; on N. side of F. of Forth, 10 m. N.E. of Kirkcaldy; linen, coal; p. (1951) *8,868*.
Leven, *L.*, Kinross, Scot.; associated with escape of Mary Queen of Scots from Castle I., 1568.
Leven, *salt-water L.*, Argyll, Inverness, Scot.
Levenshulme, *industl. t.*, Lancs, Eng.; sub. of Manchester.
Leverrosen, *t.*, N. Rhine–Westphalia, Germany; on R. Rhine, N. of Cologne; iron, machin., textiles, chemicals; p. (estd. 1954) *68,600*.
Levin, *t.*, N.I., N.Z.; p. (1951) *4,728*.
Levis, *t.*, Quebec, Canada; on St. Lawrence R., opposite Quebec; rly. terminus, landing place for Transatlantic passengers; p. *11,724*.
Levkas (Santa Maura), Ionian Is., Greece; ch. t. and spt., L.; mtns.; grapes, currants; a. 110 sq. m.; p. (1951) *37,712*.
Levoča, *t.*, Czechoslovakia; N.W. of Kosice; industl.
Lewes, *co. t.*, *mun. bor.*, E. Sussex, Eng.; on R. Ouse at N. entrance to gap through S. Downs; mkt., agr. ctr.; old buildings, iron wks.; p. (1951) *13,104*.
Lewis, *I.*, Outer Hebrides, Scot.; fishing, tweeds; ch. t. Stornoway; a. 770 sq. m.; p. *31,687*.
Lewisham, *metropolitan bor.*, London, Eng.; residtl.; p. (1951) *227,551*.
Lewiston, *t.*, Idaho, U.S.A.; gold, silver, lead; agr., lumber; p. (1950) *12,985*.
Lewiston, *c.*, Maine, U.S.A.; textiles, machin., timber; p. (1950) *40,974*.
Lexington, *c.*, Ky., U.S.A.; univ.; tobacco, horse-rearing; p. (1950) *55,534*.
Lexington, *t.*, Mass., U.S.A.; nr. Boston; mftg.; first battle in American War of Independence, 1775; p. (1950) *17,335*.
Leyburn, *t.*, N.R. Yorks, Eng.; in lower Wensleydale; mkt.; lead, lime; p. *1,440*.
Leyden, *see* **Leiden**.
Leyland, *t.*, *urb. dist.*, Lancs, Eng.; 5 m. S. of Preston; motors, cotton, paint and varnish, rubber goods; p. (1951) *14,722*.
Leyre, *R.*, S.W. France; length 40 m.
Leyte, *I.*, Philippines; a. 2,785 sq. m.; p. *727,600*.
Leytha (Leitha), *R.*, Austria; flowing to the Danube below Vienna.
Leyton, *mun. bor.*, Essex, Eng.; E. sub. of London; residtl., engin.; p. (1951) *105,183*.
Leytonstone, *t.*, part of Leyton, Essex, Eng.
Lhasa, *c.*, *cap.*, Tibet; "forbidden" c.; Buddhist ctr., temple, monasteries, shrines; caravan tr. in carpets, silk, lace, gold, tea; p. *15,000*.
Liao Ho, *R.*, Manchuria, N. China; rises in mtns. of Jehol, flows E. and S. across Plain of Manchuria into G. of Liaotung, Yellow Sea; too shallow for lge. ships; length approx. 1,000 m.
Liaoning, *prov.*, Manchuria, China; now includes part of Jehol prov.; cap. Shenyang; p. (1953) *18,545,147*.
Liaopei, *prov.*, China; a. 40,498 sq. m.; cap. Liaoyuan; p. (estd. 1947) *4,030,000*.
Liaotung, *peninsula*, Manchuria, China; nr. G. of same name.
Liaoyang, *c.*, Liaoning, N. China; at foot of

Changpai Shan 50 m. S.W. of Shenyang (Mukden); p. (estd. 1941) *102,478*.
Libau, *see* Lepaya.
Liberal, *t.*, S.W. Kan., U.S.A.; natural gas, flour, machin.; p. (1950) *7,134*.
Liberec, *t.*, Czechoslovakia; on R. Neisse; textiles, chemicals, tr. ctr.; p. (1957) *66,796*.
Liberia, *rep.*, W. Africa; coffee, palm oil, ivory, sugar; cap. Monrovia; a. 43,000 sq. m.; p. *c. 2,500,000* (inc. *60,000* civilised cst. Negroes and *c. 15,000* Americo-Liberians.)
Libertad (**New San Salvador**), *spt.*, Salvador, Central America; p. (1946) *37,879*.
Libmanan, *mun.*, Luzon, Philippine Is.; hemp, rice; p. *23,000*.
Libourne, *t.*, Gironde, France; on R. Dordogne; vineyards, brandy, sugar, woollens; p. (1954) *19,474*.
Libreville, *cap.*, Gabun rep., Equatorial Africa; at mouth of R. Ogowe; spt.; coaling-sta.; p. *17,868*.
Libya, *independent st.*, *former Italian col.*, N. Africa; joint caps. Tripoli, Benghazi; some agr., fruits, fishing; a. 679,358 sq. m.; p. (1954) *1,091,830*.
Libyan Desert, part of the Sahara, Africa.
Licata, *spt.*, Sicily, Italy; on R. Salso; sulphur; p. *29,675*.
Lichfield, *c.*, *mun. bor.*, Staffs, Eng.; 7 m. N.W. of Tamworth; cath.; agr. and light inds.; p. (1951) *10,624*.
Lichtenstein-Callnberg, *t.*, Saxony, Germany; cas.; textiles; p. *11,829*.
Lick Observatory, on Mt. Hamilton, nr. San José, Cal., U.S.A.
Lickey Hills, Worcester, Eng.; 4 m. S.W. of Birmingham; sm. I. of ancient rocks; largely wooded; used for recreational purposes by industl. ts. around Birmingham; rise to 956 ft.
Licking, *R.*, Ky., U.S.A.; trib. of Ohio R.; length 220 m.
Licosa, *C.*, Italy; S. side of G. of Salerno.
Liddel, *R.*, Roxburgh, Dumfries, Scot.; trib. of R. Esk.; valley used by "Waverley Route" rly. from Carlisle to Edinburgh.
Lidköping, *t.*, Sweden; on L. Wener; p. *9,296*.
Liechtenstein, *sm. principality*, Europe; between Austria and Switzerland; agr., cattle, cotton weaving and spinning, leather goods; cap. Vaduz; a. 62 sq. m.; p. (1955) *14,757*.
Liége, *prov.*, Belgium; minerals; cap. Liége; a. 1,525 sq. m.; p. (estd. 1957) *1,005,849*.
Liége (**Luik**), *c.*, *prov. cap.*, Belgium; at junction of Rs. Meuse and Ourthe; cath., univ.; textiles, machin., coal, iron ind.; p. (estd. 1957) *156,612*.
Liegnitz, *see* Lignice.
Lier, *t.*, Belgium; textiles; p. (estd. 1957) *29,060*.
Liestal, *cap.* of the half-can. Baselland, Switzerland; p. *7,211*.
Liévin, *mftg. t.*, Pas-de-Calais, France; adjoining Lens; coal-mining; p. (1954) *31,808*.
Liévres, *R.*, Quebec, Canada; trib. of St. Lawrence R.
Liffey, *R.*, Ireland; flows from Wicklow to Dublin Bay; length 50 m.
Lifu, *I.* (French); Loyalty Is., Pacific.
Ligao, *t.*, Luzon, Philippine Is.; sugar, rice.
Lignice (**Liegnitz**), *t.*, Silesia, Poland; German before 1945; cas.; foodstuffs, textiles, rly. junction; p. (1950) *55,940*.
Ligny, *t.*, Meuse, France; nr. Bar-le-duc; p. (1954) *4,910*.
Liguria, *region*, N.W. Italy; inc. provs. of Genoa and Porto Maurizio; a. 2,089 sq. m.; p. (1951) *1,557,833*.
Ligurian Sea, Mediterranean; N. of Corsica.
Lika, *R.*, Jugoslavia; partly underground; length 30 m.
Likiang, *c.*, Yunnan, China; gr. tr.; p. *45,000*.
Lille, *cap.*, Nord, France; on R. Deule; univ.; linens, cottons, rayons, iron, sugar, chemicals; p. (1954) *194,616*.
Lillehammer, *t.*, Norway; in R. Lagen valley; agr., lumbering; p. *6,472*.
Lim Fjord, *shallow strait*, Jutland, Denmark; connects N. Sea with Kattegat; length 100 m.
Lima, *dep.*, Peru; a. 15,048 sq. m.; p. (1947) *1,093,780*.
Lima, *cap.*, Peru; univ.; comm. ctr., textiles, leather, furniture, iron-ore; spt. Callao; p. (estd. 1950) *835,468*.
Lima, *c.*, Ohio, U.S.A.; on Ottawa R.; rly. wks., oil, car bodies, refrigerators; p. (1950) *50,246*.
Limassol, *spt.*, Cyprus; wine, grapes, raisins; p. (estd. 1959) *37,000*.
Limavady, *t.*, *urb. dist.*, Londonderry, N. Ireland; mkt.; linen; p. (1951) *3,179*.
Limbach, *t.*, Saxony, Germany; N.W. of Chemnitz; hosiery, textiles, machines; p. (estd. 1954) *20,000*.
Limbe, *t.*, Nyasaland, Africa; merged with Blantyre (q.v.); elec. and power plants; p. *7,140*.
Limburg, *prov.*, Belgium; agr., livestock, gin, sugar-beet, mftg.; cap. Hasselt; a. 930 sq. m.; p. (estd. 1957) *546,877*.
Limburg, *prov.*, Neth.; drained by R. Maas (Meuse); cap. Maastricht; agr., cattle, coal, iron; a. 846 sq. m.; p. (1948) *691,493*.
Limburg, *c.*, Hessen, Germany; on R. Lahn; cath.; iron, machin., glass, paper; rly. junction; p. (estd. 1954) *15,800*.
Limehouse, *par.*, Stepney, E. London, Eng.; on R. Thames; p. *31,000*.
Limerick, *co.*, Munster, Ireland; agr., livestock, fishing; a. 1,064 sq. m.; p. (1956) *86,901*.
Limerick, *co. bor.*, *spt.*, *cap.*, Limerick, Ireland; at head of Shannon estuary; bacon, tanning, shipbldg.; p. (1956) *50,869*.
Limmat, *R.*, Switzerland; trib. of R. Aar; flows through c. of Zurich; length 80 m.
Limoges, *ch. t.*, Haute-Vienne, France; porcelain, kaolin paste; p. (1954) *105,990*.
Limón, *prov.*, Costa Rica, Central America; p. (1946) *41,077*.
Limón, *prov. cap.*, *spt.*, Costa Rica, Central America; comm. ctr.; p. (1950) *41,360*.
Limousin, *old prov.*, and *natural division* ("pays"), Central France; located W. of Auvergne; plateau, average alt. 1,000 ft., composed of old crystalline rocks; exposed, damp climate; rich pasture favours raising of dairy cattle, horses; kaolin deposits; ch. t., Limoges.
Limpopo, or Crocodile R., S. Africa.
Linares, *prov.*, Chile; a. 3,790 sq. m.; cap. L.; p. (1957) *175,534*.
Linares, *t.*, Spain; lead-mining and mftg.; p. (1950) *52,811*.
Lincoln, *agr. co.*, Eng.; a. 2,665 sq. m.; divided into 3 administrative dists.; Holland, p. (1951) *101,545*; Kesteven, p. (1951) *131,566*; Lindsey, engin., agr. machin.; p. (1951) *473,463*.
Lincoln, *c.*, *co. bor.*, *co. t.*, Lincoln, Eng.; on R. Witham in gap through Lincoln Wolds; cath.; heavy engin., iron foundries, bricks, lime, seed milling, malting; p. (1951) *69,412*.
Lincoln, *c.*, Ill., U.S.A.; coal; agr.; pottery; p. (1950) *14,362*.
Lincoln, *cap.*, Nebraska, U.S.A.; rly. ctr., flour; p. (1950) *98,884*.
Lincoln, *t.*, R.I., U.S.A.; limestone, textiles; p. (1950) *11,270*.
Lincoln Edge, *hill ridge*, Lincoln, Eng.; runs N. from Ancaster through Lincoln to Humber; narrow ridge with steep scarp slope to W., broken across by R. Witham at Lincoln; composed of limestone, little surface drainage; iron-ore deposits worked in N. nr. Scunthorpe; sheep, barley; rarely exceeds 300 ft. alt.
Lincoln Wolds, *low plateau*, Lindsey, Lincoln, Eng.; runs N. 45 m. from Wash to Humber; chalk covered with glacial deposits; mixed farming, grains, roots, sheep; lge. farm units; scantily populated; rise to approx. 450 ft.
Lindau, *t.*, Bavaria, Germany; situated on I. in L. Constance; foodstuffs, machin., elec. goods; route ctr.; p. (estd. 1954) *21,200*.
Linden, *t.*, N.J., U.S.A.; p. (1950) *30,644*.
Lindsey, *N. div.*, Lincoln, Eng.; ch. ts. Lincoln, Grimsby; a. 1,520 sq. m.; p. (1951) *473,463*.
Linea (**La Linea**), *t.*, Spain; nr. Gibraltar; vegetables, fruit; p. *38,188*.
Lingen, *t.*, Lower Saxony, Germany; on Dortmund–Ems Canal; petrol, textiles, cheese, cellulose; route ctr.; p. (estd. 1954) *20,700*.
Linköping, *t.*, S.E. Sweden; tobacco, cloth mftg., valves; p. (1951) *54,552*.
Linlithgow, *burgh*, *co. t.*, W. Lothian, Scot.; 15 m. W. of Edinburgh; paper, glue, chemicals, distilling, brewing; p. (1951) *3,929*.
Linnhe, *L.*, Argyll, Scot.; 21 m. long; entrance to Caledonian canal.
Linosa, *I.* (Italian), Mediterranean, W. of Malta.
Linslade, *t.*, *urb. dist.*, Bucks, Eng.; 1 m. N.W. of Leighton Buzzard; p. (1951) *3,269*.
Linyu, *t.*, N.E. Hopeh, China; on G. of Liaotung, E. end of Great Wall; p. *30,000*.

Linz, *c., cap.,* Upper Austria; on Danube; boats, brewing, printing, iron, steel, textiles; cath.; p. (1951) *185,177.*
Lions, G. of, Mediterranean, S. France.
Lipa, *t.,* Luzon, Philippine Is.; sugar, tobacco, cocoa, maize; p. *45,175.*
Lipari Is., Italy; volcanic, Stromboli 3,155 ft.; a. 45 sq. m.; olives, grapes, wine, sulphur; lgst. I. and cap. L.; p. *19,500.*
Lipetsk, *industl t.,* R.S.F.S.R.; on the R. Voronezh; iron, engin., ferro-alloys; p. (1959) *156,000.*
Lippe, *R.* Germany; trib. of Rhine; length 110 m.
Lippstadt, *t.,* N. Rhine-Westphalia, Germany; on R. Lippe; metallurgy, textiles, rly. ctr.; p. (estd. 1954) *32,200.*
Liri, *R.,* Central Italy; rises in Alban Hills, flows S.E. to Cassino and then S.W. to G. of Gaeta; valley followed by main road from Rome to Naples; length 105 m.
Lisbon, *spt., cap.,* Portugal; on R. Tagus; cas., cath.; univ.; cotton, silk, gold, silver, chemicals; p. (1952) *795,000.*
Lisburn, *t., urb. dist.,* Antrim, N. Ireland; on R. Lagan, 6 m. S.W. of Belfast; linen mftg.; p. (1951) *14,778.*
Lisieux, *t.,* Calvados, France; cath.; flannel, dairying, footwear, machin.; p. (1954) *15,342.*
Liskeard, *mkt. t., mun. bor.,* Cornwall, Eng.; on R. Looe at S. edge of Bodmin Moor; mining, tanning, chemicals; p. (1951) *4,391.*
Lisle, *t.,* Tasmania; gold.
Lismore, *mkt. t., rural dist.,* on R. Blackwater, Waterford, Ireland; p. (1951) *9,194.*
Lismore, Scot., *I.,* 12 m. long in Loch Linnhe near Oban; p. *200.*
Lismore, *t.,* N.S.W., Australia; dairying, sugar-refining, maize, potatoes; p. (1958) *19,110.*
Lissa, *I.,* Jugoslavia; wine.
Listowel, *urb. dist.,* Kerry, Ireland; on R. Feale; cas. ruins; p. (1951) *3,149.*
Listowel, *industl. t.,* S.E. Ont., Canada; p. *3,013.*
Litchfield, *c.,* Ill., U.S.A.; natural gas, oil; p. (1950) *7,208.*
Litherland, *urb. dist.,* Lancs, Eng.; N. sub. of Liverpool; tanning, rubber processing, tar distilling, tin smelting; p. (1951) *22,197.*
Lithgow, *t.,* N.S.W., Australia; coal-mining, ironwks., potteries; p. (1958) *14,850.*
Lithuania, *constituent rep.,* U.S.S.R.; former independent st.; agr., livestock, timber; cap. Vilnius; a. 31,600 sq. m.; p. (1959) *2,713,000.*
Litomerice, *t.,* Czechoslovakia; on R. Elbe; brewing, agr. ctr.; p. *18,509.*
Little Bahama, one of the Bahama Is., W.I.
Little Belt, *strait,* separating Jutland from I. of Fyn, Denmark.
Little Cayman, *I., see* **Cayman Is.**
Little Colorado, *R.,* Arizona, U.S.A.; trib. of Colorado R.
Little Falls, *c.,* Minn., U.S.A.; on R. Mississippi; timber; p. (1950) *6,717.*
Little Falls, *t.,* N.Y., U.S.A.; on Mohawk R.; paper, leather, bicycles, knitted goods; p. (1950) *9,541.*
Little Lever, *urb. dist.,* Lancs, Eng.; residtl. and industl.; p. (1951) *4,703.*
Little Rock, *t.,* Ark., U.S.A.; on Arkansas R.; oil, cotton-seed cakes, cotton, machin.; p. (1950) *102,213.*
Little Sioux, *R.,* Iowa, U.S.A.; trib. of Missouri; length 300 m.
Littleborough, *t., urb. dist.,* Lancs, Eng.; 3 m. N.E. of Rochdale; cotton, woollens, dyeing; p. (1951) *10,982.*
Littlehampton, *t., urb. dist.,* W. Sussex, Eng.; on S. cst. at mouth of R. Arun; holiday resort, sm. spt.; p. (1951) *13,948.*
Littleport, *mkt. t.,* Cambs, Eng.; N. of Ely; agr.; p. (par.) *4,709.*
Littleton, *t.,* N.H., U.S.A.; mftg.; p. (1950) *3,819.*
Littoria (Latina), *t.,* Lazio, Italy; in ctr. of reclaimed area of Pontine Marshes, 38 m. S.E. of Rome; mkt. ctr., on which planned road system converges; built since 1932; p. (1951) *35,115.*
Liverpool, *c., spt., co. bor.,* Lancs, Eng.; 2nd lgst. pt. in Gr. Britain, on N. bank at entrance to Mersey estuary; shipping and shipbldg.; elec. mnfs. and engin., flour milling, sugar refining, tobacco, seed and rubber processing; cath., univ.; p. (1951) *789,532.*
Liverpool, *t.,* N.S.W., Australia; poultry farming, dairying, mkt. gardening; p. (1947) *12,642.*
Liverpool, *t.,* S.W. Nova Scotia, Canada; fish, lumber, shipbldg.; mnfs.; p. *3,170.*
Liversedge, *t.,* W.R. Yorks, Eng.; woollens, chemicals, machin.; p. *15,000.*
Livingston, *t.,* Mont., U.S.A.; industl.; p. (1950) *7,683.*
Livingstone, *t.,* N. Rhodesia; on Zambesi R. where the rly. bridges the r., stands at 3,000 ft.; former cap.; impt. saw-mills ctr.; p. *7,890.*
Livingstone, *mtns.,* Tanganyika, highest point, 9,600 ft.
Livingstone Falls, cataracts on R. Congo, Africa.
Livny, *t.,* R.S.F.S.R.; on R. Sosna; mftg., farming leather, iron; p. *21,000.*
Livorno, *see* **Leghorn.**
Livry-Gargain, *t.,* Seine-et-Oise, France; p. (1954) *25,322.*
Lizard, The, *C.,* Cornwall, Eng.; S. point of Eng.
Ljubljana, *cap.,* Slovenia, Jugoslavia; on Laibach R.; textiles, chemicals, bell mftg, engin.; p. (1953) *138,981.*
Llanberis, *t.,* Caernarvon, Wales; tourist ctr. at base of Snowdon; p. *2,370.*
Llanberis, *pass,* Caernarvon, N. Wales; between mtns. Snowdon and Clyder Fawr; road carries heavy tourist traffic; summit alt. 1,168 ft.
Llandaff, *c.,* Glamorgan, S. Wales; part of Cardiff; cath.; p. *13,227.*
Llandarcy, *vil.,* Glamorgan, S. Wales; on cst. Swansea Bay, Bristol Channel; lge. oil-refinery.
Llandilo, *t., urb. dist.,* E. Carmarthen, Wales; on R. Towy, 10 m. E. of Carmarthen; agr. mkt.; p. (1951) *2,003.*
Llandovery, *t., mun. bor.,* N.E. Carmarthen, Wales; on R. Towy, 8 m. N.E. of Llandilo; coal, lead-mining; p. (1951) *1,856.*
Llandrindod Wells, *t., urb. dist.,* mid-Radnor, Wales; medicinal waters; p. (1951) *3,213.*
Llandudno, *t., urb. dist.,* Caernarvon, Wales; between Gr. and Little Orme's Head; holiday resort; p. (1951) *16,712.*
Llandysul, *t.,* S. Cardigan, Wales on R. Teifi; woollen milling; p. (1951) *2,590.*
Llanelly, *spt., mun. bor.,* Carmarthen, Wales; on N. cst. of Loughor estuary; coal-mining, steel and tin-plate wks.; p. (1951) *34,329.*
Llanera, *commune,* N.W. Spain; horticulture; coal; p. *11,424.*
Llanfairfechan, *t.,* N. Caernarvon, Wales; under Penmaenmawr Mt.; seaside resort; granite quarrying; p. *3,200.*
Llanfair Caereinion, *t.,* Montgomery, Wales; mkt., flannel; p. *1,665.*
Llanfyllin, *t., mun. bor.,* Montgomery, Wales; 11 m. S.W. of Oswestry; brewing, malting; Roman remains; p. (1951) *1,419.*
Llangefni, *t., urb. dist.,* Anglesey, Wales; in ctr. of the I.; mkt. and agr. t.; p. (1951) *2,225.*
Llangollen, *t., urb. dist.,* Denbigh, Wales; on R. Dee; mkt., tourist ctr., flannel mftg., light engin., slate quarrying; p. (1951) *3,275.*
Llanidloes, *t., mun. bor.,* Montgomery, Wales; on R. Severn; leather, ironfoundry, engin. wks.; p. (1951) *2,341.*
Llanos, *lowland region,* Venezuela and Colombia, S. America; drained by R. Orinoco and tribs.; high temperatures throughout year, but rain chiefly in summer; ch. vegetation, coarse grass which withers during dry season (Dec. to May); little developed, some cattle-rearing.
Llanos de Urgel, *upland region,* Lérida, N.E. Spain; semi-arid; formerly steppe-land, now irrigated by R. Segre; vine, olive, maize, tobacco.
Llanquihue, *prov.,* Chile; a. 7,005 sq. m.; p. (1957) *168,005.*
Llanrwst, *t., urb. dist.,* Denbigh, Wales; on R. Conway; 10 m. S. of Conway; mkt., tourist ctr.; p. (1951) *2,592.*
Llanstephan, *vil.,* Carmarthen, Wales; cas.
Llantrisant, *rural dist.,* Glamorgan, Wales; iron, coal, quarrying; p. (rural dist. 1951) *25,561.*
Llanwrtyd Wells, *t., urb. dist.,* Brecknock, Wales; iron, farming; p. (1951) *560.*
Llerena, *old walled t.,* Badajoz, Spain; p. *4,778.*
Lleyn, *peninsula, rural dist.,* Caernarvon, N. Wales; extends W. from Snowdonia to Bardsey I., separates Cardigan Bay from Caernarvon Bay; crystalline rocks form hills in E., otherwise low, undulating; pastoral farming, sheep, cattle; settlements mainly on cst., fishing vils. and sm. seaside resorts; ch. t.,

Pwllheli; a. 180 sq. m.; p. rural dist. (1951) *17,660*.
Llwchwr, *urb. dist.*, Glam., S. Wales; p. (1951) *25,737*.
Loa, *R.*, N. Chile.
Loanda or **São Paulo de Loanda,** *c.*, *spt.*, Angola, Africa; exp. rubber, coffee, palm oil, coconuts, rum, ivory; p. *23,000*.
Loango, *spt.*, Congo rep., Eq. Africa; N. of mouth of R. Congo; rubber, palm-oil exp.
Loanhead, *burgh*, Midlothian, Scot.; 5 m. S.E. of Edinburgh; coal, iron ore, engin.; p. (1951) *4,886*.
Löbau, *industl. t.*, Germany; p. *12,635*.
Lobaye, *R.*, Congo rep., Eq. Africa.
Lobito, *spt.*, Angola, Africa; N. of Benguela; exp. copper; rly. terminus; p. *13,592*.
Lobitos, *t.*, Piura dep., Peru; on cst. 20 m. N. of Talara; oil-wells.
Locarno, *t.*, Switzerland; on L. Maggiore; tourist ctr.; L. treaty 1925; p. *5,500*.
Lochaber, *mountainous dist.*, S. Inverness, Scot.; contains Ben Nevis.
Lochalsh, *see* **Kyle of Lochalsh.**
Lochgelly, *burgh*, Fife, Scot.; nr. Dunfermline; coal-mining; p. (1951) *9,102*.
Lochgilphead, *burgh*, Argyll, Scot.; on arm of Loch Fyne; at E. entrance to Crinan Canal; tourist ctr.; p. (1951) *1,229*.
Lochmaben, *burgh*, Dumfries, Scot.; in Annandale, 7 m. N.E. of Dumfries; p. (1951) *1,127*.
Lochy, Loch, Inverness, Scot.; used by Caledonian Canal; 10 m. long; R. Lochy flows 8 m. to Fort William from S. end of the loch.
Lockerbie, *burgh*, Dumfries, Scot.; in Annandale 10 m. E. of Dumfries; sheep mkt.; p. (1951) *2,623*.
Lockhart, *t.*, Texas, U.S.A.; cotton, petroleum, agr.; p. (1950) *5,573*.
Lock Haven, *c.*, Penns., U.S.A.; on Susquehanna R.; timber; p. (1950) *11,381*.
Lockport, *t.*, Ill., U.S.A.; rly. ctr.; p. (1950) *4,955*.
Lockport, *c.*, N.Y., U.S.A.; on Erie canal; machin., paper pulp, fruit; p. (1950) *25,133*.
Locle, Le, *t.*, Switzerland; watch-mkg.; p. *11,336*.
Loddon, *R.*, Victoria, Australia; rises in Grampian Mtns., flows N. into R. Murray at Swan Hill; water used for irrigation in N. Victoria; length approx. 200 m.
Lodève, *t.*, Herault, France; cloth mftg.; cath.; p. (1954) *6,426*.
Lodi, *c.*, Italy; on R. Adda; cheese, majolica ware; cath.; p. *29,000*.
Lodi, *t.*, Cal., U.S.A.; in San Joaquin valley; agr., especially grapes; packing plants; p. (1950) *13,798*.
Lodi, *t.*, N.J., U.S.A.; p. (1950) *15,392*.
Lodore, *waterfall*, nr. Keswick, Cumberland, Eng.
Lodz, *prov.*, Central Poland; a. 7,904 sq. m.; p. (estd. 1950) *1,474,108*.
Lodz, *t.*, central Poland; the "Manchester of Poland"; textiles, paper, engin.; p. (1957) *687,000*.
Lofoten Is., *storm-swept gr.*, off N.W. cst. Norway; stretching 175 m.; mainly mtns.; cod and herring fishing.
Loftus, *t.*, *urb. dist.*, N.R. Yorks, Eng.; on N.E. flank of Cleveland Hills; stone, iron and steel; p. (1951) *7,423*.
Logan, *c.*, Utah, U.S.A.; p. (1950) *16,832*.
Logan, *t.*, Ohio, U.S.A.; coal, natural gas, oil; leather, wood mnfs.; p. (1950) *5,972*.
Logan, *mtn.*, S.E. Yukon, Canada; alt. 19,850 ft.
Logansport, *c.*, Ind., U.S.A.; on Wabash and Erie canal; timber, fruit, grain, machin., woollens; p. (1950) *2,103*.
Logroño, *prov.*, N. Spain, cap. Logroño; a. 1,946 sq. m.; p. (1950) *229,791*.
Loir, *R.*, France; trib. of R. Sarthe; length 150 m.
Loire, *R.*, France; lgst. in cty., flows from Cévennes Mtns. to Atlantic; length 620 m.
Loire, *dep.*, France; agr. (potatoes vineyards), mining, mftg.; cap. St. Etienne; a. 1,853 sq. m.; p. (1954) *654,482*.
Loire, Atlantique, *dep.*, W. France; cap. Nantes; a. 2,695 sq. m.; p. (1954) *733,575*.
Loire, Haute, *dep.*, France; cap. Le Puy; a. 1,930 sq. m.; p. (1954) *215,577*.
Loiret, *dep.*, France; agr., vineyards, distilling, mftg.; cap. Orléans; a. 2,630 sq. m.; p. (1954) *360,523*.
Loir-et-Cher, *dep.*, Central France; cap. Blois; a. 2,479 sq. m.; p. (1954) *239,824*.
Loja, *prov.*, Ecuador; cap. Loja; a. 3,705 sq. m.; p. (1950) *216,802*.
Lokeren, *t.*, Belgium; textiles, chemicals, tobacco; p. (estd. 1957) *25,926*.
Lokoja, *t.*, Nigeria; at confluence of Rs. Niger and Benue; military sta.; importance decreased since rlys. opened; p. *2,122*.
Lolland, *I.*, Danish, Baltic Sea; a. 462 sq. m.; forests; cap. Maribo.
Lombardy, *region*, N. Italy; in R. Po Valley; a. 9,190 sq. m.; p. (1951) *6,560,721*.
Lombardy, Plain of, N. Italy; extensive lowland flanked by Alps, Apennines, Adriatic Sea; built up by alluvium from R. Po, its tribs. and R. Adige; zone bounding main Rs. liable to floods, elsewhere irrigation necessary on account of hot summers; intensively cultivated, rice, maize, flax, clover, lucerne, wheat, apples, dairy cattle, mulberry; densely populated; many industl. ts., Milan, Novara, Pavia, etc.; length 250 m., width varies from 50 to 120 m.
Lombok, one of the lesser Sunda Is., Indonesia, Malay Archipelago; mtns., peak of Lombok 11,810 ft., volcanic; Wallace's Line passes between Lombok and Bali; ch. t. Mataram; p. *701,298*.
Lomé, *spt.*, *cap.*, Togoland, W. Africa; p. (estd. 1949) *31,500*.
Lomme, *commune*, Nord, France; spinning, hats; p. (1954) *23,488*.
Lomond, *L.*, between Dunbarton and Stirling cos., Scot.; contains 30 Is.; lgst. loch in Scot.; length 20 m.; a. 27 sq. m.
Lomond Hills, Kinross and Fife, Scot.; alt. 1,713 ft. and 1,471 ft.
Lomza, *t.*, Poland; on Narew R.; grain, timber; p. *13,772*.
London, *cap. c.*, *spt.*, Eng.; on R. Thames; inc. 28 metropolitan bors.; world's 3rd lgst c.; tourist ctr., lge. tr., comm., mftg.; many historic bldgs.; p. (1951) *8,346,137* (Greater London); (1951) *3,348,336* (co.); (1951) *5,268* (c.).
London, *t.*, Ontario, Canada; on R. Thames, 65 m. W. of Hamilton; rly. ctr., agr., chemicals; univ.; p. (1956) *101,693*.
Londonderry, *co.*, N. Ireland; a. 816 sq. m.; p. (excl. co. bor.) (1951) *105,421*.
Londonderry (or **Derry**), *co. bor.*, N. Ireland; on left bank of R. Foyle, 4 m. upstream from Lough Foyle; shirt mftg.; p. (1951) *50,099*.
Londonderry, *C.*, jutting into Timor Sea, W. Australia.
Long Beach, *t.*, Cal., U.S.A.; p. (1950) *250,767*.
Long Beach, *t.*, Long I., N.Y., U.S.A.; holiday resort; p. (1950) *15,586*.
Longbenton, *t.*, *urb. dist.*, Northumberland, Eng.; 3 m. N.E. of Newcastle; coal-mng.; p. (1951) *28,071*.
Long Branch, *c.*, N.J., U.S.A.; seaside resort; p. (1950) *23,090*.
Long Eaton, *t.*, *urb. dist.*, Derby, Eng.; on R. Trent, 5 m. S.W. of Nottingham; rly. wks., lace mftg., elec. cables, flexible tubing, hosiery; p. (1951) *28,638*.
Longford, *co.*, Leinster, Ireland; peat bogs; dairy farming; a. 421 sq. m.; p. (1956) *32,884*.
Longford, *t.*, *co. t.*, Longford, Ireland; agr. ctr.; p. (1951) *3,845*.
Long Forties Bank, *submarine sandbank*, N. Sea; 80 m. E. of Aberdeen; valuable fishing-grounds; depth of water, from 25 to 40 fathoms.
Long I., part of N.Y., U.S.A.; separated from mainland by East R.; contains Queens and Brooklyn, bors. of New York City; mkt. gardening, fisheries, oysters, holiday resorts; a. 1,682 sq. m.
Long I., Bahamas Is., W.I.; p. (1953) *3,755*.
Long I. City, part of Queen's bor., N.Y., U.S.A.; industl. ctr.; food, engin., leather.
Long, Loch, *arm of sea*, between Dunbarton and Argyll, Scot.; length 17 m.
Longmeadow, *t.*, S.W. Mass., U.S.A.; residtl.; p. (1950) *6,508*.
Longreach, *t.*, Queensland, Australia; in ctr. of Gr. Australian (artesian) basin, 400 m. W. of Rockhampton; where rly. from cst. crosses R. Thompson; collecting and forwarding ctr. for cattle and wool.
Longridge, *t.*, *urb. dist.*, Lancs, Eng.; 6 m. N.E. of Preston; cotton, nails; p. (1951) *4,314*.
Long's Peak, *mtn.*, Col., U.S.A.; alt. 14,271 ft.

Longtown, *mkt. t.*, Cumberland, Eng.; on R. Esk; agr.; p. *6,676.*
Longview, *t.*, Texas, U.S.A.; p. (1950) *24,502.*
Longview, *t.*, Wash., U.S.A.; p. (1950) *20,339.*
Longwy, *t.*, Meurthe-et-Moselle, France; fortfd.; iron, porcelain; p. (1954) *16,578.*
Long Xuyon, *t.*, S. Vietnam; rich mkt. t.; p. *148,000.*
Lons-le-Saunier, *cap.*, Jura, France; salt springs; wine, agr.; livestock; p. (1954) *15,030.*
Looe, *t.*, *sm. spt.*, *urb. dist.*, Cornwall, Eng.; on both sides of Looe estuary, 10 m. W. of Plymouth Sound; fishing and fish-canning; holiday resort; p. (1951) *3,801.*
Lookland, *t.*, S.W. Ohio, U.S.A.; chemicals, paper, light mnfs.; p. (1950) *5,736.*
Loos, *t.*, Pas-de-Calais, France; coal-mining; p. (1954) *14,882.*
Lop Nor, *marsh*, Sinkiang, W. China; in Tarim Basin at foot of Altyn Tagh; ctr. of inland drainage, receives water from R. Tarim; almost uninhabited.
Lorain, *t.*, Ohio, U.S.A.; on L. Erie; shipbldg., steelwks., fisheries; p. (1950) *51,202.*
Lorca, *t.*, Murcia, Spain; agr. prod., woollens, chemicals; bishop's palace; p. (1950) *70,998.*
Lord Howe I., Australian I., S. Pac. Oc., length 7 m., width 1½ m.; *c.* 436 m. N.E. of Sydney; palm seed ind.; p. (1958) *223.*
Lordsburg, *t.*, N.M., U.S.A.; mining; tourists; p. (1950) *3,525.*
Lorena, *c.*, S.E. Brazil; cotton, coffee; p. *10,262.*
Loreto, *t.*, Ancona, Italy; pilgrim ctr.; p. *6,700.*
Loreto, *dep.*, Peru; rubber; cap. Iquitos; a. 119,270 sq. m.; p. (1947) *346,499.*
Lorient, *spt.*, Morbihan, France; on Bay of Biscay; govt. dockyds. and arsenal; fishing; p. (1954) *47,095.*
Lörrach, *t.*, Baden–Württemberg, Germany; N.E. of Basle; textiles, tobacco, chocolate mnfs., machin.; p. (estd. 1954) *24,100.*
Lorraine, *prov.*, France; agr., wine, iron.
Los Angeles, *c.*, S. Cal., U.S.A.; ch. comm. ctr. on W. cst.; winter resort, fruit, clothing, steel, oil refining, aircraft mftg., car assembly; film ctr.; p. (1950) *1,970,358.*
Los Angeles, *cap. c.*, Bio Bio, Chile; p. (1940) *20,979.*
Losinj, *I.*, Jugoslavia; summer resort, tr.
Los Rios, *prov.*, Ecuador, S. America; a. 2,295 sq. m.; cap. Babahoyo; p. (1952) *150,260.*
Los Santos, *prov.*, Panama, Central America; cap. Las Tablas; p. (1950) *61,422.*
Lossiemouth, *burgh*, Moray, Scot.; on Moray F., 5 m. N. of Elgin; fishing; p. (1951) *5,596.*
Lostwithiel, *t.*, *mun. bor.*, Cornwall, Eng.; at head of Fowey estuary; mkt., angling; p. (1951) *2,165.*
Lot, *R.*, S. France; trib. of Garonne R.; length 272 m.
Lot, *dep.*, S.W. France; livestock, wine, cereals, coal, iron; a. 2,018 sq. m.; cap. Cahors; p. (1954) *147,754.*
Lota, *t.*, Chile, on cst.; p. *34,445.*
Lot-et-Garonne, *dep.*, S.W. France; agr. (cereals, vines, fruit); cap. Agen; a. 2,079 sq. m.; p. (1954) *265,549.*
Lothians, *Scottish dist.*, S. of F. of Forth, cos. Mid Lothian, W. Lothian and E. Lothian.
Lötschental, *picturesque valley*, can. Valais, Switzerland; reached from Goppenstein on Lötschberg rly.; leads to Langgletscher; ch. vil., Kippel.
Loughborough, *t.*, *mun. bor.*, Leicester, Eng.; on R. Soar 10 m. N. of Leicester; hosiery, engin., elec. goods, chemicals; college; p. (1951) *34,731.*
Loughor, *R.*, Glamorgan, S. Wales; rises in Black Mtns., flows S.W. into Bristol Channel; lower valley submerged to form estuary, length 8 m., width 4 m., around which cluster steel-wks. and zinc refineries of Llanelly, Bynea, Gorseinon, Gowerton, etc.
Loughrea, *mkt. t.*, Galway, Ireland; p. (1951) *2,847.*
Loughton, *t.*, Essex, Eng.; on border of Epping Forest; residtl.; p. *15,000.*
Louisiana, *st.*, U.S.A.; agr., tobacco, cotton, sugar, timber, minerals and mftg.; cap. Baton Rouge; ch. spt. New Orleans; a. 48,523 sq. m.; p. (1950) *2,683,516* (one-half coloured).
Louisville, *c.*, Ky., U.S.A.; on Ohio R.; univ.; lgst. tobacco mkt. in world; iron, tanning, furniture mftg.; p. (1950) *369,129.*
Loulé, *t.*, Portugal; esparto-grass ctr.; porcelain, leather; p. *23,000.*
Lourdes, *t.*, France; on R. Pau; great pilgrim ctr.; slate, marble; p. (1954) *15,829.*
Lourenço Marques, *cap.*, *spt.*, Mozambique, Port. E. Africa; rly. terminus, coaling-sta.; p. (1950) *93,516.*
Louth, *t.*, *mun. bor.*, Lindsey, Lincoln, Eng.; on E. edge of Lincoln Wolds; abbey ruins; cattle mkt., farm implements, rope mkg., lime, malting, canning; p. (1951) *11,128.*
Louth, *maritime co.*, Leinster, Ireland; mtns., bog and barren land; salmon fishing; cap. Dundalk; a. 316 sq. m.; p. (1956) *69,262.*
Louvain, *t.*, Belgium; univ.; lace, brewing, tobacco mftg.; p. (estd. 1957) *33,793.*
Louviers, *t.*, Eure, France; on R. Eure; cloth mftg.; p. (1954) *10,746.*
Loveland, *t.*, N. Col. U.S.A.; beet-sugar refined, vegetables, fruit canning; p. (1950) *6,773.*
Low Archipelago, *see* **Tuamotu Is.**
Low Countries. Name applied to Belgium and The Netherlands. *See under separate headings.*
Lowell, *c.*, Mass., U.S.A.; at junction of Merrimac and Concord Rs.; 30 m. N. of Boston; textiles, machin., chemicals, carpets; James Whistler, the artist, born here; p. (1950) *97,249.*
Lower Austria, *prov.*, Austria; industl., agr.; ch. t. Vienna; a. 7,098 sq. m.; p. (1948) *1,281,301.*
Lower Saxony, *Land*, Germany; a. 18,226 sq. m. p. (1950) *6,797,379.*
Lowestoft, *spt.*, *mun. bor.*, Suffolk, Eng.; on E. Anglian cst. 9 m. S. of Gr. Yarmouth; holiday resort, fishing ctr., boat bldg., engin., vehicle mftg.; p. (1951) *42,837.*
Lowther Hills, *mtns.*, between Dumfries and Lanark, Scot.; highest point 2,403 ft.
Loyalty Is., S. Pac. Oc.; included in French administration of New Caledonia; copra; lgst. Is., Maré, Lifou, Uvéa; a. about 800 sq. m.
Lozère, *dep.*, S.E. France; traversed by Cévennes Mtns.; agr., silkworm-rearing, stock-raising; cap. Mende; a. 1,996 sq. m.; p. (1954) *82,391.*
Lualaba, *R.*, Belgian Congo, Central Africa; rises nr. Elisabethville in Katanga prov., flows N. approx. 500 m. to Kikondja, where joined by R. Lufira to form R. Congo; name also applied to main stream of R. Congo as far downstream as Ponthierville.
Luang Prabang, *c.*, Laos, Indo-China; on Mekong R.; silk, ivory, rubber; pagoda; p. *25,000.*
Lubao, *t.*, Luzon, Philippine Is.; sugar, alcohol.
Lubbock, *t.*, N. Texas, U.S.A.; p. (1950) *71,747.*
Lübeck, *c.*, *spt.*, cap. Schleswig-Holstein, Germany; on R. Trave; cath.; shipbldg., machin., chemicals, textiles, iron, foodstuffs; pt. and rly. junction; p. (estd. 1954) *230,200.*
Lublin, *prov.*, E. Poland; agr.; a. 10,834 sq. m.; p. (estd. 1950) *1,655,179.*
Lublin, *t.*, *prov. cap.*, Poland; textiles, engin., agr. tr.; cath., 2 univs.; p. (1957) *147,000.*
Lubnaig, *Loch*, Perth, Scot.; drains to R. Teith by the R. Leny.
Lubny, *t.*, Ukrainian S.S.R.; on rly. E. of Kiev; engin., chemicals; p. *23,332.*
Lubsko, *t.*, W. Poland (formerly German); p. *10,578.*
Lucca, *c.*, *cap.* Lucca, Tuscany, Italy; nr. Pisa; cath., many churches; jute mftg., tobacco, silk, cotton, and oil-refining inds.; p. (1951) *87,454.*
Lucena, *t.*, Córdoba, Spain; brandy, wine, textiles, pottery; p. *23,000.*
Lucena, *commune*, S. Spain; metallurgy; leather, pottery, linen; horse-breeding; p. *32,687.*
Lucenec, *t.*, Czechoslovakia, on Hungarian border; magnesite, textiles, sawmilling.
Lucera, *t.*, Apulia, Italy; 8 m. W. of Foggia; cas., cath.; silk mftg.; p. *17,000.*
Lucerne (Luzern), *can.*, Switzerland; agr., pastoral, vineyards; cap. Lucerne; a. 576 sq. m.; p. (1950) *223,249.*
Lucerne (Luzern), *t.*, *cap.*, Lucerne can., Switzerland; at W. end of L. Lucerne, 45 m. E. of Berne; light inds.; impt. tourist ctr.; p. (1950) *60,526.*
Lucerne, *L.*, Switzerland; also known as Lake of the Four Cantons; length 23 m.
Luckenwalde, *t.*, Brandenburg, Germany; on R. Nuthe; textiles, footwear, machin., wood and metals, chemicals; p. (estd. 1954) *33,000.*
Lucknow, *c.*, cap. Uttar Pradesh India; on R. Gumti; rly. ctr., muslin embroidery, brocade mftg.; famous defence of L. in Indian Mutiny 1857; p. (1951) *496,861.*

Lüdenscheid, *t.*, Westphalia, Germany; S.E. of Barmen; hardware; p. *33,000*.
Lüderitz, *t.*, S.W. Africa; on cst. of Kalahari desert; linked by rly. to S. African rly. system at De Aar; diamonds; p. *3,307*.
Ludhiana, *t.*, E. Punjab, India; nr. R. Sutlej, W. of Simla; p. (1951) *153,795*.
Ludington, *t.*, Mich., U.S.A.; on Lake M.; woodwkg.; p. (1950) *9,506*.
Ludlow, *mkt. t.*, *mun. bor.*, Salop, Eng.; at foot of Clee Hills on R. Teme; agr. mkt., agr. implements, oil pressure appliances, meters, gauges; p. (1951) *6,455*.
Ludwigsburg, *t.*, Baden-Württemberg, Germany; N. of Stuttgart; cas.; textiles, foodstuffs, machin., toys; p. (estd. 1954) *58,100*.
Ludwig's Canal, Germany; unites Rs. Danube and Main; length 110 m.
Ludwigshafen, *t.*, Rhine-Palatinate, Germany; on R. Rhine, opposite Mannheim; chemicals, marine diesel engines, metallurgy, glass; R. pt. and rly. junction; p. (estd. 1954) *139,100*.
Lufkin, *c.*, Texas, U.S.A.; lumber, engin.; food prod.; p. (1950) *15,135*.
Lug, *R.*, trib. of R. Wye, Hereford, Eng.
Lugano, *t.*, Ticino, Switzerland; on L. Lugano; tourist ctr., silk, paper; p. (1941) *17,030*.
Lugano, *L.*, Italy-Switzerland; length 16 m.
Lugansk, *see* Voroshilovgrad.
Lugnaquilla, *mtn.*, Wicklow, Ireland; highest point in Wicklow Mtns., alt. 3,039 ft.
Lugo, *prov.*, N.W. Spain; fisheries, leather; cap. Lugo; a. 3,815 sq. m.; p. (1950) *508,916*.
Lugo, *t.*, *prov. cap.*, Spain; on R. Minho; tanning, textiles; p. (1950) *53,743*.
Lukow, *t.*, Poland; E. of Lodz; p. *8,513*.
Lukuga, intermittent outlet of L. Tanganyika, Africa, linking with R. Congo.
Luleå, *spt.*, N. Sweden; on Lule R. at head of G. of Bothnia; exp. iron ore, timber, leather (reindeer hides); p. (1951) *22,514*.
Lulworth Cove, *sm. inlet*, Dorset, Eng.; on S. cst., 9 m. E. of Weymouth; formed by sea breaching hard coastal rocks and eroding softer rocks behind; tourists.
Lumbira, *t.*, on N. shore of L. Nyasa, Tanganyika.
Lund, *t.*, Sweden; nr. Malmö; ironwks., sugar refining; univ.; p. (1951) *33,954*.
Lundy I., Bristol Channel; 12 m. N.W. of Hartland Point, N. Devon, Eng.; 2½ m. long by 1 m. wide.
Lune, *R.*, Lancs and Westmorland, Eng.; flows 45 m. to Irish Sea.
Lüneburg, *t.*, Lower Saxony, Germany; S.E. of Hamburg, on Ilmenau R.; chemicals, wood, iron, paper; rly. junct.; p. (estd. 1954) *59,400*.
Lünen, *t.*, N. Rhine–Westphalia, Germany; N.E. of Dortmund; coal, metallurgy, glass, wood; R. pt. and rly. ctr.; p. (estd. 1954) *62,800*.
Lunenberg, *t.*, *spt.*, Nova Scotia, Canada; shipbldg., fishing; p. (1941) *2,727*.
Lunéville, *t.*, Meurthe-et-Moselle, France; S.E. of Nancy, on R. Meurthe; cottons, woollens, hosiery, porcelain; p. (1954) *22,690*.
Lungchow, *t.*, Kwangsi, China; nr. Vietnam frontier; military sta.; p. *13,600*.
Lungi, *t.*, Sierra Leone, Ghana; nr. Freetown; only civil airport in st.
Lunkiang, *see* Tsitsihar.
Lupata Gorge, Mozambique, Port. E. Africa; narrow pass occupied by R. Zambesi.
Lurgan, *t.*, *mun. bor.*, Armagh, N. Ireland; textiles, tobacco mftg.; p. (1951) *16,181*.
Luristan, *prov.*, W. Persia; grain, carpets.
Lusaka, *t. cap.*, N. Rhodesia; p. (1950) *26,100*.
Lushun, *see* Port Arthur.
Lüta, Manchuria, China; joint name for Dairen and Port Arthur; *see also* under separate headings; p. (estd. 1952) *1,054,000*.
Luton, *t.*, *mun. bor.*, Beds, Eng.; in Chiltern Hills nr. source of R. Lea; hat-mkg., cars, aircraft engines, chemicals; p. (1951) *110,370*.
Lutsk, *t.*, Ukrainian S.S.R.; comm. ctr., mnfs.; p. *15,760*.
Luxembourg, *prov.*, S.E. Belgium; on French border; wooded and hilly; a. 1,705 sq. m.; cap. Arlon; p. (estd. 1957) *316,364*.
Luxembourg, *grand duchy*, Europe; on borders of France, Germany, Belgium; upland, much over 1,000 ft.; very impt. deposits of iron ore; cap. Luxembourg; a. 999 sq. m.; p. (1958) *317,853*.
Luxembourg, *t.*, *cap.*, Luxembourg; in S. of Grand Duchy; iron and steel, heavy engin., leather, paper inds.; p. (1958) *70,158*.
Luxor, *vil.*, Upper Egypt; on E. bank of R. Nile; site of Thebes; ruined temples; p. *5,000*.
Luzerne, *bor.*, Penns., U.S.A.; on Susquehanna R.; p. (1950) *6,176*.
Luzon, *I.*, lgst. in Philippines; mtns.; cotton, coffee, sugar, cereals, coal, copper; cap. Manila; a. 40,420 sq. m.; p. *4,000,000*.
Lvov, (Pol. Lwów, Ger. Lemberg), *c.*, Ukraine, U.S.S.R.; ceded by Poland 1939; univ., 3 caths.; engin., textiles, chemicals, oil-refining, sawmilling; p. (1959) *410,000*.
Lyallpur, *t.*, W. Punjab, Pakistan; agr., cotton mnfs.; p. (1951) *179,144*.
Lydd, *mkt. t.*, *mun. bor.*, Kent, Eng.; on Romney Marsh, 4 m. S.W. of New Romney; "lyddite" shells, concrete; p. (1951) *2,774*.
Lydda, *t.*, Israel; rly. junction, airport; p. (1946) *20,000*.
Lydenburg (Leydenburg), *t.*, Transvaal, S. Africa; gold, farming (cotton, wheat, sheep); p. *3,832*.
Lydford, *par.* and *vil.*, Devon, Eng.; old stannary ctr. for Devon; p. *2,200*.
Lydney, *par.*, Gloucester, Eng.; in Forest of Dean; iron, coal; p. *4,158*.
Lyell, *mtn.*, Stanley Range, N.S.W., Australia; alt. 2,000 ft.
Lyell, *mtn.*, Cal., U.S.A.; in Sierra Nevada; alt. 13,190 ft.
Lyme Regis, *spt.*, *mun. bor.*, Dorset, Eng.; on bdy. between Devon and Dorset; holiday resort, p. (1951) *3,191*.
Lymington, *t.*, *mun. bor.*, Hants, Eng.; on The Solent at mouth of R. Beaulieu; small spt., yachting; p. (1951) *22,674*.
Lymm, *t.*, *urb. dist.*, Cheshire, Eng.; 5 m. W. of Altrincham; salt mftg.; mainly residtl.; p. (1951) *6,410*.
Lynbrook, *t.*, Long I., N.Y., U.S.A.; p. (1950) *17,314*.
Lynchburg, *c.*, Va., U.S.A.; footwear, agr. implements, tobacco; p. (1950) *47,727*.
Lyndhurst, *t.*, N.J., U.S.A.; synthetic perfumery; p. (1950) *19,980*.
Lynher, *R.*, Cornwall, Eng.; length 26 m.
Lynn, *spt.*, Mass., U.S.A.; footwear, elec appliances; p. (1950) *99,738*.
Lynn Canal, *fiord*, Alaska, U.S.A.; continuation of Chatham strait.
Lynton, *t.*, *urb. dist.*, N. Devon, Eng.; 17 m. W. of Minehead on Bristol Channel; seaside tourist ctr. of Exmoor; p. (1951) *2,123*.
Lynwood, *t.*, S.W. Cal., U.S.A.; engin.; p (1950) *25,823*.
Lyon, *c.*, Iowa, U.S.A., on Mississippi R.; p. (1950) *15,267*.
Lyon, *R.*, Perth, Scot.; trib. of R. Tay; length 38 m.
Lyonnais, *mtns.*, France; W. of Lyons.
Lyons, *c. cap.*, Rhône dep., France; at confluence of Rs. Saône and Rhône; comm. ctr., silk, rayon, chemicals, engin.; univ.; p. (1954) *471,270*.
Lyons, *t.*, N.Y., U.S.A.; on Erie canal; p. (1950) *4,217*.
Lys, *R.*, Belgium and France, trib. of R. Scheldt; length 100 m.
Lysterfiord, N.E. arm of the Sogne fiord, Norway; length 25 m.
Lytham St. Annes, *t.*, *mun. bor.*, N. Lancs, Eng.; on N. cst. of Ribble estuary, 4. m. S. of Blackpool; holiday ctr., shipbldg.; p. (1951) *30,298*.
Lyttelton, *spt.*, S.I., N.Z.; on N. cst. of Banks Peninsula; ch. pt. of Canterbury Plain; exp. mutton, wool, wheat; p. (1951) *3,686*.
Lyublino, *t.*, U.S.S.R.; 8 m. S.E. of Moscow; p. (1959) *86,000*.

M

Ma'an, *t.*, Jordan, connected by rail and good road to Amman; p. *8,000*.
Maas, *R.*, Dutch name for the R. Meuse after it has entered the Neth.
Maasin, *mun.*, S.W. Leyte, Philippine Is.; cst. tr.; hemp; p. *29,264*.
Maastricht, *t.*, *cap.*, Limburg, Neth.; on R. Meuse; pottery, glass, textiles, brewing; p. (estd. 1955) *84,000*.
Mablethorpe and Sutton, *t.*, *urb. dist.*, Lindsey, Lincs, Eng.; on E. cst., 15 m. N. of Skegness; holiday resort; p. (1951) *5,394*.

Macao, *Port. terr.*, S. China; consists of peninsula and 2 sm. Is. (Taipa and Colôane) to S. of estuary of Canton R.; a. 6 sq. m.; p. (1950) *187,772* (inc. *2,719* Europeans).
Macao, *c.*, Macao terr., S. China; occupies peninsula section of the terr.; impt. fisheries; p. (1950) *166,544*.
Macapá, *cap.*, Amapa St., Brazil; at mouth of R. Amazon; p. *1,012*.
Macará, *t.*, Ecuador; p. *10,262*.
Macassar, *ch. t.*, *pt.*, Celebes, Indonesia; p. *84,900*.
Macassar, *strait*, Indonesia; separates Borneo from Celebes; 240 m. wide.
Macau, *spt.*, Rio Grande do Norte, Brazil; p. *6,656*.
Macclesfield, *t.*, *mun. bor.*, Cheshire, Eng.; at foot of Pennines, 10 m. S. of Stockport; on R. Bollin; mkt., textiles, clothing, paper prods., engin.; p. (1951) *35,981*.
Macdonnell Range, *mtns.*, Northern Terr., Australia; highest part of desert tableland, centrally situated within the continent; some gold and mica mines, but development hampered by aridity and isolation; highest alt. 4,482 ft.
Macduff, *spt. burgh*, Banff, Scot.; 2 m. E. of Banff; fishing; p. (1951) *3,322*.
Macedonia, *dist.*, Greece; cereals, tobacco, fruit, opium, fishing; p. (1951) *1,690,455*.
Macedonia, *fed. unit*, Jugoslavia; cap. Skopje; a. 10,598 sq. m.; p. (1948) *1,152,054*.
Maceió, *spt.*, *cap.*, Alagoas St., Brazil; cotton, sugar; p. (1950) *124,544*.
Macequece, *t.*, Manica dist., Mozambique; p. *9,284*.
Macerata, *prov.*, Italy, a. 1,070 sq. m.; p. (1951) *300,963*.
Macerata, *prov. cap.*, Italy; cath., univ.; terracotta, glass, chemicals; p. (1951) *31,423*.
Macgillicuddy's Reeks, *mtns.*, Kerry, Ireland; highest peak, Carrantuohill, alt. 3,414 ft.
Machala, *t.*, S.W. Ecuador; cocoa, coffee, leather, gold; p. (1938) *7,730*.
Machynlleth, *t.*, *urb. dist.*, Montgomery, Wales; on R. Dovey; tourist ctr.; p. (1951) *1,875*.
Macintyre, *R.*, N.S.W., Australia; forms border between Queensland and N.S.W.; trib. of R. Darling; length 350 m.
Mackay, *spt.*, Queensland, Australia; on R. Pioneer; gold, sugar, dairying and banana ctr.; p. (1957) *15,000*.
Mackenzie, *dist.*, N.W. Terrs., Canada; a. 527,490 sq. m.; forests and tundra; oil, radium, uranium; furs and timber.
Mackenzie, *R.*, N.W. Terrs., Canada; rises in Rocky Mtns. as Athabaska R. and flows into L. Athabaska, leaves as Slave R. and thence into Gr. Slave L., which it leaves as M. R. into Beaufort Sea; length 2,350 m.
Mackinac Sound, connects Ls. Michigan and Huron, N. America.
Mackinney, *c.*, N.E. Texas, U.S.A.; cotton ctr.; p. (1950) *10,560*.
Macleod, *t.*, S. Alberta, Canada; agr., livestock, coal; p. (1941) *1,649*.
Macmillan, *R.*, N.W. Terrs., Canada; trib. of Yukon R.
Macnean, *L.*, cos. Leitrim and Fermanagh, Ireland.
Macomb, *c.*, Ill., U.S.A.; industl.; p. (1950) *10,592*.
Mâcon, *t.*, *cap.*, Saône-et-Loire, France; on R. Saône; ruined cath.; agr. implements, wines, rope, copper; p. (1954) *22,393*.
Macon, *t.*, Ga., U.S.A.; on Ocmulgee R.; univ.; rly. junction, ironwks., cotton mftg.; p. (1950) *70,252*.
Macon, *t.*, E. Miss., U.S.A.; cotton, dairying, lumbering; p. (1950) *4,152*.
Macquarie, I., *Australian I.*, S. Pacific; 900 m. S.E. of Tasmania, Australia; 21 m. long, 2 m. wide; uninhabited except for meteorological and research base.
Macquarie, *R.*, N.S.W., Australia; trib. of R. Darling; length 350 m.
Macroom, *t.*, Cork, Ireland; on R. Sullane; agr. tr., fishing; p. (1951) *2,277*.
Mactan, *I.*, off Cebu, Philippine Is.; mangroves, coconuts; a. 24 sq. m.; p. *40,103*.
Madagascan Republic, *I.*, *aut. rep.* within Fr. Community, lge. I. off E. cst. of Africa; agr., livestock; cap. Tananarive; ch. spt. Tamatave; a. 228,000 sq. m.; p. (1959) *5,174,523*.
Madang, *t.*, Papua–New Guinea; copra ctr.; p. *500*.
Madawaska, *t.*, Me., U.S.A.; spt.; lumber, pulp, paper-mills; p. (1950) *2,975*.
Madawaska, *R.*, Ontario, Canada; trib. of Ottawa R.; length 230 m.
Maddalena, *I.*, off N.E. cst. of Sardinia, Italy.
Maddaloni, *t.*, Naples, Italy; p. *21,975*.
Madeira, *Portuguese I.*, Atl. Oc.; wine, sugar, fruits; holiday resort; cap. Funchal; a. 315 sq. m.; p. (1950) *269,179*.
Madeira, *R.*, Brazil; trib. of R. Amazon; together with Mamoré R.; l. 2,000 m.
Madeley, *t.*, Salop, Eng.; on R. Severn; mkt., coal- and iron-mining; p. *7,300*.
Madera, *t.*, central Cal., U.S.A.; agr., lumber, wines; p. (1950) *10,497*.
Madhya Bharat, formerly a st., absorbed by Madhya Pradesh, 1 Nov. 1956.
Madhya Pradesh, *st.*, Indian Union; absorbed the sts. of Bhopal, Uindhya Pradesh, and Madhya Bharat 1 Nov. 1956; rice, jute, pulses, oilseeds, cotton; forests; manganese, coal, marble, limestone; cotton textiles; cap. Bhopal; a. 171,201 sq. m.; p. (estd. 1957) *26,071,637*.
Madinet El Faiyûm, *see* **El Faiyûm**.
Madison, *c.*, Ind., U.S.A.; on Ohio R.; mftg.; p. (1950) *7,506*.
Madison, *t.*, Ill., U.S.A.; heavy engin. wks.; p. (1950) *7,963*.
Madison, *cap.*, Wis., U.S.A.; univ.; agr. tools, machin., footwear; p. (1950) *96,056*.
Madisonville, *t.*, Ky., U.S.A.; p. (1950) *11,132*.
Madoc, *t.*, Ontario, Canada; on Deer R.; p. *1,059*.
Madras, *st.*, India; cereals, cotton, tobacco, ground-nuts, iron ore, gold, silver; ch. ts. Madras, Madura, Trichinopoly; a. 50,110 sq. m.; p. (estd. 1957) *29,974,936*.
Madras, *c.*, *spt.*, *cap.*, Madras, S. India; on S.E. (Coromandel) cst.; cath., univ.; comm. ctr., cottons, tanning, brewing, potteries; p. (1951) *1,416,056*.
Madre de Dios, *dep.*, E. Peru; ch. t. Maldonado; forested; gold, silver; a. 58,827 sq. m.; p. (1947) *4,950*.
Madre de Dios, *R.*, Bolivia; trib. of R. Madeira; rises in Peru.
Madrid, *cap.*, Spain; on R. Manzanares; univ., cath., palace; Prado; gold and silver work; leather goods; chemicals, furniture mftg.; p. (1954) *1,699,775*.
Madrid, *prov.*, Spain; agr., freestone, granite, gypsum quarried; a. 3,089 sq. m.; cap. M.; p. (1949) *1,926,311*.
Madron, *t.*, Cornwall, Eng.; 3 m. N.E. of Penzance; p. *3,276*.
Madura, *I.*, Indonesia; off N.E. of Java; cereals, coconuts, fishing, cattle rearing, salt; a. 1,770 sq. m.; p. (1930) *1,962,462*.
Madura, *c.*, Madras, India; univ.; coffee, muslin, brasswk., wood carving; p. (1951) *361,781*.
Maebashi, *c.*, Honshu, Japan; mulberry trees, silk production; p. (1947) *79,732*.
Maelstrom, *whirlpool*, N.W. cst., Norway.
Maentwrog, *vil.*, Merioneth, N. Wales; in Vale of Festiniog, 2 m. E. of Festiniog; ch. hydro-elec. power-sta. in N. Wales.
Maesteg, *t.*, *urb. dist.*, Glamorgan, Wales; 5 m. E. of Port Talbot; coal-mining, iron, tin-wks.; p. (1951) *23,124*.
Mafeking, *t.*, C. Prov., S. Africa; famous siege, 1899–1900; p. *5,813*.
Magadan, *spt.* R.S.F.S.R.; on N. side of Sea of Okhotsk; engin.; p. (1959) *62,000*.
Magallanes, *prov.*, Chile; sheep-rearing; cap. Punta Arenas; fox breeding; petroleum; a. 52,271 sq. m.; p. (1957) *66,258*.
Magdalen, **Is.**, G. of St. Lawrence, Canada.
Magdalena, *dep.*, Colombia; coffee, cotton, rubber; cap. Santa Marta; a. 20,813 sq. m.; p. (1947) *426,390*.
Magdalena, *R.*, Colombia; length 1,000 m.
Magdeburg, *c.*, Saxony-Anhalt, Germany; on R. Elbe; cath.; beet-sugar, chemicals, iron, steel, machin., ship-bldg.; route ctr. and R. pt.; p. (estd. 1954) *240,000*.
Magelang, *t.*, Java, Indonesia; tr. ctr.; p. *52,944*.
Magellan, *strait*, between Tierra del Fuego and Chile, S. America.
Magenta, *t.*, N. Italy; nr. Milan; silk, matches; p. *12,650*.
Maggiore, *L.*, N. Italy–Switzerland; a. 82 sq. m.; contains Borromean Is.; tourist resort.

Magione, *commune*, Central Italy; olives, hides; p. *10,611*.
Maglie, *commune*, S.E. Italy; citrus fruits; p. *11,297*.
Magnet Mtn., S. Urals, R.S.F.S.R.; very rich deposit of magnetite iron ore; smelted at Magnitogorsk and in Kuzbas region.
Magnitka, *t.*, R.S.F.S.R.; iron ore, titanium, vanadium, zinc
Magnitogorsk, *t.*, R.S.F.S.R.; at S. end of Ural Mtns.; iron, steel, engin., iron ore, chemicals; p. (1959) *311,000*.
Magog, *t.*, S. Quebec, Canada; textiles, mnfs.; p. (1941) *9,034*.
Mahabaleshwar, *t.*, Bombay, India; in W. Ghats at alt. 4,500 ft.; health resort; p. *4,900*.
Mahad Al-Dhahab, *t.*, Hejaz, Saudi-Arabia; between Mecca and Medina; gold-mining.
Mahalla El Kubra, *t.*, Lower Egypt; p. (1947) *115,509*.
Mahanadi, *R.*, India; flows from Orissa to Bay of Bengal; length 520 m.
Mahanoy City, *t.*, Penns., U.S.A.; anthracite; p. (1950) *10,934*.
Mahé, *former Fr. prov.*, S. India; united with India 1954; cap. Mahé; p. (1948) *18,293*.
Mahé, *t.*, *cap.*, Mahé, S. India; on Malabar cst., 30 m. N. of Calicut; vanilla, fishing; p. (1948) *14,092*.
Mahón, *spt. cap.*, Minorca, Balearic Is., Spain; cheese; p. *18,220*.
Maidenhead, *t.*, *mun. bor.*, Berks, Eng.; on R. Thames, 9 m. above Windsor; light engin., printing, jam mkg.; p. (1951) *27,125*.
Maidens, The, *gr. of dangerous rocks*, nr. Larne, off Antrim cst., N. Ireland.
Maidstone, *co. t.*, *mun. bor.*, Kent, Eng.; on R. Medway; hops, fruit ctr.; brewing, paper, agr. tools, confectionery; p. (1951) *54,026*.
Maikop, *t.*, Adygeysk, U.S.S.R.; oil-refineries; p. (1939) *67,302*.
Main, *R.*, Germany; trib. of R. Rhine; length 304 m.
Main, *Hudson Bay Co's.* fort, at mouth E. Main R., Labrador, Canada.
Maine, *st.*, New England, U.S.A.; mtns., with much forest; potatoes, stone, lime, clay, paper mftg.; cap. Augusta; ch. spt. Portland; a. 33,215 sq. m.; p. (1950) *913,774*.
Maine, *R.*, France; formed by junction of Sarthe and Mayenne, flows 7 m. to R Loire at Angers.
Maine-et-Loire, *dep.*, France; agr., vineyards; cap. Angers; a. 2,811 sq. m.; p. (1954) *518,241*.
Mainz, *c.*, *cap.* Rhineland-Palatinate, Germany; at confluence of Rs. Rhine and Main; R. pt.; cath. univ., cas.; machin., chemicals; wine-trading, vehicle, and wood inds; p. (estd 1954) *106,600*.
Maiquetia, *spt.*, *wat. pl.*, N. Venezuela; airport; p. *13,216*.
Maison-Carée, *commune*, N. Algeria; 5 m. E. of Algiers; airport; p. *24,341*.
Maisons-Alfort, *t.*, Seine, France; p. (1954) *40,358*.
Maisons-Laffitte, *t.*, Seine-et-Oise, France; p. (1954) *15,481*.
Maitland West, *t.*, N.S.W., Australia; on R. Hunter, nr. Newcastle; agr., pastoral ctr., coal-mining; p. (1958) *23,030*.
Maizuru, *c.*, *spt.*, Honshu, Japan; naval base; p. (1947) *29,303*.
Majorca *or* **Mallorca**, *see* **Balearic Is.**
Majunga, *spt.*, Madagascar; on N.W. cst., at mouth of R. Ikopa; p. (1957) *50,356*.
Makeyevka, *t.*, Ukrainian S.S.R.; iron and steel, engin., coal; p. (1959) *358,000*.
Makhachkala, *spt.*, R.S.F.S.R.; oil-refining, chemicals, textiles, engin.; p. (1959) *119,000*.
Makó, *t.*, Hungary; agr.; flour milling; p. (1948) *35,814*.
Makran, *dist.*, Baluchistan, Pakistan; a. 26,000 sq. m.; p. (estd. 1951) *143,000*.
Makurdi, *t.*, Nigeria, W. Africa; on R. Benue, 150 m. upstream from confluence with R. Niger at Lokoja; mkt. for palm prod., ground-nuts; site of rly. bridge across R. Benue on E. main rly. from Pt. Harcourt to Kaduna.
Makwar, *vil.*, Sudan, N.E. Africa; on R. Blue Nile, 200 m. upstream from Khartoum; site of Sennar Dam.
Malabar Coast, India; name applied to W. cst. of India from Goa to southern tip of peninsula at Cape Comorin; sand dunes backed by lagoons; coastlands intensively cultivated, rice, spices, rubber, coconuts; ch. pt. Cochin.
Malacca, *terr.*, Malaya; sq. a. 640 m.; cap. M.; p. (1957) *291,233*.
Malacca, *strait*, separates Sumatra from Malay Peninsula.
Maladetta, with **Pic d' Anéto**, highest point in the Pyrenees; alt. 11,174 ft.
Malaga, *Mediterranean prov.*, S. Spain; agr., exp. wine, fruits, olive oil; a. 2,813 sq. m.; p. (1950) *750,115*.
Málaga, *spt.*, *cap.* Malaga, Spain; cotton, sugar, leather; p. (1950) *276,222*.
Malakal, *cap.*, Upper Nile, Sudan; p. (estd. 1949) *13,000*.
Malakoff, *t.*, S.W. Paris, France; residtl.; p. (1954) *28,876*.
Malang, *t.*, Java, Indonesia; p. *86,646*.
Malange, *t.*, central Angola, Africa; p. *5,299*.
Mälar, **L.**, S.E. Sweden; connected with the Baltic by Södertelge canal, has 1,260 Is.; length 80 m.; a. 477 sq. m.
Malatya, *t.*, central Turkey; fruit, opium; p. (1945) *41,559*.
Malay Archipelago, *lge. gr. of tropical Is.* extending 4,800 m. from the Nicobar Is. in Bay of Bengal to the Solomon Is. in the Pacific; inc. Sumatra, Java, Borneo, the Celebes, the Philippines, New Guinea, the Bismarck Archipelago.
Malay Peninsula, the most S. portion of the continent of Asia; a. about 70,000 sq. m.
Malaya, Federation of, independent st. of Brit. Commonwealth 31 Aug. 1957; consisting of 11 sts.; ch. inds.: rice cultivation, rubber, mining, fishing; Fed. cap. Kuala Lumpur; a. 50,690 sq. m.; p. (estd. 1957) *5,718,000*.
Malbork (Marienburg), *t.*, E. Prussia, Poland, German before 1945; on R. Nogat; cas.; rly junction; p. (estd. 1939) *27,000*.
Malden, *c.*, Mass., U.S.A.; mftg. sub. of Boston rubber gds., hosiery, furniture; p. (1950) *59,804*
Malden, *t.*, Mo., U.S.A.; mkt., agr., cotton processing ctr.; p. (1950) *3,396*.
Malden I., (Brit.) in Pac. Oc.; a. 35 sq. m., guano, uninhabited.
Malden and Coombe, *mun. bor.*, Surrey, Eng.; light inds.; p. (1951) *45,559*.
Maldive Is., *sultanate*, Brit. prot. st., chain of coral atolls, Indian Ocean, 400 m. S.W. Ceylon; cap. Malé; Brit. airfield in Addu atoll; fishing millet, fruit, nuts; a. 115 sq. m.; p. (1956) *81,950*.
Maldon, *t.*, *mun. bor.*, Essex, Eng.; at head of Blackwater estuary; agr. machin., steel window-frames, flour milling; p. (1951) *9,721*.
Maldonado, *dep.*, Uruguay; a. 1,587 sq. m.; p (1953) *67,933*.
Maldonado, *spt.*, Uruguay; 60 m. E. of Montevideo; p. *7,000*.
Malham Cove, W. Riding, Yorks, Eng.; in Craven dist. of N. Pennines, 10 m. N.W. of Skipton; semi-circular amphitheatre surrounded by limestone cliffs from base of which emerges R. Aire.
Malin Head, Donegal, Ireland; most N. point.
Mali, Federation of, *fed. st.*, formed 1959 by the union of Senegal and Sudan, reps. within Fr. Community; Dakar seat of Fed. institutions; a. 538,916 sq. m.; p. (estd. 1959) *5,977,000*.
Malinao, *mun.*, Luzon, Philippine Is.; hemp; p. *15,089*.
Malindi, *spt.*, Kenya; once cap. of Port. E. Africa; p. *1,677*.
Malines (Mechelen), *c.*, Belgium; on R. Dyle; cath.; rly. ctr., furniture, textiles, leather; p. (estd. 1957) *63,298*.
Malita, *t.*, Mindanao, Philippines; p. *30,755*.
Mallaig, *vil.*, S.W. Inverness, Scot.; on Sound of Sleat; rly. terminus; fish; p. *1,000*.
Malleco, *prov.*, S. Chile; cap. Angol; a. 5,511 sq. m.; p. (1957) *191,330*.
Malling, *t.*, *rural dist.*, Kent, Eng.; 3 m. W. of Maidstone; mkt., fruit ctr., chemicals; p. (rural dist. 1951) *36,334*.
Mallow, *mkt. t.*, Cork, Ireland; on R. Blackwater; agr., fishing, flour mills, tanneries, condensed milk; p. (1951) *5,583*.
Malmédy, *t.*, Belgium; transferred to Belgium from Germany after the First World War; tanning, dyeing, paper-wks.; p. *5,702*.

Malmesbury, *t.*, *mun. bor.*, Wilts, Eng.; on R. Avon, 8 m. N. of Chippenham; mkt.; abbey; elec. eng. ind.; p. (1951) *2,509*.
Malmesbury, *t.*, Victoria, Australia; on R. Campaspe, 20 m. S.E. of Bendigo; dam across R. provides water for domestic and mining purposes to Bendigo.
Malmesbury, *t.*, S.W. Cape Prov., S. Africa; mineral springs; p. *5,731*.
Malmö, *spt.*, S. Sweden; on The Sound; exp. bacon, matches; industl.; p. (1951) *192,498*.
Malmöhus, *co.*, Sweden; a. 1,872 sq. m.; p. (1950) *582,422*.
Malo-les-Bains, *sub.* of Dunkerque, Nord, France; seaside resort; p. (1954) *12,101*.
Malone, *t.*, N.Y., U.S.A.; iron-mining; p. (1950) *9,051*.
Malstadt Burbach, *t.*, Germany; on R. Saar; ironwks.; p. *36,000*.
Malta, *I.*, *internally self-governing Brit. col.* in the Mediterranean, 60 m. S. of Sicily; cap. Valetta; lgst. indus. was naval dockyard, now being converted to civil use; Malta received George Cross for heroism under bombing and blockade in Second World War; a. (inc. Gozo and Comino) 122 sq. m.; p. (1956) *314,000*.
Maltby, *urb. dist.*, W. Riding, Yorks, Eng.; p. (1951) *12,485*.
Malton, *mkt. t.*, *urb. dist.*, N.R. Yorks, Eng.; on R. Derwent, in S.W. of Vale of Pickering; brewing, ironwks.; p. (1951) *4,235*.
Maluti, *mtn. range*, Basutoland, S. Africa; highest peak Machacha, alt. 10,990 ft.
Malvern or Great Malvern, *t.*, *urb. dist.*, Worcester, Eng.; at E. foot of Malvern Hills; spa; scholastic ctr.; well-known dramatic festival held yearly; stone quarrying, agr. machin., motor-cars, electronics wks., plastics; p. (1951) *21,681*.
Malvern Hills, *narrow ridge* forming bdy. between Worcester and Hereford, Eng.; rises very abruptly from Severn Valley to over 1,000 ft. between Malvern and Bromsberrow; moorland, woodland on lower slopes; length 8 m., width, under 1 m., maximum alt., 1,395 ft.
Malverne, *t.*, N.Y., U.S.A., on Long I.; residtl. sub. of New York; p. (1950) *8,086*.
Malwa, *t.*, Poland; tanning, grain, agr. implements; p. *14,000*.
Mamaroneck, *t.*, N.Y., U.S.A.; textiles, mnfs. oils; p. (1950) *15,016*.
Mammola, *t.*, Reggio, S. Italy; p. *9,925*.
Mammoth Caves, Ky., U.S.A.; Green R.; stalactite formations in avenues aggregating 150 m. long.
Mamore or Rio Grande, *R.*, Bolivia; trib. of R. Beni; length 500 m.
Mam Soul, *mtn.*, Ross and Inverness, Scot.; alt. 3,862 ft.
Man, I. of, in Irish Sea; 30 m. from England (Cumberland), and N. Ireland (Down), 20 m. from Scotland (Wigtown); tourist ctr.; agr., sheep, lead, zinc; ch. t. Douglas; old cap. Castletown; administered according to own laws; a. 227 sq. m.; p. (1951) *55,213*.
Mana, *R.*, Fr. Guiana, S. America; length 175 m.
Manabi, *prov.*, Ecuador; on W. slope of the Andes; cap. Puertoviejo; cacao, sugar; a. 7,891 sq. m.; p. (1950) *401,378*.
Manacor, *t.*, Majorca, Spain; 30 m. from Palma; artificial pearls, wine; 7 m. from its spt. Porto Cristo; stalactite caves of Drach and Hams; p. *19,060*.
Manado, *spt.*, Celebes, Indonesia; coffee, rice, jungle prod.; p. (1930) *27,544*.
Managua, *cap.*, Nicaragua; nr. Lake M.; univ., palace; coffee; p. (1954) *176,569*.
Manama, *cap.*, Bahrein, Is., Persian Gulf; p. (1950) *39,648*.
Mananjary, *t.*, E. Madagascar; sugar, coffee; p. *5,000*.
Manar, *G.*, with Palk Strait separates India from Ceylon.
Manasarowar, *sacred L.*, Tibet.
Manatee, *t.*, Fla., U.S.A.; lumber, fruit and vegetable canning; p. (1950) *3,582*.
Manáus (Manaos), *t.*, *cap.*, Amazonas, Brazil; at confluence of R. Negro with R. Amazon; univ.; rubber tr.; p. (1950) *142,372*.
Mancha, La, *plain*, Cuidad-Real prov., S. Spain; in shallow depression on central plateau, average alt. between 1,500 and 3,000 ft., drained by headstreams of R. Guadiana; semi-arid climate with hot summers, cold winters; widespread salt deposits; Merino sheep, esparto grass; Spain's lgst. grape-growing region.
Manche, *maritime dep.*, N.W. France; on English Channel; agr. and dairying; cap. Saint Lo; ch. port Cherbourg; a. 2,475 sq. m.; p. (1954) *446,860*.
Manche, La, *see* **English Channel**.
Manchester, *c.*, *spt.*, *co. bor.*, S. Lancs, Eng.; on R. Irwell (which separates it from Salford); inland terminus of Manchester Ship Canal; ctr. of cotton tr. and ind.; also engin. heavy, light and elec., and aircraft, paper, foodstuffs and many other inds.; gr. comm., cultural and recreational cap. of N.W. England; p. (1951) *703,175*.
Manchester, *t.*, E. Iowa, U.S.A.; tr. ctr.; flour milling; woollen goods; p. (1950) *3,987*.
Manchester, *c.*, N.H., U.S.A.; at Amoskeag Falls, on the Merrimac R.; textiles, footwear, machin.; p. (1950) *82,732*.
Manchester, *t.*, Conn., U.S.A.; textiles (silk); p. (1950) *34,116*.
Manchester Ship Canal, *ship canal*, S. Lancs, Ches., Eng.; joining Manchester to Mersey estuary at Eastham; can be used by ocean steamers; length 35½ m.
Manchuria, *former Chinese outer terr.*, no longer exists as administrative unit, comprised nine provs.—Liaoning, Kirin, Heilungkiang, Liaopeh, Nunkiang, Hsingan, Sunkiang, Hokiang and Antung; mountainous, N.W. and E.; drained to N. by Sungari and S. by Liao Rs.; forested; soya-beans, wheat, coal, iron, gold, silver; a. 503,013 sq. m.; cap. Changchun.
Mandal, *t.*, Norway; p. *3,975*.
Mandalay, *c.*, Upper Burma; on the R. Irrawaddy, 400 m. N. of Rangoon; formerly cap. of kingdom; silk, old carved wooden palace and many pagodas; p. (1955) *182,367*.
Mandaue, *t.*, Cebu, Philippines; rice.
Manduria, *t.*, Italy; tr. ctr.; p. *17,675*.
Mandvi, *spt.*, Kutch, India; p. (1941) *22,638*.
Manfalut, *t.*, Upper Egypt; on R. Nile; p. *5,000*.
Manfredonia, *spt.*, Foggia, Italy; cath.; cereals, fruit; p. *18,600*.
Mangaldan, *t.*, Luzon, Philippines; rice.
Mangalore, *spt.*, Madras, India; exp. coffee, coconuts, rice, spices; p. (1951) *117,083*
Mangerton, *mtn.*, Kerry, Ireland.
Mangum, *t.*, S.W. Okla., U.S.A.; mkt., flour mills, cotton; granite; p. (1950) *4,271*.
Manhattan, I., N.Y., U.S.A.; at mouth of Hudson R.; a. 22 sq. m., forms major part of bor. of Manhattan (p. (1957) *1,785,878*) of N.Y. City.
Manica and Sofala, *prov.*, Mozambique; comprises dists. of Beira and Tete; cap. Beira.
Manihiki, Cook Is., N.Z.; p. *454*.
Manila, *ch. t.*, *spt.*, Luzon, Philippines; univ., cath.; tobacco, clothing, liquor; tr. ctr.; p. (1948) *1,024,557*.
Manipur, Union Terr., India; rice, cotton, fruits; cap. Imphal; a. 8,628 sq. m.; p.(1951) *577,635*.
Manisa, *t.*, Turkey; comm. ctr., cotton, silk; p. (1945) *32,142*.
Manistee, *c.*, Mich., U.S.A.; on L. Michigan; timber, salt, fruit; p. (1950) *8,642*.
Manistique, *t.*, Mich., U.S.A.; on M. R.; p. (1950) *5,086*.
Manitoba, *prov.*, Canada; wheat, minerals, furs; cap. Winnipeg; a. 246,512 sq. m.; p. (1956) *850,040*.
Manitowoc, *c.*, Wis., U.S.A.; on L. Michigan; shipbldg., iron, aluminium goods, flour; p. (1950) *27,598*.
Manizales, *cap.*, Caldas dep., Colombia; coffee; p. (1951) *94,826*.
Mankato, *c.*, Minn., U.S.A.; agr. tools, flour, brewing; p. (1950) *18,809*.
Mannar, Gulf of, *see* **Manar**.
Mannheim, *t.*, Baden–Württemberg, Germany; gr. R. pt. at confluence of Rs. Neckar and Rhine; cas.; machin., vehicles, cellulose, steel, elec., foodstuffs, tobacco, wood, textiles, chemicals; p. (estd. 1954) *272,400*.
Manningtree, *mkt. t.*, Essex, Eng.; at head of Stour estuary; p. *790*.
Manopello, *t.*, Pescara, Italy; p. *5,750*.
Manorhamilton, *t.*, Leitrim, Ireland; rly. wks.; p. *1,012*.
Manresa, *t.*, Spain; textiles, paper, chemicals, ironwks.; p. *36,381*.
Mans, Le, *see* **Le Mans**.

Mansel I., Hudson Bay, Canada; S.E. of Coats I.
Mansfield, *t.*, *mun. bor.*, Notts, Eng.; on E. flank of Pennines, 12 m. N. of Nottingham; iron, coal, hosiery, footwear mftg., sand-quarrying, metal box wks., lace, cotton, lt. engin.; p. (1951) *51,343*.
Mansfield, *t.*, Mass., U.S.A.; textiles, engin.; confectionery; p. (1950) *4,808*.
Mansfield, *c.*, Ohio, U.S.A.; machin., farm tools, paper, rubber goods; p. (1950) *43,564*.
Mansfield Woodhouse, *t.*, *urb. dist.*, Notts, Eng.; 2 m. N. of Mansfield; stone quarries; Roman remains; p. (1951) *17,819*.
Mansura, *t.*, Lower Egypt; cotton mftg.; p. (1947) *102,709*.
Mantes-la-Jolie, *t.*, Seine-et-Oise, France; on R. Seine; cath., agr. prod., hosiery, musical instruments; p. (1954) *15,155*.
Mantiqueira, *mtn. range*, Brazil; N.W. of Rio de Janeiro; highest peak Itatiaia 9,255 ft.
Mantua, *prov.*, Italy; a. 903 sq. m.; p. (1951) *423,609*.
Mantua, *t.*, N. Italy; on R. Mincio; ironwks.; p. (1951) *53,693*.
Manukau Harbour, N.I., N.Z.; *lge. shallow inlet* on W. cst. of Auckland Peninsula which is here less than 6 m. wide; provides additional harbour facilities for spt. of Auckland but shallow water limits usefulness; mainly used for recreational sailing.
Manych, *R.*, U.S.S.R.; trib. of R. Don; length 300 m.; canal is being built through R. to the Caspian to provide through connection with Black Sea.
Manzala (**Menzala**), *lagoon*, Mediterranean cst., Egypt, N.E. Africa; extends E. from Damietta mouth of Nile to Pt. Said; fringed by salt marsh; a. 800 sq. m.
Manzanares, *R.*, Spain; trib. of R. Jarama.
Manzanares, *t.*, Spain; 30 m. E. of Ciudad Real; soap, bricks, pottery mftg., agr. prod.; p. *18,451*.
Manzanillo, *spt.*, Cuba; exp. sugar, tobacco, timber and beeswax; comm. ctr.; p. (1943) *79,349*.
Manzanillo, *spt.*, Colima, Mexico; p. (1940) *6,831*.
Maoka, *spt.*, W. Sakhalin I., U.S.S.R.; ice-free in winter; p. *17,879*.
Mar, *ancient dist.*, Aberdeen, Scot.; between Rs. Don and Dee.
Maracaibo, *spt.*, *cap.*, Zulia st., Venezuela; on W. of narrow entrance to L. Maracaibo; oil, coffee, cocoa, and hide exp.; shipbldg.; p. (1950) *232,488*.
Maracaibo, *G.* and *L.*, Zulia st., Venezuela, S. America; lge. fresh-water lake, 120 m. long, 60 m. wide; too shallow for lge. ships; oil-wells on fringes and drilled into lake floor.
Maracay, *t.*, W. Venezuela; ctr. of the civil service; p. (1950) *65,761*.
Maragheh, *t.*, Persia; on N. end of L. Urmia; p. (1956) *36,556*.
Marajó, *I.*, at mouth of the Rs. Amazon and Pará, Brazil; a. 173 sq. m.
Maralinga, S. Australia; about 200 m. N.E. Eucla; joint U.K.–Australian atomic testing ground; first weapon exploded here 27 Sept. 1956.
Maranhão, *st.*, N.E. Brazil; rice, cotton, sugar, tobacco, coffee, cattle, gold, copper; cap. São Luiz; a. 129,271 sq. m.; p. (1950) *1,600,396*.
Marañon, *R.*, *see* **Amazon, R.**
Marans, *t.*, Charente-Maritime, France; industl.; p. (1954) *3,711*.
Maras, *t.*, S. central Turkey; tr. in Kurdish carpets; p. (1945) *36,404*.
Marathon, *plain*, Greece; battle between Greeks and Persians 490 B.C.
Marazion, *mkt. t.*, Cornwall, Eng.; on Mount's Bay; pilchard fisheries; p. *1,100*.
Marbella, *spt.*, Malaga, Spain; cas.; porcelain mftg., exp. fish, fruits, cork; p. *8,982*.
Marble, *I.*, Keewatin, N.W. Terrs., Canada.
Marble Bar, *t.*, W. Australia; located 85 m. inland by rail from Pt. Hedland; ctr. of gold-mining a.
Marblehead, *spt.*, Mass., U.S.A.; holiday resort, footwear; p. (1950) *13,765*.
Marburg, *t.*, Hessen, Germany; univ., cas.; instruments, pharmaceuticals, wall-paper mftg.; p. (estd. 1954) *41,600*.
Marcaria, *t.*, Italy; on R. Oglio; industl; p. *10,475*.
March, *mkt. t.*, *urb. dist.*, I. of Ely, Eng.; in Fens, 12 m. N.W. of Ely; impt. rly. junction; mkt., farm tools; p. (1951) *12,993*.
Marchena, *t.*, Spain; on R. Guadalquivir; mftg.; p. *12,500*.
Marches, The, *region*, Italy; on Adriatic cst. between Abruzzi and Emilia; embracing provs. of Marcerata, Ascoli-Piceno, Ancona, and Pesaro and Urbino; maize, wine, tobacco, silk, paper; a. 3,744 sq. m.; p. (1951) *1,361,517*.
Marchienne-au-Pont, *t.*, Belgium; on R. Sambre; tr. ctr.
Marcq-en-Barœul, *commune*, sub. Lille, Nord, France; textiles, foundries; p. (1954) *24,564*.
Marcus Hook, *t.*, Del., U.S.A.; on right bank of R. Del. 15 m. below Philadelphia.
Mar del Plata, *t.*, Argentina; on C. Corrientes; p. (1947) *104,513*.
Mardin, *t.*, Turkey; agr., textiles; p. (1945) *18,519*.
Maree, *L.*, Ross and Cromarty, Scot.; length 12½ m., breadth 2½ m.; contains many Is.
Mareotis or **Birket-et-Mariut**, *L.*, Lower Egypt; separated from Mediterranean by ridge of sand on which stands Alexandria; length 50 m., width 20 m.
Margam, *t.* in Pt. Talbot mun. bor., W. central Glamorgan, S. Wales; on cst. of Swansea Bay; lge. new steel-wks., lgst. steel-rolling mill in Europe; p. (estd. 1955) *18,300*.
Margarita, *I.*, Venezuela; in the Caribbean S.; pearl fisheries; a. 450 sq. m.; cap. Asuncion.
Margate, *t.*, *mun. bor.*, Kent, Eng.; W. of N. Foreland, in the Isle of Thanet; seaside resort; p. (1951) *42,487*.
Margelan, *t.*, E. Uzbek S.S.R.; agr. ctr., tr. especially cotton and silk; p. (1959) *68,000*.
Mari, *autonomous Soviet Socialist rep.*, U.S.S.R.; cap. Ioshkar Ola; p. (1959) *465,000*.
Maria Elena, *t.*, Antofagasta, N. Chile; nitre processing; p. (1940) *9,215*.
Mariana, *t.*, Minas Gerais, Brazil; tr. ctr.
Mariana Is., *chain of 15 Is.*, N. Pacific; U.S. Pac. Trust Terr.; a. 450 sq. m.; admin. ctr., Saipan; p. (1935) *39,728* Japanese, *4,297* natives.
Mariánské Lázně (**Marienbad**), *t.*, Czechoslovakia; spa, antimony; p. *8,417*.
Maribor, *t.*, Slovenia, Jugoslavia; fruit ctr., leather goods, wine, rly. wks.; p. (1953) *77,124*.
Marie Galante, *I.*, Lesser Antilles gr.; Fr. possession; sugar-cane; p. (1946) *29,349*.
Marienburg, *see* **Malbork.**
Marienwerder, *see* **Kwidzyn.**
Marietta, *t.*, Ohio, U.S.A.; on confluence of Muskingum R. with Ohio R.; timber, ironwks., coal, oil, natural gas; p. (1950) *16,006*.
Marigliano, *t.*, Campagna, Italy; p. *14,155*.
Mariinsk Canal, R.S.F.S.R.; system of canals and canalised Rs. linking R. Volga nr. Rybinsk with L. Onega; with Stalin Canal and Moscow–Volga Canal it gives through access by inland waterway from Moscow to Leningrad; overall length of canal approx. 350 m.
Marin, *spt.*, N.W. Spain; fishing; textiles; p. *16,294*.
Marinette, *t.*, Wis., U.S.A.; on L. Michigan; paper, pulp, timber; p. (1950) *14,178*.
Marino, *t.*, Sicily, Italy; p. *6,625*.
Marion, *c.*, Ind., U.S.A.; natural gas, iron, paper, glass, wireless sets; p. (1950) *30,081*.
Marion, *t.*, Ohio, U.S.A.; agr. implements, steam shovels, tractors; p. (1950) *33,817*.
Marion, *c.*, S. Ill., U.S.A.; fruit; coal; engin.; p. (1950) *10,459*.
Maritime Alps, *mtn. ranges*, S. France–Italy.
Maritime Provinces, embraces Canadian provs. of Nova Scotia, New Brunswick, Pr. Edward I.
Maritsa, *R.*, Bulgaria and Greece; length 260 m.
Maritzburg, *see* **Pietermaritzburg.**
Mariupol, *see* **Zhdanov.**
Marken, *I.*, nr. Amsterdam, Netherlands; tourist ctr.
Market Deeping, *t.*, Lincoln, Eng.; on R. Welland; brewing, rope; p. *876*.
Market Drayton, *t.*, *urb. dist.*, Salop, Eng.; on R. Tern 5 m. S. of Newcastle-under-Lyme; agr. implements, nylon mftg.; p. (1951) *5,638*.
Market Harborough, *t.*, *urb. dist.*, Leicester, Eng.; on R. Welland, 8 m. N.W. of Kettering; elec. engin., foodstuffs, corsetry; p. (1951) *10,401*.
Market Rasen, *t.*, *urb. dist.*, Lindsey, Lincoln, Eng.; 14 m. N.E. of Lincoln; agr. ctr.; p. (1951) *2,133*.

Market Weighton, *t.*, E.R. Yorks, Eng.; malting, iron; p. *1,735*.
Markinch, *burgh*, Fife, Scot.; 8 m. N. of Kirkcaldy; paper mftg., distilling; p. (1951) *2,306*.
Marks (Marxstadt), *t.*, U.S.S.R.; on R. Volga; agr. ctr.; p. *12,457*.
Marl, *t.*, N. Rhine–Westphalia, Germany; in the Ruhr; coal-mining and chemicals; p. (estd. 1954) *52,900*.
Marlboro, *c.*, Mass., U.S.A.; boot mftg.; p. (1950) *15,756*.
Marlborough, *t.*, *mun. bor.*, Wilts, Eng.; on R. Kennet in heart of Marlborough Downs; agr., tanning, brewing; public school; p. (1951) *4,556*.
Marlborough, *prov. dist.*, S.I., N.Z.; pastoral; a. 4,220 sq. m.; cap. Blenheim; p. (estd. 1958) *27,300*.
Marlborough Downs, *hills*, Wilts, Eng.; chalk; highest point, Milk Hill, 976 ft.
Marlin, *t.*, Texas, U.S.A.; hot artesian water; oil; cotton; dairying; p. (1950) *7,099*.
Marlow, *t.*, *urb. dist.*, Bucks, Eng.; on R. Thames; mkt., tourist ctr.; brewing and chair mkg.; p. (1951) *6,480*.
Marmande, *t.*, Lot-et-Garonne, France; on R. Garonne; brandy, liqueur, woollens, iron; p. (1954) *12,368*.
Marmara, *sea*, separates Europe from Anatolia.
Marmolata, highest point of Dolomite Alps, S. Tyrol, Italy; alt. 11,045 ft.
Marne, *R.*, Central France; rises in Plateau de Langres, flows N.W. and W. across Champagne Humide, Champagne Pouilleuse and Beauce, joins R. Seine just above Paris; with Marne–Rhine and Marne–Saône Canals it forms impt. inland waterway linking Seine with Rhine and Rhône valleys; length (approx.) 325 m.
Marne, *dep.*, N.E. France; agr., wines, textiles, minerals; cap. Chalons-sur-Marne; a. 3,168 sq. m.; p. (1954) *415,141*.
Marne, Haute, *dep.*, France; a. 2,420 sq. m.; cap. Chaumont; p. (1954) *197,147*.
Maros, *R.*, Hungary; trib. of R. Theiss; length 400 m.
Marple, *t.*, *urb. dist.*, Cheshire, Eng.; 3 m. E of Stockport; textiles; p. (1951) *13,068*.
Marquesas, *I. gr.* (Fr.), Pac. Oc.; a. 480 sq. m.; lgst. Is. Nukuhiva and Hivaoa; bananas, sugar-cane, copra.
Marquette, *c.*, Mich., U.S.A.; on L. Superior; iron-ore deposits, timber, rly. wks.; p. (1950) *17,202*.
Marradi, *t.*, Italy; p. *8,275*.
Marrakesh, *c.*, Morocco; tourist ctr., leather goods; p. (1946) *237,800*.
Marree, *sm. t.*, S. Australia; 70 m. S. of L. Eyre on rly. from Pt. Augusta to Alice Springs; terminus of overland stock route from Queensland.
Marsala, *spt.*, Sicily, Italy; wine ctr.; p. *71,295*.
Marsciano, *t.*, Umbria, Italy; industl.; p. *16,725*.
Marseilles, *t.*, N. Ill., U.S.A.; paper, bricks; p. (1950) *4,514*.
Marseilles, *c.*, *spt.*, cap. Bouches-du-Rhône, S. France; cath., univ., palace; comm. pt., coal, iron, bauxite, marine engin., aircraft, glass, agr. prod., wines, oil refining; p. (1954) *661,492*.
Marshall, *c.*, Mo., U.S.A.; p. (1950) *8,850*.
Marshall, *c.*, Texas, U.S.A.; rly. wks., canning, foundries; p. (1950) *22,327*.
Marshall, *spt.*, W. Liberia, W. Africa; exp. rubber; p. *1,000*.
Marshall, *I. gr.*, N. Pac. Oc.; U.S. Pac. Trust Terr., formerly Japanese mandate; total a. 150 sq. m.; sugar-cane, copra; ch. I. Jaluit; p. (1958) *13,928*.
Marshalltown, *t.*, Iowa, U.S.A.; on I. R.; iron, steel, machin., food canning; p. (1950) *19,821*.
Marshfield, *spt.*, Ore., U.S.A.; fishing, lumber, mining; p. (1950) *5,218*.
Marshfield, *t.*, Wis., U.S.A.; mftg. ctr. in timber region; p. (1950) *12,394*.
Martaban, *t.*, Burma; on R. Salween.
Martha's Vineyard, *I.*, Mass., U.S.A.; holiday resort, ch. ts. Vineyard Haven, Oak Bluffs, Edgartown; 21 m. long.
Marti, *t.*, Cuba; sugar, sisal; p. *5,060*.
Martigny, *t.*, Valais, Switzerland; peaches, tourist resort; p. (1941) *4,307*.
Martigues, *t.*, Bouches-du-Rhône, France; nr. Marseilles; p. (1954) *15,150*.
Martina, *t.*, Italy; industl., tr. ctr.; p. *38,325*.
Martinborough, *t.*, S. of N.I. N.Z.; p. (1951) *970*.
Martinez, *c.*, W. Cal., U.S.A.; industl., oil refineries, copper smelting; p. (1950) *8,468*.
Martinique, *I.*, (Fr.) W. Indies; cap. Fort-de-France; sugar, rum; a. 385 sq. m.; p. (1954) *239,130*.
Martinsburg, *c.*, W. Va., U.S.A.; in Shenandoah valley; rly. wks., cider, textiles; p. (1950) *15,621*.
Martin's Ferry, *t.*, Ohio, U.S.A.; on O. R., iron and steel mftg., coal-mining; p. (1950) *13,220*.
Marton, *t.*, N.I., N.Z., p. *2,810*.
Martos, *t.*, Andalusia, Spain; agr. ctr., wines, sulphur springs; p. *27,131*.
Marus, *t.*, Turkey; p. (1945) *36,404*.
Mary, *t.*, Turkmen. S.S.R.; cereals, fruit, textiles; p. (1959) *48,000*.
Maryborough, *t.*, Queensland, Australia; fruit ctr.; gold, coal, timber, sugar; p. (1957) *18,800*.
Maryborough, *t.*, Victoria, Australia; rly. ctr.; agr., pastoral; gold; p. (1957) *7,210*.
Maryborough, *see* **Port Laoighise, Ireland**.
Maryland, *st.*, U.S.A.; steel, copper, smelting and refining, coal, asbestos, potash, salts; agr. livestock; cap. Annapolis; lgst. c. Baltimore; a. 10,577 sq. m.; p. (1950) *2,343,001*.
Marylebone, *see* **St. Marylebone**.
Maryport, *mkt. t.*, *urb. dist.*, *spt.*, Cumberland, Eng.; on the Irish Sea; coal, iron, plastics, footwear; p. (1951) *12,237*.
Marysville, *t.*, Cal., U.S.A.; fruit; p (1950) *7,826*.
Marysville, *t.*, Kan., U.S.A.; rly. ctr. in rich agr. region; p. (1950) *3,866*.
Marysville, *t.*, Ohio, U.S.A.; mkt., grass seed, livestock; p. (1950) *4,256*.
Maryville, *c.*, E. Tenn., U.S.A.; lumber; clothes; quarries; p. (1950) *7,742*.
Masai Land, *dist.*, S. Kenya, Africa.
Masaya, *cap. c.* of M. dep. S.W. Nicaragua; agr., tobacco; p. (1947) *22,722*.
Masbate, *I.*, Philippines; a. 1,262 sq. m.; p. *108,800*.
Mascara, *t.*, Algeria; wine, oil, cereals; p. (1948) *35,078*.
Mascarene Is., collective name of Mauritius, Rodriguez and Réunion, in Indian Ocean.
Masena, *t.*, Fr. W. Africa; nr. L. Chad; cap. of Bhagirmi.
Masham, *t.*, N.R. Yorks, Eng.; on R. Ure; 9 m. N.W. of Ripon; mkt., sheep fair; p. *1,702*.
Mashonaland, *prov.* S. Rhodesia; tobacco and maize cultivation.
Masira, I., off cst. of Oman, Arabia.
Mask, *L.*, Mayo and Galway, Ireland; length 12 m., width 2–4 m.
Mason City, *t.*, Iowa, U.S.A.; on the Sheel Rock R.; cement, bricks, sugar-beet; p. (1950) *27,980*.
Massa or Massa Carrara, *t.*, Italy; olive oil, paper, tobacco, marble; p. (1951) *50,192*.
Massachusetts, *st.*, New England, U.S.A.; fisheries, agr. textiles, footwear, iron and steel goods, elec. machin., rubber goods, leather, paper, wood pulp; cap. Boston; a. 8,257 sq. m.; p. (1950) *4,690,514*.
Massafra, *t.*, Italy; industl.; p. *12,275*.
Massarosa, *commune*, Tuscany, Italy; agr.; p. *12,546*.
Massawa, *spt.*, Eritrea; pt. for Ethiopia; pearl fishing; p. *17,169*.
Massena, *t.*, N.Y., U.S.A.; p. (1950) *13,137*.
Massillon, *c.*, Ohio, U.S.A.; coal, machin., glass, aluminium ware; p. (1950) *29,594*.
Masterton, *t.*, N.I., N.Z.; p. (1951) *11,542*.
Masulipatam, *spt.*, Kistna dist., Andhra Pradesh, India; on the Coromandel cst.; cotton mftg., rice; p. (1941) *59,146*.
Matabeleland, *dist.*, S. Rhodesia; cereals, sugar, cotton, gold.
Matadi, *pt.*, Belg. Congo; nr. mouth of R. Congo; p. *23,000*.
Matagalpa, *industl. t.*, Nicaragua; p. (1947) *52,073*.
Matale, *t.*, Ceylon; Buddhist monastery; p. (1941) *14,090*.
Matamoros, *t.*, Mexico, on Rio Grande; livestock tr. ctr.; p. (1950) *118,215*.
Matanzas, *prov.*, Cuba; sugar, tobacco, rice; a. 3,259 sq. m.; p. (1943) *361,079*.
Matanzas, *spt.*, *prov. cap.*, Cuba; exp. sugar, cigars; p. (1943) *73,749*.
Matapan, *C.*, W. side of G. of Laconia, Greece.
Matara, *spt.*, S. Ceylon; p. *22,908*.
Mataro, *spt.*, Spain; nr. Barcelona; fisheries, textiles, chemicals, paper; p. *24,000*.
Matehuala, *t.*, central Mexico; in mining region; p. (1940) *16,548*.

Matera, *t.*, Italy; N.W. of Taranto; tr. ctr., leather, oil; p. (1951) *30,411*.
Matlock, *t.*, *urb. dist.*, Derby, Eng.; on R. Derwent; 15 m. N. of Derby; health resort, tourist ctr., quarrying, light inds.; p. (1951) *17,770*.
Mato Grosso, *st.*, Brazil; cap. Cuiaba; a. 487,482 sq. m.; p. (1950) *528,451*.
Mato Grosso, *plateau*, Mato Grosso st., Brazil; average alt. 3,000 ft., acts as divide between Amazon and Parona–Paraguay R. systems; reserves of gold, diamonds, manganese but largely undeveloped.
Matrah, *t.*, Muscat and Oman, Arabia; tr. route ctr.; p. *8,500*.
Matsue, *t.*, Honshu, Japan; p. (1947) *57,401*.
Matsumoto, *t.*, Japan; silkworm tr.; p. (1947) *79,133*.
Matsuyama, *t.*, Japan; p. (1950) *163,859*.
Matterhorn, German name for (Fr.) Mt. Cervin, (It.) Monte Cervino; Pennine Alps, Switzerland; alt. 14,678 ft, (*see* Zermatt).
Mattoon, *c.*, Ill., U.S.A.; ironwks., flour, bricks, agr. tr.; p. (1950) *17,547*.
Maturin, *t.*, Venezuela; comm.; p. (1947) *10,705*.
Mauban, *spt.*, Luzon, Philippine Is.; cst. tr.; p. *14,832*.
Maubeuge, *t.*, Nord, France; metal, glasswks.; p. (1954) *24,215*.
Mauch Chunk, *bor.*, E. Penns., U.S.A.; coal, carnotite, clothing; p. (1950) *2,959*.
Mauchline, *par.*, Ayr, Scot.; associated with Robert Burns; p. *4,000*.
Maui, *I.*, Hawaiian Is.; a. 728 sq. m.; p. (1948) *45,336*.
Maule, *prov.*, Chile; a. 2,172 sq. m.; p. (1957) *86,629*.
Maumee, *R.*, Ind., U.S.A.; flows to L. Erie; length 180 m.
Mauna Kea, *volcano*, Hawaii; alt. 13,823 ft.
Mauna Loa, *volcano*, Hawaii; alt. 13,675 ft.
Mauritania, Islamic Republic of, *aut. rep.* within Fr. Community, W. Africa; livestock, gum, salt; cap. Nouakchott; a. 322,340 sq. m.; p. (1957) *624,000*.
Mauritius, *I.*, *Brit. col.*, Indian Ocean; 500 m. E. of Madagascar; sugar, rum; cap. Port Louis; a. 720 sq. m.; p. (estd. 1957) *596,621*.
Mawddach, *R.*, *estuary*, Merioneth, Wales; length 19 m.
Maxwelltown, *t.*, Dumfries, Scot.; on R. Nith; textiles, timber.
May, *I.*, Firth of Forth, Fife, Scot.
Mayaguana I., Bahamas, W. Indies; p. (1953) *615*.
Mayaguez, *spt.*, Puerto Rico; sugar, coffee, tobacco; p. (1950) *58,744*.
Mayari, *mun.*, E. Cuba, W. Indies; sugar; mining; p. *45,126*.
Maybole, *burgh*, Ayr, Scot.; 8 m. S. of Ayr; footwear, agr. implements; p. (1951) *4,766*.
Mayen, *c.*, Rhine prov., Germany; mftg., brewing; leather; quarries; p. *14,327*.
Mayence, *see* **Mainz**.
Mayenne, *dep.*, N.W. France; pastoral and agr.; cap. Laval; a. 1,987 sq. m.; p. (1954) *251,522*.
Mayenne, *R.*, France; trib. of R. Sarthe; length 125 m.
Mayfield, *t.*, S.W. Ky., U.S.A.; tobacco; dairy prod.; clothing; p. (1950) *8,990*.
Maynard, *t.*, Mass., U.S.A.; p. (1950) *6,690*.
Maynooth, *t.*, Kildare, Ireland; Roman Catholic College; p. (1946) *886*.
Mayo, *maritime co.*, Connacht, Ireland; broken cst., much barren mtn. land, many large lakes; agr., fishery; co. t. Castlebar, a. 2,126 sq. m.; p. (1956) *133,036*.
Mayotte, *ch. I.*, Fr. col., Comoro Archipelago, Mozambique Channel; sugar-cane, vanilla, cacao, a. 140 sq. m.; p. *18,000*.
Maywood, *t.*, Ill., U.S.A.; adjoining Chicago; residtl., some mnfs.; p. (1950) *27,473*.
Mazagan, *spt.*, Morocco; grain and wool tr.; p. (1946) *40,318*.
Mazamet, *t.*, Tarn, France; tanning, leather wks.; p. (1954) *17,070*.
Mazanderan, *prov.*, N. Persia; on Caspian Sea; wool, tobacco; a. 10,460 sq. m.; p. *200,000*.
Mazar-i-Sharif, *t.*, Afghanistan; fortress; p. (estd. 1948) *41,960*.
Mazarron, *t.*, Murcia, Spain; metal wks., flour, soap; p. *18,000*.
Mazatenango, *t.*, S.W. Guatemala; coffee, cacao, sugar, fruit; p. *14,227*.
Mazatlan, *spt.*, W. cst. Mexico; hides, minerals, fruit; p. (1940) *63,298*.
Mazingarbe, *t.*, Pas-de-Calais, France; p. (1954) *10,311*.
Mazzara, *t.*, Sicily, Italy; cath., ruined cas.; agr. prod.; p. *24,250*.
Mazzarino, *t.*, Sicily, Italy; mftg.; p. *21,580*.
M'babane, *t.*, Swaziland; alt. 3,800 ft.; administrative ctr.; European p. *1,100*.
McAlester, *t.*, Okla., U.S.A.; coal-mining ctr., rly. wks.; p. (1950) *17,878*.
McClintock Channel, *strait*, between Prince of Wales's land and Victoria I., Arctic Canada.
McComb, *t.*, Miss. U.S.A.; p. (1950) *10,041*.
McKeesport, *c.*, Penns., U.S.A., on Monongahela R.; coal-mining, iron and steel mftg.; p. (1950) *51,502*.
McKees Rocks, *t.*, Penns., U.S.A.; on Ohio R.; iron, glass; p. (1950) *16,241*.
M'Clure, *strait*, between Banks I. and Melville I., Canada.
McPherson, *t.*, Yukon, Canada; on Peel R.
McPherson, *t.*, Kan., U.S.A.; in oil-field region; refining plants; p. (1950) *8,689*.
Mead, *L.*, Cal., U.S.A.; on R. Colorado behind Boulder (Hoover) Dam; world's lgst. reservoir; stores water for irrigation in Imperial Valley and Yuma dist; length 115 m.
Meadville, *c.*, Penns., U.S.A.; on French Creek; univ.; rly. wks., rayon yarn; p. (1950) *18,972*.
Mealfuarvonie, *mtn.*, on side of L. Ness, Scot.; alt. 2,284 ft.
Meath, *maritime co.*, Leinster, Ireland; pastoral; co. t., Trim; a. 906 sq. m.; p. (1956) *66,689*.
Meathus Truim, *see* **Edgeworthstown**.
Meaux, *t.*, Seine-et-Marne, France; on R. Marne; cath.; dairying; p. (1954) *16,767*.
Mecca, *holy c.*, Saudi Arabia; Mohammedan pilgrim ctr.; p. *150,000*.
Mechanicsburg, *bor.*, S. Penns., U.S.A.; steel; clothes; p. (1950) *6,786*.
Mechelen, *see* **Malines**.
Mecklenburg, *Land*, Soviet Zone, Germany; bordering on Baltic Sea; a. 22,938 sq. m.; cap. Schwerin; p. (1946) *2,139,640*.
Medan, *cap.*, E. Sumatra, Indonesia; rubber, tobacco; p. (1930) *76,584*.
Medellin, *c.*, Colombia, S. America; univ.; textiles, tobacco, coffee, hides, precious metals; p. (1951) *329,965*.
Medford, *t.*, Mass., U.S.A.; sub. of Boston; residtl.; chemicals, machin., textiles; p. (1950) *66,113*.
Medicina, *commune*, N. Italy; textiles, agr.; leather; p. *14,903*.
Medicine Bow, *mtns.*, Col. and Wyo., U.S.A.
Medicine Hat, *t.*, Alberta, Canada; on S. Saskatchewan R.; rly. junction; coal, natural gas, flour; p. (estd. 1958) *21,079*.
Medina, *c.*, N.Y., U.S.A.; on Erie Canal, sandstone quarries; p. (1950) *6,179*.
Medina, *t.*, N. Ohio, U.S.A.; bees, honey, beeswax; p. (1950) *5,097*.
Medina, *c.*, Saudi Arabia; tomb of Mohammed; dates; p. *45,000*.
Medinia-Sidonia, *t.*, Spain; agr. prod.; p. *12,486*.
Medinet-el-Fayoum, *see* **El Faiyûm**.
Mediterranean, *gr. inland sea*, almost tideless, dividing Europe from Africa; and communicating with the Atlantic by the Strait of Gibraltar and Black Sea by the Dardanelles, Sea of Marmara and Bosporus, E. part touches Asia in the Levant; total length W. to E. 2,200 m.; greatest width of sea proper about 700 m.; water a. 900,000 sq. m.; greatest depth 14,695 ft.; ch. Is.: Corsica, Sardinia, Sicily, Crete, Cyprus, and the Balearic, Lipari, Maltese, Ionian grs., also Grecian Archipelago.
Médoc, *old dist.*, Gironde, France, extending for about 48 m. along Garonne R.; noted for wines.
Medveditsa, *R.*, U.S.S.R.; trib. of R. Don; length 330 m.
Medway, *R.*, Kent, Eng.; length 70 m.
Meenen, *t.*, Belgium; on Lys R.; tobacco tr., textiles, rubber goods, soap; p. (1947) *22,031*.
Meerane, *t.*, Saxony, Germany; textiles, machin., chemicals; p. (estd. 1954) *27,500*.
Meerut, *c.*, Uttar Pradesh, India; scene of outbreak of Indian Mutiny, 1857; p. (1951) *233,183*.
Megara, *t.*, Greece; p. (1940) *13,360*.
Mehsana, *t.*, Bombay, India; rice, cotton, tobacco; p. (1941) *15,762*.
Meiktila, *dist.*, Upper Burma; teak forests; cap. M.; p. (of t.) *8,830*.

Meiling Pass, on bdy. between Kwangtung, Kiangsi, S. China; provides historic routeway across Nanling mtns., followed by old imperial highway from Nanking to Canton; alt. approx. 1,000 ft.
Meiningen, *t.*, Thuringia, Germany; on R. Werra; cas.; machin., chemicals; p. (estd. 1954) *23,800.*
Meiringen, *t.*, Switzerland; nr. to Aar Gorge; resort; p. *3,285.*
Meissen, *c.*, Saxony, Germany; on R. Elbe; cath.; famous porcelain wks., textiles, iron, furniture, elec. machin.; p. (estd. 1954) *51,100.*
Mejillones, *spt.*, Chile; saltpetre; p. *1,065.*
Meknès, *c.*, Morocco, N. Africa; one of the caps. of M.; agr. ctr., olives; p. (1946) *159,600.*
Mekong, *R.*, S.E. Asia; rises in Tibet and separates Laos and Siam; length 2,800 m.
Melanesia, *chain of I. grs.*, S. Pacific; New Britain, Solomon, Santa Cruz, New Hebrides, New Caledonia, Loyalty and other archipelagos.
Melbourne, *spt. cap.*, Victoria, Australia; at mouth of Yarra R.; univ., caths.; cattle, sheep, fish and rabbit mkts.; p. (1957) *1,677,100.*
Meld, *t.*, Potenza, Italy; cath.; p. *14,300.*
Melfort, *t.*, Sask., Canada; mkt., rly. ctr.; lumber, wheat; p. (1946) *2,005.*
Melilla, *spt.*, Morocco, N. Africa; exp. iron ore; convict settlement; p. (1949) *95,841.*
Melipilla, *t.*, central Chile; agr., dairy prod.; p. (1940) *9,316.*
Melitopol, *t.*, Ukrainian S.S.R.; engin., p. (1959) *95,000.*
Melksham, *t.*, *urb. dist.*, Wilts, Eng.; on R. Avon, 5 m. N.E. of Bradford-on-Avon; rubber wks., heavy engin., flour mills, creameries, rope and matting; p. (1951) *6,727.*
Mělnik, *t.*, Czechoslovakia; p. *11,251.*
Melrose, *burgh*, Roxburgh, Scot.; on R. Tweed; 4 m. E. of Galashiels; ruined abbey, dist. ass. with Sir Walter Scott.; p. (1951) *2,146.*
Meltham, *t.*, *urb. dist.*, W.R. Yorks, Eng.; 4 m. S.W. of Huddersfield; woollen textiles; p. (1951) *5,107.*
Melton Mowbray, *t.*, *urb. dist.*, Leicester, Eng.; on Lincoln Heights, 15 m. N.E. of Leicester; mkt., hunting dist.; famous pork pies; footwear, wool spinning mills; p. (1951) *14,082.*
Melun, *t.*, cap. Seine-et-Marne, France; on R. Seine; agr. tools and prod.; p. (1954) *20,219.*
Melville, *t.*, S.E. Sask., Canada; rly. ctr.; wheat; p. *4,011.*
Melville I., off N. cst., Arnhem Land, Australia.
Melville I., N.W. Terrs., Arctic Canada.
Memel, *see* **Klaipeda.**
Memmingen, *t.*, Bavaria, Germany; rly. junction; machin., textiles; p. (estd. 1954) *25,800.*
Memphis, *ancient c.*, Egypt; on R. Nile; 10 m. S. of Cairo; near by are Sakkara ruins.
Memphis, *c.*, Tenn., U.S.A.; on R. Mississippi; rly. ctr., timber, cotton seed, ironwks., oil; p. (1950) *396,000.*
Mena, *t.*, W. Ark., U.S.A.; lumber, bricks, cotton, flour; tourist resort; p. (1950) *4,445.*
Menado, *t.*, Celebes, Indonesia; p. *27,544.*
Menai Bridge, *urb. dist.*, Anglesey, Wales; p. (1951) *1,855.*
Menai Strait, separates Isle of Anglesey from Caernarvon, Wales; crossed by Britannia rly. and Menai suspension bridges; 14 m. long, ½ m. to 2 m. wide.
Menam, *R.*, W. Siam; length 750 m.
Menasha, *t.*, Wis., U.S.A.; on L. Winnebago; mnfs.; p. (1950) *12,385.*
Mende, *t.*, cap. Lozère, France; on R. Lot; serge mftg.; p. (1954) *7,752.*
Menden, *t.*, N. Rhine–Westphalia, Germany; metallurgy, elec. prod.; p. (estd. 1954) *23,900.*
Menderes, *R.*, Anatolia, Turkey; length 200 m.
Mendip Hills, Somerset, Eng.; limestone range containing many karst features inc. Cheddar Gorge and Wookey Hole, length 20 m.; highest point 1,067 ft.
Mendota, *c.*, Ill., U.S.A.; nr. Chicago, mftg.; p. (1950) *5,129.*
Mendoza, *prov.*, W. Argentina; wheat, stock-raising; cap. Mendoza; a. 57,445 sq. m.; p. (estd. 1958) *797,100.*
Mendoza, *t.*, cap. Mendoza prov., Argentina; on Transandine Rly.; wine-producing dist.; p. (estd. 1954) *115,161.*
Menfi, *t.*, Sicily, Italy; industl.; p. *10,225.*
Mengtsz, *c.*, Yunnan, China; ruined in Tai-ping rebellion; tin and opium tr.; p. *193,004.*
Menin, *see* **Meenen.**
Menominee, *c.*, Mich., U.S.A.; on M. R.; timber, iron goods, paper, sugar; p. (1950) *11,151.*
Menominee, *c.*, Wis., U.S.A., on Red Cedar R.; grain, timber; p. (1950) *8,245.*
Menteith, L., of, S.W. Perth, Scot.; between Rs. Forth and Teith; a. 2½ sq. m.
Mentone, *t.*, Alpes-Maritimes, S. France; on Mediterranean cst.; health resort, olive oil, wines, perfumes; p. (1954) *17,109.*
Meppel, *t.*, Neth.; nr. Zuider Zee, shipbldg.; p. *12,133.*
Mequinez, *see* **Meknès.**
Merano, *t.*, Tyrol, N. Italy; health resort; p. *30,350.*
Merced, *t.*, Cal., U.S.A.; p. (1950) *15,278.*
Mercedes, *cap.*, Soriano dep., Uruguay; p. (1942) *24,000.*
Mercedes, *t.*, S. Texas, U.S.A.; cotton, oil, fruit; veg. canning; p. (1950) *10,081.*
Merchanicville, *t.*, N.Y., U.S.A.; on Hudson R.; p. (1950) *7,385.*
Merchantville, *bor.*, N.J., U.S.A.; paper, lead mnfs.; p. (1950) *4,183.*
Mergui, *archipelago*, Burma; teak, rice, pearl fishing.
Mergui, *t.*, Tenasserim, Lower Burma; on Bay of Bengal; pearl fishing; p. *20,405.*
Mérida, *t.*, Badajoz, Spain; on R. Guadiana; agr. dist., textiles; p. *16,000.*
Mérida, *cap.*, Yucatán, Mexico; univ.; sisal-hemp, ropes, cigars, brandy; p. (1950) *155,899.*
Meriden, *c.*, Conn., U.S.A.; hardware mftg.; p. (1950) *44,088.*
Meridian, *t.*, Miss., U.S.A.; in cotton-growing region; p. (1950) *41,893.*
Mérignac, *commune*, Gironde dep., S.W. France; cattle mkt.; p. (1954) *23,050.*
Merioneth, *maritime co.*, N. Wales; pastoral and mining; nuclear power-sta. at Trawsfynydd, due 1964; co. t., Dolgelly; a. 660 sq. m.; p. (1951) *41,456.*
Meriti, *c.*, S.E. Brazil; 10 m. N. Rio de Janeiro; p. (1947) *38,645.*
Merom, Waters of, *L.*, modern Hule L., Upper Galilee, Israel.
Merrick, *mtn.*, Kirkcudbright, Scot.; highest peak in S. Uplands of Scot.; alt. 2,764 ft.
Merill, *t.*, N. Wis., U.S.A.; wooden goods, paper, knitwear; p. (1950) *8,951.*
Merrimac, *R.*, N.H. and Mass., U.S.A.
Merse, *geographical sub-region*, S.E. Scot.; comprises lower valleys of Rs. Tweed and Teviot below Melrose and Hawick; glacial deposits form low hillocks *en échelon*, which largely influence the pattern of streams, roads, settlements, etc.; most favoured part of Scot. for crop growing, wheat, barley, root crops (for feeding to cattle, sheep); ch. ts. Hawick, Kelso, Berwick-on-Tweed (Eng.); a. approx. 220 sq. m.
Mersea, *I.*, at mouth of R. Colne, Essex, Eng.; oysters; holiday resort; length 5 m., width 2 m.
Merseburg, *c.*, Saxony, Germany; on R. Saale; cath., cas.; paper, machin., tobacco, chemicals; p. (estd. 1954) *34,500.*
Mersey, *R.*, between Lancs and Cheshire, Eng.; enters Irish Sea by fine estuary at Liverpool; length 68 m.
Merseyside, *lge. conurbation*, S.W. Lancs and N. Cheshire, Eng.; comprises: (1) spt. and industl. a. either side of lower Mersey estuary; (2) residtl. a. of W. Wirral Peninsula; a. 150 sq. m.; p. (1951) *1,382,244. See also under* **Bebington, Birkenhead, Bootle, Crosby, Ellesmere Pt., Hoylake, Huyton, Litherland, Liverpool, Neston, Wallasey, Wirral.**
Mersey Tunnel, biggest underwater tunnel in world, linking Liverpool and Birkenhead; opened 1934; main tunnel 2 m. l., with branch bores, 3 m.
Mersin, *spt.*, Turkey; textiles, fruit, cereals, timber; p. (1945) *33,086.*
Merthyr Tydfil, *t.*, *co. bor.*, Glamorgan, S. Wales; in narrow valley of R. Taff, 22 m. N.W. of Cardiff; hosiery, elec. goods, aircraft, bricks; p. (1951) *61,093.*
Merton and Morden, *urb. dist.*, Surrey, Eng.; residtl.; light inds.; p. (1951) *74,602.*
Meru, *mtn.*, Tanganyika Terr., Brit. E. Africa; extinct volcano overlooking E. arm of Gr. Rift valley; coffee plantations at alt. 5,000–6,000 ft., some rubber below 4,000 ft.; alt. summit 14,953 ft.
Merv, *see* **Mary.**
Mesabi Range, *hills*, N.E. Minn., U.S.A.; about

100 m. long, alt. 200–500 ft.; vast iron-ore deposits.

Mesagna, *t.*, S. Italy; mnfs.; p. *17,300*.

Meshed, *c.*, Khurasan, Persia; nr. Kashaf Rud R.; tr., pilgrim ctr.; silks, carpets; p. (1956) *242,165*.

Mesopotamia, *see* **Iraq**.

Messina, *c.*, *spt.*, Sicily, Italy; opposite Reggio; univ.; exp. fruit, wine, silk, oil; silk mnf.; p. (1951) *218,906*.

Messina, *strait*, between Sicily and Italian mainland; length 22 m. minimum width 3 m.

Messinia, *prefecture*, Peloponnese, Greece; cap. Kalamai; p. (1951) *227,648*.

Mesta, *R.*, Bulgaria, Greece; rises in Rhodope Mtns., flows S.E. into Ægean Sea 15 m. E. of Kavàlla; valley famous for tobacco; known in Greece as NESTOS; approx. length 175 m.

Mestre, *t.*, Italy; on lagoon at landward end of causeway linking Venice to mainland; p. *11,750*.

Mesurado, *R.*, Liberia, Africa; 300 m. long.

Meta, *R.*, Colombia and Venezuela; navigable for 400 m.; trib. of R. Orinoco; length 750 m.

Metaline, *t.*, Wash., U.S.A.; on R. Colombia nr. Canada–U.S.A. bdy.; lead–zinc mines.

Metemma, *t.*, Sudan; opposite Shendi, on R. Nile.

Methil, *t.*, Fife, Scot.; on F. of Forth; united with Buckhaven.

Methuen, *t.*, Mass., U.S.A.; textiles, footwear; p. (1950) *24,477*.

Metkovic, *t.*, Yugoslavia; on R. Narenta; mkt.; p. (1947) *5,723*.

Metropolis, *c.*, Ill., U.S.A.; on R. Ohio; p. (1950) *6,093*.

Mettmann, *t.*, N. Rhine–Westphalia, Germany; nr. Düsseldorf; iron, machin.; p. (estd. 1954) *19,300*.

Metuchen, *bor.*, N.J., U.S.A.; residtl., chemicals, needles, rubber; p. (1950) *9,879*.

Metz, *c.*, cap. Moselle, France; on R. Moselle 25 m. N. of Nancy; cath.; wines, leather goods, preserved fruits; p. (1954) *85,701*.

Meudon, *t.*, Seine-et-Oise, France; nr. Versailles; observatory; glass, linen, ammunition; p. (1954) *24,729*.

Meurthe, *R.*, France; length 70 m.

Meurthe-et-Moselle, *dep.*, E. France; agr., vineyards, mining; cap. Nancy; a. 2,037 sq. m.; p. (1954) *607,022*.

Meuse, *dep.*, N.E. France; livestock, mining, wine; cap. Bar-le-Duc; a. 2,408 sq. m.; p. (1954) *207,106*.

Meuse (**Maas**,) *R.*, France; rises in Haute-Marne, flows past Verdun into Belgium past Namur and Liége into the Netherlands and joins the Waal, left arm of the Rhine; length 570 m.

Mevagissey, *vil.*, Cornwall, Eng.; fishing and fish canning; tourist resort; p. *1,739*.

Mexborough, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Don, 10 m. above Doncaster; potteries, iron; p. (1951) *18,965*.

Mexcala, *R.*, S. Mexico; flows into Pacific; length 500 m.

Mexia, *t.*, Texas, U.S.A.; rly. ctr.; cotton, oil, engin.; p. (1950) *6,627*.

Mexicali, *cap.*, N. Terr., Lower California, Mexico; p. (1950) *141,189*.

Mexico, *fed. rep.*, S. of N. America; contains much forest, fertile land and mtn. dists.; rich in minerals, silver, copper, arsenic, oil, zinc, lead; stock-raising and agr. are the ch. occupations in the N. States; cap. Mexico City; a. 763,944 sq. m.; p. (1950) *25,791,017*.

Mexico City, *cap. c.*, Mexico; in plain, alt. 7,460 ft. above sea-level; fine Houses of Congress, many lge. public buildings, extensive tr. and inds.; p. (1953) *3,795,567*.

México, *st.*, Mexico; a. 8,267 sq. m.; cap. Toluca; p. (1950) *1,389,892*.

Mexico, *c.*, Mo., U.S.A.; firebrick and shoe factories; p. (1950) *11,623*.

Mexico, G. of, *lge. inlet* of the Atlantic (1,000 m. E. to W. by 800 m. N. to S.) lying S. of U.S.A. and E. of Mexico. Communicates by Florida Strait with the Atlantic and by Channel of Yucatán with the Caribbean Sea.

Meycauayan, *mun.*, Luzon, Philippines; rice, sugar, maize; p. *16,082*.

Mézières, *t.*, Ardennes, France; on R. Meuse; nails, hardware, type-founding; p. (1954) *11,073*.

Mezökovesd, *t.*, Hungary; industl.; p. *20,838*.

Mezötur, *t.*, Hungary; mkt., flour, pottery; p. *25,835*.

Mhow, *t.*, Madhya Pradesh, India; cotton; p. (1941) *31,177*.

Miagao, *t.*, Panay, Philippines; tr. ctr., mnfs.

Miami, *t.*, Fla., U.S.A.; winter resort, fruits, fishing; p. (1957) *261,000*.

Miami, *t.*, Okla., U.S.A.; tr. ctr., agr., cattle; packing, mining; p. (1950) *11,801*.

Miamisburg, *t.*, Ohio, U.S.A.; p. (1950) *6,329*.

Miani, *t.*, N.W. Punjab, Pakistan; salt; p. about *6,000*.

Mianwali, *dist.*, W. Punjab, Pakistan; p. (estd. 1951) *550,000*.

Michigan, *st.*, U.S.A.; in valley of Gr. Lakes; industl.; cars, iron and steel goods, petroleum, minerals; some agr.; cap. Lansing; a. 58,216 sq. m.; p. (1950) *6,371,766*.

Michigan, *L.*, N. America; in basin of St. Lawrence R., enclosed by two peninsulas of the St. of M. and by Wis., Ill. and Ind.; a. 23,900 sq. m.; discharges by Straits of Mackinac to L. Huron.

Michigan City, *t.*, Ind., U.S.A.; on L. M.; rly. wks., furniture, hosiery; p. (1950) *28,395*.

Michipicoten, *R.*, Ontario, Canada; flows 125 m. to L. Superior.

Michoacan, *st.*, Mexico; on the Pacific; mtnous. and rich in minerals; cap. Morelia; a. 23,200 sq. m.; p. (1950) *1,416,681*.

Michurinsk, *t.*, R.S.F.S.R.; N.W. of Tambov; p. (1959) *80,000*.

Micronesia, *grs. of sm. Is.*, S. Pacific; includes Carolines, Marianas (Ladrones), Marshall, Pelews, etc.

Middelburg, *t.*, cap. Zeeland, Neth.; on Walcheren I. nr. Flushing; margarine, timber; p. (1951) *21,417*.

Middelburg, *t.*, Transvaal, S. Africa; coal, iron, copper, cobalt; p. *7,995*.

Middelfart, *t.*, Fyn, Denmark; off Fredericia; p. *8,089*.

Middleboro, *t.*, Mass., U.S.A.; agr. ctr.; p. (1950) *5,889*.

Middle Congo, *see* **The Congo, Republic of**.

Middlesboro, *t.*, Ky., U.S.A.; p. (1950) *14,482*.

Middlesbrough, *spt.*, *co. bor.*, Cleveland dist., N.R. Yorks, Eng.; on S. side of Tees estuary; impt. iron and steel ind., heavy engin., shipbldg. and coal exp.; p. (1951) *147,336*.

Middlesex, *co.*, S.E. Eng.; N. of R. Thames; in effect continuous with London; thickly populated, residtl., industl.; a. 232 sq. m.; p. (1951) *2,268,776*.

Middleton, *mkt. t.*, Durham, Eng.; on R. Tees.

Middleton, *t.*, *mun. bor.*, S.E. Lancs, Eng.; mkt.; textiles, engin.; p. (1951) *32,602*.

Middleton, *urb. dist.*, Cork, Ireland; mkt.; p. (1951) *2,828*.

Middletown, *c.*, Conn., U.S.A.; on C. R.; univ.; p. (1950) *29,711*.

Middletown, *c.*, N.Y., U.S.A.; on Walkill R.; ironwks.; p. (1950) *22,586*.

Middletown, *c.*, Ohio, U.S.A.; in Miami and Erie canal; p. (1950) *33,695*.

Middletown, *bor.*, Penns., U.S.A.; on Susquehanna R.; p. *7,046*.

Middlewich, *t.*, *urb. dist.*, Cheshire, Eng.; on Rs. Dane, Wheelock, and Croco, 5 m. N. of Crewe; salt, chemicals, silk, clothing; p. (1951) *6,734*.

Midhurst, *t.*, Sussex, Eng.; on R. Rother; mkt., agr. ctr.; brick, timber, and lime wks.; p. *1,812*.

Midland, *t.*, Mich., U.S.A.; chemicals, salt, oil; p. (1950) *14,285*.

Midland Junction, *t.*, W. Australia.

Midlothian, *co.*, Scot.; dairying, coal-mining, paper, brewing, fishing; a. 362 sq. m.; p. (1951) *565,746*.

Midnapore, *t.*, W. Bengal, India; silkworm tr.; p. (1941) *32,021*.

Midway, *Is.*, Pac. Oc.; calling-place on air-routes between San Francisco and Asia, midway between Asia and U.S.A. (to which it belongs).

Miechowice, *t.*, S.W. Poland; coal, iron foundries; p. *14,608*.

Miedzyrzecz (**Meseritz**), *t.*, E. Poland; agr., leather; p. *16,837*.

Mieres, *t.*, Spain; on R. Leno, nr. Oviedo; minerals, agr. prod.; p. (1950) *58,310*.

Mikkeli (**St. Michel**), *dep.*, Finland; a. 6,750 sq. m.; p. (1950) *241,671*.

Milan, *c.*, N. Italy; on R. Olona; cath., univ.; textiles, machin., motors, chemicals, porcelain; comm. ctr.; p. (1951) *1,268,994*.
Milas, *t.*, S.W. Turkey in Asia; agr., fruit; carpets; p. *8,322*.
Milazzo, *spt.*, Sicily, Italy; fruits, wines, olive oil, sulphur; p. *19,141*.
Mildenhall, *t.*, W. Suffolk, Eng.; on R. Lark, 10 m. N.W. of Bury St. Edmunds; mkt., flour; p. *3,235*.
Mildura, *c.*, Victoria, Australia; on R. Murray; irrigation ctr., fruit; p. (1957) *11,760*.
Miles City, *c.*, Mont., U.S.A.; on Yellowstone R.; cattle; p. (1950) *9,243*.
Milford, *t.*, Conn., U.S.A.; residtl., resort; fish; light engin.; p. (1950) *26,870*.
Milford, *t.*, Delaware, U.S.A.; p. (1950) *5,179*.
Milford, *t.*, Mass., U.S.A.; boot mnfs.; p. (1950) *14,396*.
Milford Haven, *spt.*, *urb. dist.*, Milford Haven, Pembroke, Wales; on N. Shore of Milford Haven; fishing, trawlers built and repaired, net mkg.; proposed oil-tanker terminal; p. (1951) *11,717*.
Milford Sound, *inlet*, at S. extremity of S.I., N.Z.: tourist resort.
Milianah, *t.*, Algeria; tr. ctr.; p. *5,000*.
Militello, *t.*, Sicily, Italy; agr., interests; p. *10,770*.
Milk, *R.*, Mont., U.S.A.; trib. of Missouri R.; length 500 m.
Millau, *t.*, Aveyron, France; on R. Tarn; glove mnfs.; p. (1954) *19,209*.
Millbrook, *t.*, Hants, Eng.; at mouth of R. Test, nr. Southampton.
Milbury, *t.*, Mass., U.S.A.; p. (1950) *8,347*.
Millersburg, *bor.*, Penns., U.S.A.; machin., shoes; p. (1950) *2,861*.
Millinocket, *t.*, Me., U.S.A.; paper; p. (1950) *5,755*.
Millom, *t.*, Cumberland, Eng.; on N.W. cst. of Duddon estuary; iron-ore mining, ironwks.; p. *8,708*.
Millport, *burgh*, Bute, Scot.; on Gr. Cumbrae I., in F. of Clyde; resort; cath.; quarries; p. (1951) *2,012*.
Milltown Malby, *t.*, Clare, Ireland; mkt.; p. *995*.
Millvale, *bor.*, Penns., U.S.A.; p. (1950) *7,287*.
Millville, *c.*, N.J., U.S.A.; on Maurice R.; glass, iron, cotton; p. (1950) *16,041*.
Milngavie, *burgh*, Dunbarton, Scot.; 5 m. N.W. of Glasgow; textiles; p. (1951) *7,883*.
Milnrow, *t.*, *urb. dist.*, S.E. Lancs, Eng.; sub. of Rochdale; cotton and waste spinning, engin., brick mkg., paper and tube mftg.; p. (1951) *8,585*.
Milos, *I.*, Cyclades, Greece; volcanic; length 13 m.; fruits, gypsum, sulphur; famous statue of Venus found here in 1820.
Milspe, *commune*, Westphalia, Germany; ironwks.; p. *11,291*.
Milstin, *peak*, Atlas Mtns., Morocco, N. Africa; alt. 11,400 ft.
Milton, *t.*, Mass., U.S.A.; sub. of Boston; p. (1950) *22,395*.
Milton, *t.*, Penns., U.S.A.; on Susquehanna R.; ironwks.; p. (1950) *8,578*.
Milton, *t.*, S.I., N.Z.; p. (1951) *1,672*.
Milverton, *t.*, Somerset, Eng.; 6 m. W. of Taunton; mkt.
Milwaukee, *c.*, Wis., U.S.A.; on L. Michigan, 70 m. N. of Chicago; univ.; rly. ctr., motor cars, meat canning, agr. tools, machin.; p. (1950) *637,392*.
Minab, *t.*, S. Persia; orchards; p. about *10,000*.
Minas Basin, *E. arm*, Bay of Fundy, Nova Scotia, Canada.
Minas Gerais, *st.*, Brazil; extensive mining, diamonds, gold, iron, manganese, aluminium, cotton, coffee, agr.; cap. Belo Horizonte; a. 224,701 sq. m.; p. (1950) *7,839,792*.
Minas Novas, *t.*, Minas Gerais, Brazil.
Minatitlán, *t.*, E. Mexico; petroleum refineries; p. (1940) *18,539*.
Minch, The, *channel* between the Outer and Inner Hebrides; 24 m. to 40 m. wide.
Minchinhampton, *t.*, Gloucester, Eng.; in Cotswold Hills, 4 m. S.E. of Stroud; mkt., woollens, brewing; p. *3,500*.
Mincio, *R.*, Italy; trib. of R. Po; drains L. Garda; length 38 m.
Mindanao, 2nd lgst. I. of Philippines; rice, coffee, tobacco, coal, minerals; ch. t. Zamboanga; a. 36,537 sq. m.; p. *560,000*.
Minden, *c.*, N. Rhine–Westphalia, Germany; on R. Weser at crossing of Mittelland Canal; cath.; glass, tobacco, metal, wood, leather, meat prod.; p. (estd. 1954) *43,200*.
Minden, *t.*, La., U.S.A.; exp. cotton; petroleum, natural gas; p. (1950) *9,787*.
Mindoro, *I.*, Philippines, S. of Luzon; a. 3,759 sq. m.; p. *100,000*.
Minehead, *t.*, *urb. dist.*, Somerset, Eng.; at N. foot of Exmoor, on Bristol Channel cst.; mkt., holiday resort; p. (1951) *7,400*.
Mineo, *t.*, Sicily, Italy; mftg.; p. *11,400*.
Mineola, *t.*, N.Y., U.S.A.; sub. N.Y. c.; glass, packing; p. (1950) *14,831*.
Minersville, *bor.*, Penns., U.S.A.; on Schuylkill R.; p. (1950) *7,783*.
Minervino, *t.*, S. Italy; industl.; p. *18,375*.
Minho, *prov.*, N. Portugal; fruit-growing, cattle, textiles; a. 1,889 sq. m.; p. (1940) *741,510*.
Minho, *R.*, separates Portugal from Spain in N.W.; length 170 m.
Minhow, *see* Foochow.
Minia, *t.*, Egypt; on R. Nile; cotton, tr. ctr.; p. (1947) *44,325*.
Minicoy Is., Arabian Sea, joined with Laccadive and Maldive Is. to form Union Territory.
Minneapolis, *c.*, Minn., U.S.A.; on Mississippi R., at Falls of St. Anthony; univ.; flour, timber, machin., linseed oil; p. (1950) *521,718*.
Minnesota, *st.*, U.S.A.; iron-ore, agr., flour, timber, meat; cap. St. Paul; a. 84,068 sq. m.; p. (1950) *2,982,483*.
Minnick, Water of, *R.*, Ayr and Kirkcudbright, Scot.; trib. of R. Cree; length 15 m.
Minorca (Menorca), Spanish I., Balearic Is., Mediterranean Sea; fruits, olives, cereals, cattle, minerals; cap. Mahón; a. 283 sq. m.; p. *42,000*.
Minot, *t.*, N.D., U.S.A.; p. (1950) *22,032*.
Minsk, *cap.*, Byelorussian S.S.R.; engin., textiles, elec. power; p. (estd. 1959) *509,000*.
Minusinsk, *t.*, R.S.F.S.R.; on R. Yenisei; wheat, lumber, sugar-beet, coal, copper, antimony; p. (1939) *20,403*.
Minya Konka, *mtn.*, Sikiang, China; at E. end of Plateau of Tibet; highest mtn. in China; alt. approx. 23,000 ft.
Miosnavo, *L.*, Norway; length 24 m.
Miquelon, *I.*, French, off S. cst. Newfoundland, Canada; fisheries.
Mira, *t.*, Italy; on Brenta Morta; p. *19,600*.
Miranda, *st.*, N. Venezuela; pastoral and agr.; cap. Los Teques; p. (1941) *227,604*.
Miranda, *t.*, N.E. Spain; on R. Ebro; p. *15,166*.
Mirandola, *t.*, Modena, Italy; p. *20,875*.
Mirano, *t.*, N. Italy; p. *14,600*.
Mirfield, *urb. dist.*, W.R. Yorks, Eng.; on R. Calder, 3 m. S.W. of Dewsbury; woollens; p. (1951) *11,885*.
Miri, *t.*, Sarawak; oil ctr.; p. *10,000*.
Mirim, *L.*, Brazil and Uruguay; 115 m. long, 20 m. wide.
Mirzapur, *t.*, Uttar Pradesh, India; on R. Ganges; carpets, brassware; p. (1941) *70,944*.
Mishawaka, *c.*, Ind., U.S.A.; on St. Joseph R.; agr. implements, p. (1950) *32,913*.
Misilmeri, *t.*, Sicily, Italy, p. *11,420*.
Misiones, *terr.*, Argentina; farming and stock-raising; cap. Posadas; a. 11,749 sq. m.; p. (estd. 1958) *363,800*.
Miskolcz, *t.*, Hungary; flour, leather, porcelain; p. (estd. 1957) *150,000*.
Misol, *I.*, N. of Ceram, Indonesia; length 50 m.
Mission, *t.*, S. Texas, U.S.A.; fruit, cotton, vegetables; engin.; p. (1950) *10,765*.
Mississinewa, *R.*, Ind., U.S.A.; trib. of Wabash R.; length 140 m.
Mississippi, *st.*, U.S.A.; cotton, sweet potatoes, pecan nuts, rice, sugar cane, sorghum cane; cable; petroleum, natural gas; cap. Jackson; a. 47,716 sq. m.; p. (1950) *2,178,914*.
Mississippi, *R.*, Canada; trib. of Ottawa R.; length 100 m.
Mississippi, *R.*, U.S.A.; total length 2,547 m., navigable for 2,000 m.
Missolonghi, *c.*, *spt.*, *cap.*, Aetolia and Acarnania, Greece; currants; p. (1951) *13,837*.
Missoula, *c.*, Mont., U.S.A.; on Klark R.; univ.; rly. wks., agr., fruit, oil ref.; p. (1950) *22,485*.
Missouri, *st.*, U.S.A.; livestock, maize, coal,

iron; cap. Jefferson City; ch. t. St. Louis; a. 69,674 sq. m.; p. (1950) *3,954,653*.
Missouri, *R.*, U.S.A.; trib. of Mississippi R.; length (including the Madison) *3,047* m., navigable 2,400 m.
Missouri Coteau, *hill ridge*, N. America; runs N.W. to S.E. across prairies of Saskatchewan (Canada), N. and S. Dakota (U.S.A.); rises abruptly from 1,600 to 2,000 ft.
Missouri, Little, *R.*, U.S.A.; trib. of M. R.; length 450 m.
Mistassini, *L.*, Quebec, Canada; 100 m. long.
Misterbianco, *commune*, E. Sicily; lava, sulphur; agr.; p. *11,387*.
Mistretta, *t.*, Sicily, Italy; mnfs.; p. *10,800*.
Misurata, *t.*, Tripolitania, Libya, N. Africa; on cst. of Mediterranean, 110 m. E. of Tripoli; mkt. for local agr. produce; fishing; p. (1938) *45,097*.
Mitau, *see* **Jelgava**.
Mitcham, *mun. bor.*, Surrey, Eng.; nr. Croydon; paint, calico printing, elec. engin.; p. (1951) *67,273*.
Mitchell, *dist.*, N.S.W., Australia; silver mining.
Mitchell, *R.*, Queensland, Australia; flows into G. of Carpentaria.
Mitchell, *t.*, Ind., U.S.A.; cement; p. (1950) *3,245*.
Mitchell, *dist.*, Queensland, Australia; p. *1,358*.
Mitchell, *t.*, S. Dakota, U.S.A.; univ.; farming; p. (1950) *12,123*.
Mitchell, *mtn. pk.*, Black Mtns., N. Carolina, U.S.A.; alt. 6,684 ft.; also called the "Black Dome."
Mitchelstown, *t.*, Cork, Ireland; nr. Fermoy; p. (1951) *2,148*.
Mitidja, *plain*, Algeria, N. Africa; borders Mediterranean 25 m. E. and W. of Algiers; intensive cultivation of vine; ch. ts. Algiers, Blida.
Mitrovica, *t.*, Jugoslavia; on R. Sava; livestock, mkt.; p. *12,000*.
Mittelland Canal, *inland waterway system*, N. Germany; system of canals and canalised Rs.; links Dortmund–Ems Canal nr. Rheine through Minden, Hanover, Magdeburg, Berlin to R. Oder at Frankfurt-on-Oder; makes use of natural E.–W. troughs across the N. German Plain.
Mittweida, *t.*, Saxony, Germany; metallurgy, textiles; p. (estd. 1954) *24,500*.
Mitzensk, *t.*, U.S.S.R.; on R. Zusha; mnfs.; p. *19,120*.
Miyako, *spt.*, Japan; p. *32,879*.
Mizen Head, *C.*, S. Ireland; W. of C. Clear.
Mjösa, *lgst. L.*, Norway; 55 m. long.
Mlada Boleslav (**Jungbunzlau**), *t.*, Bohemia, Czechoslovakia; religious ctr., chemicals; p. *19,604*.
Mlawa, *t.*, Warsaw, Poland; tanning, grain, agr. implements; p. *14,000*.
Mljet, *I.*, Adriatic Sea; part of Jugoslavia.
Moate, *t.*, W. Meath Ireland; p. (1951) *1,274*.
Moberly, *c.*, Mo., U.S.A.; rly. wks., grain, iron, hosiery, footwear; p. (1950) *13,115*.
Mobile, *c.*, *spt.*, Ala., U.S.A.; on R. M.; shipbldg., cotton exp.; p. (1950) *129,009*.
Mocha, *fortfd. spt.*, Yemen, Arabia; on Red Sea; coffee; p. *5,000*.
Modane, *t.*, S.E. Savoie, France; commands routes via Mont Cenis Pass and tunnel; p. (1954) *4,064*.
Modder, *R.*, C. Prov., S. Africa; trib. of Orange R.
Modena, *t.*, *prov. cap.*, Italy; cath. univ.; textiles, fruit, grain, leather; p. (1951) *111,094*.
Modesto, *t.*, Cal., U.S.A.; fruit, vegetables; p. (1950) *17,389*.
Modica, *t.*, Sicily, Italy; cheese, macaroni, grain, wines; p. (1948) *43,500*.
Modjokerto, *t.*, E. Java, Indonesia; sugar; fossil man discovered 1934; p. *23,600*.
Mödling, *t.*, Austria; on R. Brühl, metalwks., sulphur-baths; p. *19,000*.
Moers, *t.*, N. Rhine–Westphalia, Germany; N.E. of Krefeld; cas.; coal-mining, metal ind.; p. (estd. 1954) *36,300*.
Moffat, *burgh*, Dumfries, Scot.; in Annandale, 15 m. N.W. of Lockerbie; health resort; p. (1951) *2,623*.
Moffat Tunnel, Col., U.S.A.; carries trunk rly. from Chicago to San Francisco under Rocky Mtns. between Denver and Salt Lake City; length 6¼ m.
Mogadishu, *cap.*, former Italian Somaliland protectorate, N.E. Africa; p. (estd. 1948) *74,000*.
Mogador, *spt.*, Morocco, N. Africa; cereals, almonds, gum-arabic; p. (1946) *28,620*.
Mogilev, *c.*, Byelorussian S.S.R.; on R. Dnieper; engin., textiles; p. (1959) *121,000*.
Mogilev Podolski, *t.*, Ukrainian S.S.R.; on Dniester R.; tr., flour, sugar refining; p. (1939) *22,271*.
Mogi Mirim, *t.*, Brazil; tr. ctr.; p. *8,449*.
Mohác, *t.*, Hungary; on R. Danube; R. pt.; flour, brewing; p. *17,228*.
Mohawk, *R.*, N.Y., U.S.A.; trib. of Hudson R.; followed by impt. road, rly. and canal routes across Appalachian Mtns.; length 175 m.
Moidart, *L.*, *cst. dist.*, S.W. Inverness, Scot.
Moisie, *R.*, Labrador, Canada, flows S. into G. of St. Lawrence.
Moissac, *t.*, France; on R. Tarn; abbey; p. *7,435*.
Mojave, *desert*, Cal., U.S.A.
Moji, *spt.*, Kyushu, Japan; exp. coal, cement, timber, sugar, cotton, thread; p. (1950) *124,399*.
Mokau, *R.*, S.I., N.Z.
Mokpo, *spt.*, W. cst. S. Korea; ctr. of food-processing and cotton-ginning; p. (1949) *111,128*.
Mola di Bari, *spt.*, Apulia, Italy; grain, livestock, olives, wine; p. *18,775*.
Mola di Gaeta, *t.*, Italy; p. *15,950*.
Mold, *co. t.*, *urb. dist.*, Flint, N. Wales; on R. Alyn; chemicals, roadstone; p. (1951) *6,436*.
Moldau, *see* **Vltava**.
Moldavian S.S.R., *const. rep.*, U.S.S.R.; viniculture, fruit-growing, mkt. gard.; cap. Kishinev; a. 13,200 sq. m.; p. (1959) *2,880,000*.
Moldavia, *prov.* Romania; a. 14,660 sq. m.; wine; ch. t. Iasi; p. *2,850,068*.
Molde, *spt.*, Romsdals Fjord, Norway; p. *1,820*.
Mole, *R.*, Surrey, Eng.; rises in central Weald, flows N. into R. Thames nr. Molesey; cuts impt. gap through N. Downs between Dorking and Leatherhead; length approx. 50 m.
Molenbeek-Saint-Jean, *t.*, Belgium; nr. Brussels; large mftg. ctr.; p. (1947) *65,000*.
Molesey, E. and W. *t.*, Surrey, Eng.; at junction of Rs. Mole and Thames; residtl.; p. *8,500*.
Molfetta, *spt.*, Apulia, Italy; olive oil, macaroni, wine; p. (1948) *53,493*.
Molina de Segura, *commune*, S.E. Spain; paper mftg.; p. *13,721*.
Moline, *c.*, Ill., U.S.A.; on Mississippi R.; agr. implements, ironwks., flour; p. (1950) *37,397*.
Mollendo, *spt.*, Peru; copper; p. (1947) *14,893*.
Mölndal, *c.*, S.W. Sweden; paper, textiles; margarine; p. (1951) *20,857*.
Molokai, *I.*, Hawaiian Is.; a. 260 sq. m.; p. *5,258*.
Molotov (renamed **Perm**, 1957), *t.*, R.S.F.S.R.; on R. Kama, N.W. of Sverdlovsk; hydro-elec., oil, textiles, engin., chemicals, copper; p. (1959) *628,000*.
Molsheim, *t.*, Bas-Rhin, France; W. of Strasbourg; sword and bayonet mkg.
Molucca or Spice Is., Indonesia; between Celebes and New Guinea; spices, sago, timber, pearls, rice, copra; a. 191,681 sq. m.; p. (1930) *893,400*.
Mombasa, *spt.*, Kenya; ch. harbour, Killindini; rly. terminus; exp. tropical produce (ivory, hides, rubber, etc.); p. *102,000*.
Mön, *I.*, off cst. of Zealand, Denmark; a. 90 sq. m.; cap. Stege; p. *14,000*.
Mona Passage, *strait*, Caribbean Sea; separates Hispaniola from Puerto Rico.
Monaca, *bor.*, Penns., U.S.A.; glass, light engin.; p. (1950) *7,415*.
Monaco, *principality*, S. France; divided into 3 sections, Monaco Ville, La Condamine, and Monte Carlo (famous Casino); tourist resort, olive oil, perfumes; a. 8 sq. m.; p. (1956) *20,422*.
Monadhliath Mtns., Inverness, Scot.; on W. side Strathspey; highest peak Carn Mairg, 3,087 ft.
Monaghan, *inland co.*, Ireland; mainly pastoral and agr.; a. 500 sq. m.; p. (1956) *52,013*.
Monaghan, *co. t.*, Monaghan, Ireland; on the Ulster Canal; cath.; p. (1951) *4,723*.
Monaro, *mtn. plateau*, N.S.W., Australia; a. 8,335 sq. m.
Monastir, *see* **Bitolj**.
Moncaleiri, *commune*, Piedmont, N.W. Italy; on R. Po; industl.; p. *21,181*.
Mönch or "**The Monk**", *mtn.*, Bernese Alps, Switzerland; alt. 13,468 ft.
Mönchen-Gladbach, *t.*, *Land*, North Rhine-Westphalia, Germany; 16 m. W. of Düsseldorf; rly. ctr., gen. indus.; p. (estd.) *110,600*.
Monchique, *t.*, Algeria, Portugal; spa; wine, oil, chestnuts; p. *10,000*.

Monclova, *t.*, N.E. Mexico; coffee; copper, silver, zinc, lead-mines; p. (1941) *7,181*.
Moncton, *t.*, N.B., Canada; rly. ctr., textiles; oil near by; p. (1956) *36,003*.
Mondego, *R.*, Portugal; length 130 m.
Mondoñedo, *t.*, Galicia, Spain; cath.; p. *10,750*.
Mondovi, *t.*, Cuneo, Italy; porcelain, paper, silk; p. *20,900*.
Monessen, *t.*, Penns., U.S.A.; steel, tinplate, wire; p. (1950) *17,896*.
Monfalcone, *commune*, N.E. Italy; chemicals, shipbldg., cotton mills; p. (1948) *19,634*
Monferrato, *low hills*, Piedmont, N. Italy; S. and S.E. of Turin between valleys of R. Po and R. Tanaro; celebrated vineyards, produce Asti Spumante wines; alt. never exceeds 1,500 ft.
Monforte, *t.*, Galicia, Spain; soap, linen; p. *13,200*.
Monghyr, *dist.*, Bihar, India; a. 3,927 sq. m.; agr., mica; p. *2,000,000*.
Mongol-Buryat, A.S.S.R., U.S.S.R.; E. of L. Baikal; cattle breeding.
Mongolia, *rep.*, N. of China; a. approx. 1,000,000 sq. m.; deserts, mtns., cattle, minerals; ch. t. Ulan Bator (Urga); p. (estd. 1958) *1,000,000*.
Monmouth, *co.*, Eng.; coal, iron, steel, agr.; a. 546 sq. m.; p. (1951) *424,647*.
Monmouth, *co. t.*, *mun. bor.*, Monmouth, Eng.; at confluence of Rs. Wye and Monnow; mkt. ctr.; tinplate, timber, crushed limestone, wrought ironwk.; p. (1951) *5,432*.
Monmouth, *t.*, Ill., U.S.A.; mnfs., coal; p. (1950) *10,193*.
Monnow, *R.*, Monmouth and Hereford, Eng.; trib. of R. Wye; length 28 m.
Monongahela, *R.*, W. Va., U.S.A.; joins Allegheny R. at Pittsburgh to form Ohio R.
Monongahela City, Penns., U.S.A.; mining, natural gas; p. (1950) *8,922*.
Monopoli, *spt.*, Apulia, Italy; oil, wine, fruit, flour tr.; p. *26,725*.
Monreale, *t.*, Sicily, Italy; cath.; fruit, almonds; p. *18,625*.
Monroe, *c.*, La., U.S.A.; cotton ctr., natural gas, paper, printing ink; p. (1950) *38,572*.
Monroe, *t.*, Mich., U.S.A.; paper, machin.; p. (1950) *21,467*.
Monroe, *t.*, N.C., U.S.A.; marble quarries; mftg.; p. (1950) *10,140*.
Monroe, *t.*, Wis., U.S.A.; tr. ctr. for agr. region; cheese; p. (1950) *7,037*.
Monrovia, *cap.*, *spt.*, Liberia, Africa; at mouth of R. St. Paul; exp. rubber, palm oil; p. *18,000*.
Mons, *t.*, Belgium; on R. Trouville; cath.; rly. junction; coal, cotton, rayon, iron, engin., glass mftg.; p. (estd. 1957) *26,049*.
Monselice, *t.*, Italy; mnfs.; p. *4,143*
Monserrat or Montserrat, *mtn.*, Spain; alt. 4,000 ft.
Monsummano, *t.*, Italy; N.W. of Florence; health resort; some mnfs.; p. *9,125*.
Montagnana, *t.*, Italy; p. *12,100*.
Mont Blanc, *mtn.*, Alps; on the confines of Italy and France; highest peak in Europe except the Caucasus; alt. 15,781 ft.
Mont Cenis Pass, W. Alps; on bdy. between France and Italy; approached from W. by Isére–Arc valleys, from E. by Dora Riparia; alt. 6,876 ft.
Mont Cenis Tunnel, W. Alps; on bdy. between France and Italy; carries main rly. from Lyons to Turin under Col de Fréjus; approached from W. by Isère–Arc valleys, from E. by Dora Riparia; opened 1871; length 7½ m.
Mont-d'Or, *mtns.*, France; highest peak, 6,188 ft.
Mont Genèvre, *mtn.*, Cottian Alps, France; alt. 6,100 ft.
Mont St. Michel, *I.*, N. France; tourist ctr.
Montalcino, *t.*, Italy; industl.; p. *9,925*.
Montana, *st.*, U.S.A.; cap. Helena; Rocky Mtns.; copper, silver, gold, lead; pastoral, agr.; a. 147,138 sq. m.; p. (1950) *501,024*.
Montargis, *t.*, Loiret, France; hosiery, chemicals, rubber; p. (1954) *15,117*.
Montauban, *t.*, Tarn-et-Garonne, France; on R. Tarn; cath.; silk, agr. produce, wines; p. (1954) *38,321*.
Montbéliard, *t.*, Doubs, France; S. of Belfort; watch, textiles, mnfs., agr. tr.; p. (1954) *17,023*.
Montceau-les-Mines, *t.*, Saône-et-Loire, France; coal, textiles, metal-working; p. (1954) *28,308*.
Montclair, *t.*, N.J., U.S.A.; residtl. suburb of New York; paper goods mnfs.; p. (1950) *43,927*.
Mont-de-Marsan, *t.*, Landes, France; p. (1954) *17,120*.
Monte Bello Is., *gr.*, off N.W. cst., Australia, about 85 m. N. of pt. of Onslow; first British atomic weapon exploded here 3 Oct. 1952.
Monte Carlo, *t.*, Monaco; tourist resort, casino; p. *11,000*.
Monte Corno, *mtn.*, Italy; in Central Apennines; alt. 9,583 ft.
Monte Gargano, *peninsula*, S. Italy; projects into Adriatic Sea nr. plain of Foggia; formed by limestone plateau, alt. over 3,000 ft.; pasture on upper slopes, woodland on lower slopes; a. approx. 400 sq. m.
Monte Maggiore, *t.*, Sicily, Italy; agr. interests; p. *5,575*.
Monte Perdu, *mtn.*, Pyrenees, Spain; alt. 10,997 ft.
Monte Rosa, *gr.*, Pennine Alps, on border of Italy and Switzerland; highest peak 15,203 ft.
Monte Rotondo, *highest mtn.*, Corsica; alt. 9,071 ft.
Monte Sant-Angelo, *t.*, Italy; pilgrim ctr.; p. *24,550*.
Monte Viso, *mtn.*, Cottian Alps, France; alt. 12,615 ft.
Montecatini, *t.*, Italy; nr. Volterra; saline mineral baths; p. *9,125*.
Montecristi, *t.*, W. Ecuador; Panama hats; copra mkt.; p. (1938) *8,614*.
Montefrio, *t.*, Spain; W. of Granada; cas.; alcohol, soap, cotton mnfs.; p. *12,000*.
Montégnée, *commune*, Liége prov., E. Belgium; mftg. sub. Liége; p. *10,555*.
Montego Bay, *spt.*, Jamaica; p. (1947) *11,547*.
Monteleone di Calabria, *t.*, Italy; cas.; p. *15,675*.
Montélimar, *t.*, Drôme, France; nr. R. Rhône; bricks, tiles, "nougat," coal-mining; p. (1954) *16,639*.
Montella, *t.*, Italy; mnfs.; p. *7,075*.
Montelupo, *t.*, Italy; on R. Arno; p. *7,550*.
Montenegro, *dist.*, Jugoslavia; former kingdom; agr., pastoral; cap. Cetinje; a. 13,837 sq. m.; p. (1948) *376,573*.
Montereau-faut-Yonne, *t.*, Seine-et-Marne, France; on R. Seine; agr. tools, footwear, brick mftg.; p. (1954) *10,119*.
Monterey, *c.*, Cal., S. of San Francisco; rich in historic tradition; resort of artists and writers; impt. Sardine indus., fruit, and veg. canneries; p. (1940) *10,084*.
Monterrey, *t.*, *cap.*, Nuevo León, Mexico; cath.; textiles, brewing, ironwks., minerals; p. (1950) *339,634*.
Montespertoli, *t.*, Italy; S.W. of Florence; mkt. t.; p. *11,850*.
Montevarchi, *t.*, Italy; on R. Arno; industl.; p. *15,300*.
Montevideo, *spt.*, *cap.*, Uruguay; on N. cst. of La Plata estuary; univ.; livestock prod. mnfs. and exp.; p. (estd. 1956) *922,885*.
Montezuma, *t.*, Ga., U.S.A.; mkt. for winter mkt. garden produce, cottonseed oil; p. (1950) *2,921*.
Montgomery, *co.*, N.E. Wales; cap. Montgomery; a. 797 sq. m.; p. (1951) *45,989*.
Montgomery, *co. t.*, *mun. bor.*, Montgomery, N.E. Wales; in upper Severn valley, 8 m. N.E. of Newtown; agr. mkt.; p. (1951) *904*.
Montgomery, *c.*, *cap.*, Ala., U.S.A.; cotton, timber, fertilisers; comm. ctr.; rly. wks.; p. (1950) *106,525*.
Montgomery, *t.*, W. Punjab, Pakistan; tr., livestock; leather, cotton; p. (1941) *28,345*.
Montichiari, *commune*, Lombardy, N. Italy; mftg.; p. *11,650*.
Montignies-sur-Sambre, *t.*, Belgium; coal, ironwks.; p. (1947) *25,000*.
Montigny-lès-Metz, *commune*, Moselle, France; residtl. sub. Metz; botanic gardens; p. (1954) *19,271*.
Montilla, *commune*, S. Spain; agr., wines; textiles, pottery, soap; p. *22,527*.
Montluçon, *t.*, Allier, France; on R. Cher; agr. ctr.; machin., cutlery, chemicals, mirrors; p. (1954) *48,743*.
Montmorency, *t.*, Seine-et-Oise, France; p. (1954) *14,094*.
Montoro, *c.*, S.W. Spain; on R. Guadalquivir; agr. prod., olive oil; p. *18,000*.
Montpellier, *t.*, cap. Hérault, France; univ., wines, fruit, silk, chemicals, agr.; p. (1954) *97,501*.
Montreal, *c.*, *spt.*, Quebec, Canada; at confluence of Ottawa and St. Lawrence Rs.; caths., univ.; rly. ctr.; brewing, tobacco, footwear, etc.; comm. ctr.; lgst. c. and spt. in Canada; p. (1956) *1,109,439*.

Montreuil-sous-Bois, *t.*, Seine, France; mnfs., fruit; p. (1954) *76,252*.
Montreux, *t.*, Switzerland; on L. Geneva; health resort; p. *19,000*.
Montrose, *spt.*, *burgh*, Angus, Scot.; on E. cst. at mouth of S. Esk R.; chemicals, and rope wks., linen, fisheries; p. (1951) *10,760*.
Montrouge, *t.*, Seine, France; paper, perfumes, precision tools; p. (1954) *36,298*.
Montserrat, *I.*, Leeward Is., T.W.I.; limes, fruits, carrots and onions; ch. t. Plymouth; a. 32 sq. m.; p. (1957) *14,377*.
Montville, *t.*, S.E. Conn., U.S.A.; paper, textiles; p. (1950) *4,766*.
Monza, *t.*, Lombardy, Italy; cath.; comm., textiles, leather, hats; p. (1948) *60,950*.
Moonta, *t.*, S. Australia; on E. side of Spencer's G., 70 m. S. of Pt. Pirie; once impt. copper-mines, now declining.
Moorea, *one of the ch. Is.*, the Society gr., Pac. Oc.; a. 50 sq. m.; p. (1946) *2,838*.
Moorfoot Hills, *range*, Peebles and Midlothian, Scot.; alt. 2,136 ft.
Moorhead, *t.*, W. Minn., U.S.A.; potatoes, dairying, poultry; p. (1950) *14,870*.
Moose R., Ontario, Canada; flows to James Bay.
Moosehead, *L.*, Me., U.S.A.; source of Kennebec R.; 35 m. long, 10 m. wide.
Moose Jaw, *c.*, Saskatchewan, Canada; rly. junction; agr. ctr.; agr. implements; p. (estd. 1957) *30,000*.
Moquegua, *dep.*, S. Peru; cotton, maize, fruit; cap. M.; a. 5,549 sq. m.; p. (1947) *40,311*.
Moquegua, *t.*, Peru; wines; p. *5,000*.
Mora, *t.*, Spain; industl.; p. *10,441*.
Morar, *c.*, Gwalior, Central India.
Moratalla, *t.*, Spain; N.W. of Murcia; cloth, alcohol, wines; p. *14,536*.
Moratuwa, *t.*, Ceylon; p. (1946) *50,700*.
Morava, *R.*, Czechoslovakia and Austria; trib. of R. Danube; length 212 m.
Morava, *R.*, Jugoslavia; rises in Crna Gora (S. of Dinaric Alps), flows N. into R. Danube 50 m. below Belgrade; valley used by trunk rly. from Belgrade to Thessaloniki (Salonika) and Athens, Sofia and Istanbul (Constantinople); length approx. 350 m.
Moravia, *old prov.*, Czechoslovakia; agr., forestry, coal, textiles; ch. t. Brno; a. 10,351 sq. m.; p. *3,135,180*.
Moravská Ostrava, *t.*, Czechoslovakia; coal and iron; chemicals, oil-refining; p. (1957) *199,206*
Moray, *co.*, N.E. Scot.; cereals, fisheries, distilling, woollens; co. burgh, Elgin; a. 482 sq. m.; p. (1951) *48,211*.
Moray Firth, *arm* of N. Sea; on Scottish E. cst., between Ross and Cromarty, and Nairn, Moray cos.
Morbihan, *dep.*, France; on Bay of Biscay; agr. (apples), mining, fishing; cap. Vannes; a. 2,739 sq. m.; p. (1954) *520,978*.
Morcenx, *t.*, Landes, France; p. (1954) *3,013*.
Mordov, A.S.S.R., U.S.S.R.; between Rs. Oka and Volga; agr.; a. 9,843 sq. m.; p. (1939) *1,248,282*.
Morea, *see* **Peloponnisos.**
Morecambe and Heysham, *t.*, *mun. bor.*, N. Lancs, Eng.; on S. shore of Morecambe Bay; Morecambe, holiday resort; Heysham, port for N. Ireland; p. (1951) *37,000*.
Moree, *t.*, N.S.W., Australia; in agr. and grazing region; mkt.; p. (1947) *4,361*.
Morelia, *c.*, *cap.*, Michostán, Mexico; cath.; textiles, sugar; p. (1950) *103,516*.
Morelos, *inland st.*, Mexico; mtns., forested; cap. Cuernavaca; a. 1,916 sq. m.; p. (1950) *272,803*.
Möre Og Romsdal, *dist.*, Norway; a. 5,812 sq. m.; p. (1950) *191,438*.
Moret-sur-Loing (Moret les Sablons), *t.*, 40 m. S. of Paris on picturesque R. Loing.
Morez, *t.*, S.E. Jura, France; precision instruments, optical equipment, winter sports; p. (1946) *5,020*.
Morgan, *t.*, *R. pt.*, S. Australia; on R. Murray, where it suddenly turns S. approx. 150 m. from its mouth; handles transhipment of Murray and Darling R. traffic to rail for despatch to Adelaide.
Morgantown, *t.*, W. Va., U.S.A.; coal, oil, gas fields; chemicals, heavy ind.; p. (1950) *25,525*.
Morioka, *c.*, N. Honshu, Japan; textiles, ironwks.; p. (1950) *117,578*.
Morlaix, *spt.*, Finistère, France; tobacco, paper, brewing, agr.; p. (1954) *15,037*.
Morley, *t.*, *mun. bor.*, W.R. Yorks, Eng.; 3 m. S.W. of Leeds; woollens, coal-mining, stone quarrying, tanning; p. (1951) *39,783*.
Morocco, *independent kingdom*, N.W. Africa; cap. Rabat; other chief ts. Casablanca, Marrakesh, Tangier (an integral part of the kingdom of Morocco) Fez, Meknès, Tetuan, Oujda, Safi, Port-Lyautey; agr., forest, and animal prod.; fruits; minerals, incl. phosphates, manganese, iron ore, lead and zinc; coal, petroleum; a. 180,000 sq. m., p. (estd. 1955) *10,000,000*.
Morogoro, *t.*, Tanganyika Terr., Brit. E. Africa; on E. edge of Central African plateau, alt. approx. 3,000 ft., 110 m. by rail W. of Dar-es-Salaam; ctr. of sisal- and cotton-growing a.
Morón de la Frontera, *commune*, S.W. Spain; old church; olives; iron ore; marble; p. *26,575*.
Morotai I., N. of Molucca, Indonesia.
Morpeth, *mun. bor.*, Northumberland, Eng.; nr. Newcastle; coal-mining, iron; p. (1951) *10,797*.
Morrinsville, *t.*, N.I. N.Z.; agr. ctr.; p. (1951) *2,820*.
Morriston, *vil.*, Glamorgan, S. Wales; on R. Tawe, 2 m. N.E. of Swansea; zinc smelting and refining steel.
Morristown, *t.*, N.J., U.S.A.; holiday ctr., fruit; p. (1950) *17,124*.
Morrisville, *bor.*, Penns., U.S.A.; on Delaware R.; rubber prod.; p. (1950) *6,787*.
Morro Velho, *mining dist.*, Minas Geraes, Brazil; in Serra do Espinhaço, 10 m. S. of Belo Horizonte; deep but rich gold-mines; ch. t. Nova Lima.
Mors, *I.*, N. Jutland, Denmark; a. 138 sq. m.; p. *26,186*.
Mortlake, *t.*, Surrey, Eng.; on R. Thames; residtl. sub. of London; cement, pottery.
Morven, *mtn.*, Aberdeen, Scot.; nr. Ballater; alt. 2,862 ft.
Morven, *mtn.*, Caithness, Scot.; nr. Berriedale; alt. 2,313 ft.
Moscow, *c.*, R.S.F.S.R.; *cap.*, U.S.S.R.; on R. Moskva; caths., univ., Kremlin, palaces; comm. ctr.; textiles, steel, engin., oil refining, chemicals; p. (estd. 1959) *5,032,000*.
Moscow Sea (Ucha Reservoir), *artificial L.*, R.S.F.S.R.; created behind dam on R. Volga at Ivankovo; supplies water to Moscow, maintains level on Moscow–Volga Canal, and supplies water to 8 hydro-elec. power-stas.; a. 127 sq. m.
Moscow–Volga Canal, R.S.F.S.R.; links R. Volga at Ivankovo with Khimki suburb of Moscow; forms part of Leningrad–Moscow inland waterway; opened 1937; length 80 m.
Moselle, *dep.*, N.E. France; cap. Metz; a. 2,403 sq. m.; p. (1954) *769,388*.
Moselle, *R.*, France and Germany; trib. of R. Rhine; length 328 m.; canalisation in progress (1957) between Thionville and Coblenz (168 m.).
Moshi, *t.*, Tanganyika Terr., Brit. E. Africa; on S.E. flank of Mt. Kilimanjaro; ctr. of coffee-growing dist. at alt. approx. 5,500 ft.; despatches coffee by rail to Tanga or Mombasa.
Moskva, *R.*, U.S.S.R.; trib. of R. Oka; length 249 m.
Moss, *spt.*, Norway; shipbldg., timber; p. (1946) *17,008*.
Mossamedes, *spt.*, Angola, Africa; exp. rubber; fishing, fertilisers; p. *8,977*.
Mossel Bay, *spt.*, C. Prov., S. Africa; oysters, whaling; p. *10,000*.
Mossend, *t.*, Lanark, Scot.; nr. Glasgow; iron and steel; p. *6,000*.
Mossgiel, *t.*, S.I., N.Z.; woollens; p. (1951) *3,133*.
Mossley, *mun. bor.*, Lancs, Eng.; 3 m. E. of Oldham; mkt. t., textiles, iron and steel; p. (1951) *10,415*.
Most, *t.*, Czechoslovakia; lignite, chemicals; p. (1957) *35,770*.
Mostaganem, *t.*, Algeria; vineyards, flour, leather; p. (1948) *53,464*.
Mostar, *t.*, Herzegovina, Jugoslavia; on R. Naretva; bauxite, lignite, aluminium plant; p. (1953) *31,680*.
Mosul, *t.*, Iraq; on R. Tigris; comm. ctr., impt. during crusades; agr. prod., livestock; p. (1956) *140,295*.
Motala, *t.*, on L. Vattern, Sweden; p. (1951) *24,723*

Motherwell and Wishaw, *burgh*, Lanark, Scot.: in Clyde valley, 15 m. S.E. of Glasgow; coal, iron, steel, machin., engin., silk, nylon; p. (1951) *68,137*.
Motovilikha, *c.*, W. U.S.S.R.; industl., sub. of Perm.; motors; p. (1939) *33,110*.
Motril, *spt.*, Spain; minerals, cotton, sugar, fruits; p. *18,000*.
Mottarone, Monte, *mtn.*, Italy, between L. Maggiore and L. Orta; alt. 4,892 ft.
Motueka, *t.*, S.I., N.Z.; fruit, tobacco; p. (1951) *2,469*.
Moulins, *t.*, cap. Allier, France; on R. Allier; cath., ruined château; timber wks., brewing; p. (1954) *24,437*.
Moulmein, *spt.*, Burma on R. Salween; rice, timber; p. (1955) *101,720*.
Moundsville, *c.*, W. Va., U.S.A.; on Ohio R.; coal, glass, zinc; p. (1950) *14,772*.
Mount Adams, *peak*, White Mtns., N.H., U.S.A.; alt. 5,679 ft.
Mount Carmel, *bor.*, Penns., U.S.A.; on Wabash R.; coal-mining, clothing mftg.; p. (1950) *14,222*.
Mount Clemens, *t.*, Mich., U.S.A.; on Clinton R.; mineral springs; p. (1950) *17,027*.
Mount Desert, *I.*, Me., U.S.A.; a. 100 sq. m.; mtns.; summer resort.
Mount Gambier, *t.*, S. Australia; pastoral, agr. ctr.; p. (1947) *6,787*.
Mount Holly, *t.*, N.J., U.S.A.; textiles, clothes, leather; p. (1950) *8,206*.
Mount Isa, *t.*, W. Queensland, Australia; in Selwyn Range 80 m. W. of Cloncurry, linked by rly. through Cloncurry to E. cst. at Townsville; silver–lead mines; p. (1957) *8,140*.
Mount Lofty Range, *mtn. range*, S. Australia; lies immediately E. of Adelaide approx. 5 m. from St. Vincent G.; forms barrier to routes leaving Adelaide N.E. and E.; lower slopes support vineyards and outer suburbs of Adelaide; rises to over 3,000 ft.
Mount Morgan, *t.*, Queensland, Australia; gold-mining; p. (1947) *3,799*.
Mount Morris, *t.*, N.Y., U.S.A.; p. (1950) *3,450*.
Mount Pleasant, *t.*, Mich., U.S.A.; oil, lumber, sugar-beet, dairy prod.; p. (1950) *11,393*.
Mount Vernon, *c.*, Ill., U.S.A.; timber, flour, woollens, coal; p. (1950) *15,600*.
Mount Vernon, *c.*, Ind., U.S.A.; on Ohio R.; rly. ctr.; p. (1950) *6,150*.
Mount Vernon, *c.*, N.Y., U.S.A., on Bronx R.; sub. of N.Y.; residtl.; p. (1950) *71,899*. Takes its name from George Washington's house on the Potomac, in Virginia, 15 m. S. of Washington, D.C.
Mount Vernon, *c.*, Ohio, U.S.A.; on Kokosing R.; timber goods, mnfs.; p. (1950) *12,185*.
Mountain Ash, *urb. dist.*, Glamorgan, Wales; in narrow valley 3 m. S.E. of Aberdare; coal; p. (1951) *31,528*.
Mountain Province, *prov.*, N. Luzon, Philippines; rice, metal working; a. 5,458 sq. m.; p. *296,874*.
Mountmellick, *t.*, Laoighis, Ireland; mkt., tanning, malting; p. (1951) *2,501*.
Mount's Bay, *inlet*, S. cst. Cornwall, Eng.; 20 m. wide; fishery grounds.
Mourne Mtns., Down, N. Ireland; highest peak, 2,796 ft.
Mouscron, *t.*, Belgium; cotton- and wool-weaving; p. (estd. 1957) *36,562*.
Mouse or Souris, *R.* Canada and U.S.A.; trib. of Assiniboine R.; length 500 m.
Moy, *R.*, Mayo and Sligo, Ireland; length 35 m.
Moyeuvre-Grande, *t.*, Moselle, France; p. (1954) *10,707*.
Mozambique, *Portuguese col.*, E. Africa; sugar, oil-nuts, cotton, maize; cap. Lourenço Marques; a. 297,731 sq. m.; p. (1950) *5,732,767*.
Mozambique Channel, *strait*, Indian Ocean; separates Madagascar from mainland of Africa; length 1,000 m., width from 250 to 600 m.
Mozambique Current, *ocean current*, flows N. to S. along E. cst. of Mozambique and Natal, E. Africa; relatively warm water.
Mozdok, *t.*, R.S.F.S.R.; on Rostov–Baku rly.; oil pipe-lines; p. *14,008*.
Mpwapwa (Mpapua), *t.*, Tanganyika Terr.; tr. ctr.; p. *1,000*.
Much Wenlock, *see* **Wenlock.**
Muck, *I.*, Inner Hebrides, Scot.; S. of Eigg.
Mudgee, *t.*, N.S.W., Australia; p. (1947) *4,169*.
Mühlhausen, *t.*, Thuringia, Germany; on R. Unstrut; textiles, machin., tobacco; p. (estd. 1954) *48,100*.
Muirkirk, *vil.*, Ayr, Scot.; coal-mining, iron; p. *4,358*.
Muizenberg, *t.*, S.W. Cape Prov., S. Africa; tourist resort; p. *10,000*.
Mukachevo (Munkács), *t.*, Ukrainian S.S.R.; pyrites; p. (estd.) *26,000*.
Mukden (Moukden), *see* **Shenyang.**
Mula, *t.*, Spain; tr. ctr.; p. *14,312*.
Mulde, *R.*, Germany; trib. of R. Elbe; length 130 m.
Mulhacén, *mtn.*, Sierra Nevada range, Spain; alt. 11,663 ft.
Mülheim-am-Rhein, suburb of Cologne.
Mülheim-an-der-Ruhr, *t.*, N. Rhine–Westphalia, Germany; on R. Ruhr; cas.; coal-mining, iron, steel, tobacco; airport; p. (estd. 1954) *161,900*.
Mulhouse, *t.*, Haut-Rhin, France; textiles, chemicals, machin.; p. (1954) *99,079*.
Mull, *I.*, Argyll, Scot., included in Hebrides; a. 357 sq. m.; granite, pastoral farming; ch. t. Tobermory.
Mull of Galloway, S. point of Wigtown, Scot.
Mullet, The, *peninsula*, W. cst. Mayo, Ireland.
Mullingar, *co. t.*, Westmeath, Ireland; on Brosna R.; mkt., agr. ctr., tanning; p. (1951) *5,643*.
Multan, *div.*, W. Punjab, Pakistan; ch. t., Multan; p. (estd. 1951) *8,340,000*.
Multan, *t.*, W. Punjab, Pakistan; on R. Chenab; carpets, silks, pottery; steel plant projected 1958; p. (1951) *190,122*.
Mumbles, *holiday resort*, residtl. dist., Glamorgan, S. Wales; within Swansea bor.; p. *10,000*.
Muncie, *t.*, Ind., U.S.A.; on White R.; iron, steel, glass and paper; p. (1950) *58,479*.
Munden, *t.*, Germany; on R. Weser; ruined cas.; timber, rubber, leather; p. *12,000*.
Munhall, *t.*, Penns., U.S.A.; p. (1950) *16,437*.
Munich (München), *c.*, cap. Bavaria, Germany; on R. Isar; univ., cath., palace, museum, "English Garden"; comm. ctr.; scientific instruments; machin., brewing, textiles, tobacco, chemicals, film studios; route ctr.; p. (estd. 1954) *906,500*.
Münster, *c.*, N. Rhine–Westphalia, Germany; cath., univ., cas.; leather, metal machin., rly. junction; p. (estd. 1954) *142,900*.
Munster, *prov.*, S.W. Ireland; includes cos. Waterford, Kerry, Cork, Limerick, Clare, Tipperary; a. 9,475 sq. m.; p. (1956) *876,620*.
Muonio, *R.*, part of boundary between Finland and Sweden; flows into G. of Bothnia.
Mur, *R.*, Austria; trib. of R. Drava; length 250 m.
Murchinson, *C.*, Hall Peninsula, Baffin I., Canada.
Murchison, *R.*, W. Australia; length 800 m.
Murchison, *peak*, Rocky Mtns., B.C., Canada; alt. 13,500 ft.
Murchison Falls, on Victoria Nile, Uganda.
Murcia, *prov.*, S.E. Spain; former kingdom; minerals, cereals, fruit; cap. Murcia; a. 4,369 sq. m.; p. (1950) *756,721*.
Murcia, *c.*, *cap.*, Murcia, Spain; on R. Segura; cath., univ.; silk, glass, hats, gloves; p. (1950) *218,375*.
Murfreesboro, *c.*, Tenn., U.S.A.; p. *9,495*.
Murg, *R.*, Germany; trib. of R. Rhine; length 40 m.
Murgab or Murghab, *R.*, Afghanistan; flows 250 m. to desert swamps.
Murmansk, *spt.*, R.S.F.S.R., U.S.S.R.; on Kola peninsula; ice-free throughout year; engin., elec. power; p. (1959) *226,000*.
Murom, *t.*, R.S.F.S.R.; mkt., textiles, engin.; p. (1959) *73,000*.
Muroran, *t.*, Hokkaido, Japan; on W. cst.; p. (1950) *110,443*.
Muros, *commune*, N.W. Spain; agr., flour, soap, textiles; fishing; p. *10,475*.
Murphysboro, *c.*, Ill., U.S.A.; on Bi Muddy R.; p. (1950) *9,241*.
Murray, *R.*, separates N.S.W. and Victoria, Australia; lgst. R. in continent, length 1,600 m.
Murray, R., *dist.*, N.E. Victoria, Australia.
Murray, *t.*, N. Utah, U.S.A.; sub. Salt Lake City; lead smelting; p. (1950) *9,006*.
Murrumbidgee, *R.*, N.S.W., Australia; trib. of R. Murray; length 1,350 m.
Murshidabad, *t.*, W. Bengal, India; silk, weaving.

ivory carving, gold and silver embroidery; p. (1941) *11,000*.
Murtoza, *t.*, Portugal; fishing ctr.; p. *8,570*.
Murviedro, *spt.*, Spain; on E. cst., N. of Valencia.
Murwillumbah, *t.*, N.S.W., Australia; dairying, fruit, timber.
Murzuk, *t.*, Libya, N. Africa; in Fezzan Oasis; tr. ctr.; p. *1,000*.
Mus, *t.*, Turkey; W. of L. Van in I. of same name; p. (1945) *82,518*.
Musa Jebel, *mtn.*, Egypt; alt. 7,375 ft.; identified with the Biblical Sinai.
Muscat and Oman, *sultanate*, Arabia; agr., fruit (dates); cap. Muscat; a. 82,000 sq. m.; p. *550,000*.
Muscat, *t.*, *cap.*, Muscat and Oman, Arabia; on S. cst. of G. of Oman; sm. tr.; pearl fisheries; p. *5,500*.
Muscatine, *c.*, Iowa, U.S.A.; on Mississippi R.; meat packing, timber ind.; p. (1950) *19,041*.
Muscle Shoals, *rapids*, in Tennessee R., U.S.A.; site of Wilson dam.
Musgrave Range, *mtns.*, on bdy. between S. Australia and N. Terr., Australia; isolated highland in ctr. of continent; arid; rise to over 3,000 ft.
Muskegon, *c.*, Mich., U.S.A.; engin., motor cars, accessories, aeroplane engines; p. (1950) *48,429*.
Muskingum, *R.*, Ohio, U.S.A.; trib. of Ohio R.; length 240 m.
Muskogee, *t.*, Okla., U.S.A.; rly. wks., oil refining, cotton, flour; p. (1950) *37,289*.
Musselburgh, *anc. burgh*, Midlothian, Scot.; on S. side of Firth of Forth at mouth of R. Esk; wire, cables, nets, twine; paper mkg.; golf course; hist. bldgs; now virtually sub. of Edinburgh; p. (1951) *17,012*.
Mussel Shell, *R.*, Mont., U.S.A., trib. of Missouri R.
Mussomeli, *t.*, Sicily; agr. interests; p. *12,500*.
Muttra or Mathura, *t.*, Uttar Pradesh, India; on R. Jumna; Hindu ctr.; p. (1941) *80,532*.
Muz Tagh, *mtn. pass*, Karakoram Mtns., E. Turkestan; alt. 18,980 ft.
Muzaffarpur, *t.*, Bihar, India; p. (1941) *54,009*.
Muzo, *mun.*, central Colombia; emerald-mining; p. (1947) *3,000*.
Mwanza, *t.*, N. Tanganyika, E. Africa; pt. on L. Victoria; rly. terminus; p. *6,000*.
Mweelrea, *mtn.*, Mayo, Ireland; alt. 2,688 ft.
Mweru, *L.*, between Belg. Congo and N. Rhodesia; a. 2,700 sq. m.
Myaungmya, *dist.*, Lower Burma; ch. t. Patanawa; p. *7,773*.
Mycenae, *ancient c.*, Greece; ruined.
Myerstown, *bor.*, Penns., U.S.A.; industl.; p. (1950) *3,050*.
Mykonos, *I.*, N. Cyclades, Greece; p. *4,188*.
Mymensingh, *t.*, Bengal, Pakistan; rice, jute; p. (1941) *52,950*.
Mynyddislwyn, *t.*, *urb. dist.*, Monmouth, Eng.; in narrow valley of W. Ebbw R., 7 m. N.W. of Newport; coal-mng., elec. goods, kerb- and flagstones; p. (1951) *14,418*.
Mynydd-Mawr, *mtn.*, N. Wales; alt. 2,293 ft.
Myslowice, *t.*, Poland; nr. Katowice; rly. junction, coal, flax mills, bricks; p. *24,000*.
Mysore, *st.*, S. India, comprising Karnataka and Coorg; coffee, gold, rice, cotton; cap. Bangalore; a. 74,326 sq. m.; p. (estd. 1957) *19,401,193*.
Mysore, *t.*, Mysore, India; univ.; carpets, comm. ctr.; p. (1951) *244,323*.
Mytho, *t.*, Viet-Nam, Indo-China; p. *7,010*.
Mytholmroyd, *t.*, W.R., Yorks, Eng.; worsteds; p. *4,500*.
Mytishchi, *t.*, R.S.F.S.R., 12 m. N.E. Moscow; p. (1959) *99,000*.
Mytilene (Lesbos), *I.*, Greece, in Aegean Sea; highest point 3,080 ft.; olives, figs, lemons, oranges, grapes; antimony and marbles; ch. t. Mytilene; a. 618 sq. m.; p. (1951) *154,683*.
Mytilene, *cap.*, *spt.*, M.I., Greece; p. (1951) *27,125*.
Mzombe, *R.*, Kenya; trib. of Ruaha R.; length 110 m.
Mzymta, *R.*, U.S.S.R.; flows to Black Sea; length 80 m.

N

Naab, *R.*, Bavaria, Germany; joins R. Danube nr. Ratisbon; length 90 m.
Naarden, *t.*, N. Holland, Neth.; nr. Amsterdam; destroyed by Spaniards 1572.
Naas, *mkt. t.*, *cap.*, Kildare, Ireland; former cap. Leinster; p. (1951) *3,731*.
Naband, *t.*, Persia; on Persian G., S. of Shiraz.
Nabeul, *t.*, Tunisia, N. Africa; winter resort; p. *15,000*.
Nabi Saleh, *I.*, forming part of st. of Bahrein, Arabia; about 2 m. in circumference.
Nablus, *c.*, Jordan; N. of Jerusalem; the ancient Shechem or Sychar, and later Neapolis; former cap. Samaria; soap mftg.; Jacob's Well and Mt. Gerizim adjacent; p. (1946) *24,660*.
Nabua, *t.*, Luzon; Philippines; mkt. for agr. produce.
Nachod, *t.*, Czechoslovakia; on R. Mettaj at entrance to Lewin Nachod Pass; Prussian victory over Austrians 1866; cotton spinning, dyeing; p. *13,876*.
Nacogdoches, *t.*, Texas, U.S.A.; lignite; mkt.; mftg.; p. (1950) *12,327*.
Nadiad, *t.*, Bombay, India; good tr.; p. (1941) *18,753*.
Naestved, *mkt. t.*, Zealand, Denmark; medieval t. hall; p. *15,104*.
Naga Hills, *dist.*, Assam, India; sparse p.; inhabited by a semi-wild race; a. 5,710 sq. m.
Nagano, *c.*, central Honshu, Japan; on R. Sinanogawa, 100 m. S.W. of Niigata; silk mftg.; p. (1950) *101,426*.
Nagaoka, *t.*, N.W. Honshu, Japan; lge. oil production ctr.; p. (1947) *38,274*.
Nagasaki, *c.*, *flourishing spt.*, Kyushu, Japan; engin., shipbldg., enamelled and lacquer ware; 2nd c. to be destroyed by atomic bomb in Second World War; since rebuilt; p. (1950) *241,638*.
Nagh Hamadi (Nag' Hammâdi), *t.*, Upper Egypt, N. Africa; on R. Nile 160 m. above Asyût; site of barrage (opened 1930) to regulate Nile flood and ensure irrigation of Girga prov.; barrage carries Cairo–Shellal rly. across Nile; junction for light rly. to Kharga Oasis.
Nagina, *t.*, Uttar Pradesh, India; sugar; p. (1941) *26,077*.
Nagoya, *t.*, Owari, Honshu, Japan; thriving cap., gr. tr., ch. ceramic ind. ctr., also cotton and silk factories; p. (1955) *1,336,779*.
Nagpur, *t.*, Madhya Pradesh, India; chiefly noted for its Hindu temples; salt, grain, cotton; p. (1951) *449,099*.
Nagy Banya, *mining t.*, Romania; gold, silver, lead.
Nagy Becskerek, *industl. t.*, Jugoslavia; on R. Bega.
Nagyenyed, *t.*, Transylvania, Romania; on R. Maros; wood carving, educational ctr., famous for wine in Middle Ages.
Nagykanizsa, *t.*, Hungary; distilling, milling; p. *30,794*.
Nagykikinda, *t.*, Torontál, Jugoslavia; flour and fruit ctr.
Nagykörös, *industl. t.*, Hungary; wine; p. *29,899*.
Naha, *spt.*, Ryuku Is., Japan; U.S.A. control; mkt., textiles; U.S.A. air base; p. (1950) *44,779*.
Nahe, *R.*, Germany, flows 69 m. to R. Rhine, nr. Bingen.
Nailsworth, *t.*, *urb. dist.*, Gloucester, Eng.; in Cotswold Hills, 4 m. S. of Stroud; woollens; p. (1951) *3,523*.
Nain, *settlement Moravian Brethren*, E. cst. Labrador.
Nairn, *mar. co.*, Scot., on Moray F. between Moray and Inverness; much moorland; farming, quarries, fishing; a. 200 sq. m.; p. (1951) *8,719*.
Nairn, *burgh*, Nairn, Scot.; on S. side of Moray Firth 13 m. N.E. of Inverness; resort, bricks, road metal, chips, kerbs; p. (1951) *4,700*.
Nairobi, *c.*, *cap.*, Kenya, E. Africa; 327 m. from Mombasa; Uganda Rly. ctr.; big-game shooting; p. (estd. 1957) *221,700*.
Naivasha, *L.*, Kenya; located on floor of Gr. African Rift Valley; alt. 6,000 ft.
Najibabad, *t.*, Uttar Pradesh, India; tr. in timber, sugar, metal mnfs.
Nakhichevan, *t.*, Azerbaydzhan, S.S.R.; founded by Armenian emigrants; flourishing tr., smelting, cottons, silks; p. *12,000*.
Nakhon Ratchasima, *t.*, Siam; copper mkt.; p. *12,000*.
Nakshov, *spt.*, Laaland I., Denmark; sugar refining; p. *15,505*.
Nalchik, *t.*, R.S.F.S.R.; N. Caucasus; p. (1959) *87,000*.
Namaland or Namaqualand, *region*, S.W. Africa; extends between Walvis Bay and the Orange R., reaching from Atlantic cst. to Kalahari Desert; semi-arid; a. 100,000 sq. m.; administered by Union of S. Africa; copper, diamonds.

Namangan, *industl. t.*, Uzbekistan, S.S.R.; on the Syr Daria; textiles; p. (1959) *122,000*.
Nambour, *t.*, Queensland, Australia; butter, sugar, bananas, pineapples, citrus fruit and timber prod.; p. (1947) *2,251*.
Nam Dinh, *impt. tr. t.*, Tongking, Viet-Nam, Indo-China; p. *25,000*.
Namoi, *R.*, in N.S.W., Australia; trib. of Darling R.; 270 m.
Nampula, *ch. t.*, Mozambique, Port. E. Africa; p. *5,000*.
Namsos, *spt.*, central Norway; on Folda Fjord lumber, fish canning; textiles; copper; p. (1946) *3,796*.
Namur, *prov.*, Belgium; bordering on France; collieries, iron ore, woodland; a. 1,413 sq. m.; p. (estd. 1957) *367,475*.
Namur, *fortfd. c.*, Belgium; at confluence of Meuse and Sambre Rs.; p. (estd. 1957) *32,848*.
Nanaimo, *t.*, B.C., Canada; coal, timber, brewing; p. (1941) *6,700*.
Nanao, *t.*, Honshu, Japan; p. (1947) *29,987*.
Nanchang, *c.*, Kiangsi, China; on Kan-Kiang; tea, rice, cotton; p. (estd. 1946) *205,101*.
Nancy, *ch. t.*, Meurthe-et-Moselle, France; old cap. Lorraine; gr. industl. activity, cottons, woollens, chemicals, embroidery; p. (1954) *124,797*.
Nanda Devi, *mtn.*, Tibet, nr. Indian frontier; alt. 25,645 ft.
Nander, *t.*, Hyderabad, India; on R. Godovari; muslins and tr. ctr.; p. (1941) *10,000*.
Nanga Parbat, *mtn.*, N.W. Kashmir, India, in W. Himalayas; alt. 26,660 ft.
Nanhai, *see* Fatshan.
Nanking, *gr. c.*, Kiangsu, China; on Yangtze-Kiang; cap. during Kuomintang régime, 1928–49; famous seat of learning; cotton cloth, silk, ink; contains tombs of founders of the Ming dynasty; p. (estd. 1952) *1,020,000*.
Nanling (Nanshan), *mtns.*, S. China; form divide between Rs. flowing N. to Yangtze-Kiang and S. to Si Kiang; crossed by historic Cheling and Meiling Passes; alt. mainly below 6,000 ft.
Nanning, *cap.*, *former treaty pt.*, Kwangsi, China; on the Yu-Kiang; ch. mkt. on S. frontier; p. (1931) *68,110*.
Nan Shan, *mtns.*, Central China; between Yangtze-Kiang basin and that of the Si Kiang.
Nanterre, *t.*, Seine, France; nr. Paris; noted for cakes; aluminium mftg.; p. (1954) *53,037*.
Nantes, *t.*, cap. Loire-Atlantique, France; on R. Loire; biscuit mftg., wood pulp, bell foundries, machine wks., chemicals, sugar, oil, textiles, stained glass, nursery gardens; p. (1954) *222,790*.
Nanticoke, *t.*, Penns., U.S.A.; on Susquehanna R.; anthracite, canning; p. (1950) *20,160*.
Nantucket, *I.*, Mass., U.S.A.; official W. end of trans-Atlantic sea-crossing; summer resort; p. (1950) *2,901*.
Nantung, *c.*, Kiangsu, China; on N. bank of Yangtze-Kiang estuary 20 m. N.W. of Hai-men; p. (estd. 1935) *133,326*.
Nantwich, *mkt. t.*, *urb. dist.*, Cheshire, Eng.; on R. Weaver, 3 m. S.W. of Crewe; brine baths, fox-hunting ctr.; clothing, food prodn.; p. (1951) *8,840*.
Nantyglo and Blaina, *urb. dist.*, Monmouth, Eng.; in narrow valley 2 m. N. of Abertillery; coal, iron, footwear, rubber prods.; p. (1951) *11,427*.
Nao, *C.*, E. cst. Spain; opposite Balearic Is.
Napier, *c.*, *cap.*, Hawke's Bay, N.I. N.Z.; fine esplanade, suffered great damage by earthquake 1931, rebuilt by 1933; exp. frozen meat; p. (estd. 1958) *28,800*.
Naples, (Napoli), *c.*, *spt.*, Campania, S. Italy; on Bay of N., at foot of Vesuvius, opposite site of ancient Pompeii; sanctuary of Madonna di Pompeii; grotto of Pozzuoli, Castel del Ovo, grand cath.; votive church of San Francesco di Paola; monastery of San Martino; subject to earthquakes and volcanic eruptions; impt. shipping; mnfs.; macaroni, vermicelli, wine, olive-oil, shipbldg.; p. (1951) *1,011,919*.
Napo, *R.*, Ecuador; trib. of Amazon; length 800 m.
Napoleon, *t.*, N.W. Ohio, U.S.A.; light mnfs.; p. (1950) *5,335*.
Nara, *t.*, Honshu, Japan; S. of Kyoto; shrines and temples, colossal image of Buddha; old cap. of Japan; p. (1947) *70,731*.
Narbada or Nerbudda, *R.*, India; flowing from Rewa to the G. of Cambay, in the Arabian Sea; length 800 m.
Narbeth, *mkt. t.*, *urb. dist.*, Pembroke, Wales; nr. head of Milford Haven; p. (1951) *1,053*.
Narbonne, *t.*, Aude, France; wines, sulphur, tiles; p. (1954) *32,060*.
Nardo, *t.*, Lecce, Italy; textiles; p. *20,558*.
Narenta, *R.*, Jugoslavia; flowing 140 m. to Adriatic.
Narew, *R.*, Poland; flows to R. Bug, nr. Warsaw; length 200 m.
Narino, *dep.*, Colombia, S. America; a. 11,545 sq. m.; cap. Pasto; p. (1947) *537,410*.
Narni, *t.*, Perugia, Italy; linoleum.
Narón, *t.*, N.W. Spain; nr. Corunna; p. *13,319*.
Narrabri, *t.*, N.S.W., Australia; S. of Moree; p. (1947) *3,328*.
Narragansett Bay, *inlet* of the Atlantic off cst. of Rhode I., U.S.A.
Narrandera, *t.*, New South Wales, Australia; on R. Murrumbidgee on N. margin of Riverina dist.; collecting ctr. for wool, mutton, wheat and fruits produced in irrigated a. fringing Murrumbidgee from Narrandera to Hay.
Narrogin, *t.*, W. Australia; p. (1957) *4,201*.
Narva, *t.*, Estonian S.S.R.; founded in 1223 by the Danes; cath.; textile factories, engin.; hydro-elec.; p. *24,444*.
Narvacan, *t.*, Luzon, Philippines; in fertile valley; cotton mnfs.
Narvik, *t.*, N.W. Norway; opposite Lofoten Is.; ice-free throughout year, linked by rly. to impt. iron-ore fields in N. Sweden; exp. iron ore; p. (1946) *10,233*.
Nashua, *c.*, N.H., U.S.A.; cotton, paper, carpets, ironwks.; p. (1950) *34,669*.
Nashville, *c.*, *cap.*, Tenn., U.S.A.; on Cumberland R.; fine capitol and other public bldgs.; gr. timber tr.; univs. and colleges; mnfs. flour, cotton, soap, farm implements; p. (1950) *174,307*.
Nasik, *t.*, Bombay, India; on R. Godavari; Hindu pilgrim ctr.; metal work, cotton weaving; p. (1951) *97,042*.
Nasirabad, *t.*, E. Bengal, Pakistan; on Brahmaputra R.
Naso, *t.*, nr. Messina, Sicily; industl.; p. *8,000*.
Nassau, *I.*, Cook Is., S. Pac. Oc.; New Zealand terr.; uninhabited.
Nassau, *t.*, cap. Bahamas, W. Indies; all impt. Is. of the Bahamas connected with N. by radio telegraphy; resort; pearls, sponges, fruit; p. (1943) *29,391*.
Nässjö, *t.*, S. Sweden; lumber, leather, light mnfs.; p. (1947) *11,422*.
Natal, *cap.*, Rio Grande do Norte, Brazil; rubber; p. (1947) *51,986*.
Natal, *prov.*, Union of S. Africa; sub-tropical coastal climate; prod.; sugar-cane, tea, cereals, mineral (especially coal); cap. Pietermaritzburg; a. (inc. Zululand) 35,284 sq. m.; p. (1951) *2,408,433* (inc. *274,468* Europeans).
Natanz, *prov.*, Persia; in hill country between Kashan and Isfahan; famous for pears and other fruit.
Natchez, *c.*, Miss., U.S.A; in rich cotton-growing dist.; p. (1950) *22,740*.
Natchitoches, *t.*, La., U.S.A.; on Red R.; p. (1950) *9,914*.
Natick, *t.*, Mass., U.S.A.; boots, shoes; p. (1950) *19,838*.
Natick, *t.*, R.I., U.S.A.; cotton, light mnfs.; p. *3,660*.
Naturaliste, C., N.E. Tasmania.
Naturaliste, C., S. of Geographe Bay, W. Australia.
Naucratis, *ancient c.*, between Cairo and Alexandria; excavated by Flinders Petrie and Gardiner.
Naugatuck, *industl. t.*, Conn., U.S.A.; mnfs. rubber, iron castings; p. (1950) *17,455*.
Naumburg, *c.*, Saxony–Anhalt, Germany; at confluence of Rs. Unstrut and Saale; annual Hussite feast; cath.; textiles, leather, toys, chemicals; p. (estd. 1954) *41,500*.
Nauplia, *see* **Navplion.**
Nauru, *I.*, S. Pac. Oc.; 26 m. S. of Equator; administered jointly by Gr. Britain, Australia and New Zealand; phosphate ind.; a. 8 sq. m.; p. (1957) *4,303*.
Nauta, *t.*, Peru; on confluence of Rs. Marañon and Ucayali.
Navan (An Uamh), Meath, Ireland.
Navanagar, *t.*, Bombay, India; on G. of Kutch; silk and gold embroidery; p. (1941) *42,000*.

Navarino or **Neocastro**, *spt.*, Greece; on W. cst. Morea; Turkish-Egyptian fleet destroyed in the harbour by allied English, French and Russians in 1827.

Navarra, *prov.*, *old kingdom*, N. Spain; bounded by the Pyrenees; cap. Pamplona; grain, fruits, olives, wines, cattle-rearing, copper, silver, lead; a. 4,055 sq. m.; p. (1950) *382,932*.

Navasota, *t.*, E. Texas, U.S.A.; mkt., cotton processing mills; p. (1950) *5,188*.

Navpaktos, *spt.*, Greece; at head of G. of Corinth; p. (1940) *4,100*.

Navplion, *t.*, Peloponnesos, Greece; on G. of Navplion; p. (1951) *8,456*.

Navsari, *t.*, S.W. Baroda, W. Indian Union; cotton, leather, metal-work; p. (1941) *24,397*.

Naxos, *I.*, Greece; lgst. of the Cyclades; a. 164 sq. m.; famous for wine and fruit.

Nayarit, *st.*, Mexico; a. 10,444 sq. m.; cap. Tepia; p. (1940) *216,698*.

Nazare, *t.*, Brazil; p. *13,482*.

Nazareth, *t.*, Israel; 21 m. S.E. Acre; associations with early life of Christ; p. (1946) *15,540*.

Naze, The, *c.*, S. point of Norway.

Nazilli, *t.*, S.W. Turkey; on R. Menderes; agr., esp. olives; p. (1945) *18,877*.

Ndola, *t.*, N. Rhodesia, Central Africa; nr. bdy. with Katanga prov., Belgian Congo, 110 m. by rail N. of Broken Hill; ctr. of rich copper-mining area, less important lead- and zinc-mining; minerals despatched by rail E. to Beira and W. to Lobito Bay.

Neagh, Lough, *L.*, N. Ireland; lgst. in British Is.; a. 153 sq. m.; drained by R. Bann.

Neath, *t.*, *mun. bor.*, Glamorgan, Wales; 6 m. up R. Neath from Swansea Bay; coal, iron, tinplate, steel and engineering; p. (1951) *32,305*.

Nebraska, *st.*, U.S.A.; mainly prairie; cap. Lincoln; farming, meat-packing, oats, wheat, maize, hay, potatoes, sugar-beet, apples, wool, livestock, petroleum, cement; a. 77,227 sq. m.; p. (1950) *1,325,510*.

Nebraska, *R.*, trib. of Missouri R., U.S.A.

Nebraska City, *t.*, S.E. Neb., U.S.A.; mkt. in agr. and cattle area; starch, canning; p. (1950) *6,872*.

Neckar, *R.*, Germany; rising between the Swabian Jura, nr. Schwenningen, and the Black Forest; through Württemberg-Baden to the Rhine at Mannheim; length 240 m.

Neder Rijn, *see* **Lek**.

Needham, *t.*, Mass., U.S.A.; nr. Boston; mnfs.; p. (1950) *16,313*.

Needham Market, *t.*, Suffolk, Eng.; on R. Gipping; p. *1,349*.

Needles, *gr. of rocks*, jutting out at W. extrem. I. of Wight, Eng.

Neenah, *c.*, Wis., U.S.A.; timber yards, flour and paper mills; summer resort; p. (1950) *12,437*.

Negapatam, *t.*, Madras, India; at mouth of R. Vettar; rly. terminus; cotton, tobacco, groundnuts; p. (1941) *52,937*.

Negev, *reg.*, S. Israel, pioneering area.

Negoiul, *mtn.*, Transylvanian Romania; 8,346 ft.

Negombo, *spt.*, *urb. dist.*, N.W. prov., Ceylon; native work in metal, leather; p. (1953) *38,591*.

Negotin, *t.*, E. Jugoslavia; on Romanian border; p. *6,633*.

Negril Beach, Jamaica; 25 m. W. of Montego Bay; new resort to further Jamaica's tourist tr.

Negri Sembilan, *st.*, Federation of Malaya; a. 2,580 sq. m.; cap. Seremban; p. (1957) *365,045*.

Negritos, *t.*, Piura dep., Peru; on cst., 15 m. S. of Talara; impt. oil-field.

Negro, Rio, *prov.*, Argentina; a. 77,610 sq. m.; cap. Viedma; p. (1947) *132,726*.

Negro Rio, *R.*, Argentina; flows into G. of St. Matias.

Negro, Rio, Brazil, Colombia, S. America; one of the ch. tribs. of R. Amazon; rises in Colombia, joins the Amazon in N. Brazil.

Negros, *I.*, Philippines; S. of Mindanao; a. 4,905 sq. m.; p. *1,250,000*.

Nehbandan Range, *mtns.*, E. Persia.

Neheim-Hüsten, *t.*, N. Rhine-Westphalia, Germany; at confluence of Rs. Möhne and Ruhr; lamps, metals and chemicals; p. (estd. 1954) *29,600*.

Neilston, *par.*, nr. Glasgow, Renfrew, Scot.; bleachfields, cotton, coal.

Neisse or **Nisa**, *R.*, tribs. of R. Oder, (1) Western Neisse, now frontier between Poland and Germany to Czechoslovak frontier, (2) Eastern Neisse in E. Silesia.

Neiva, *t.*, Colombia, S. America; on R. Magdalena; cattle, coffee; p. (1947) *15,096*.

Nejd, *dist.*, Central Arabia; with Hejaz, forms kingdom of Saudi Arabia; mainly desert; impt. oil wells, horses, camels, dates, various fruits; cap. Riyadh; p. *4,000,000* (estimated).

Nellore, *t.*, Madras, India; dyeing; rice; p. (1941) *56,315*.

Nelson, *mftg. t.*, *mun. bor.*, Lancs, Eng.; on N. flank of Rossendale 3 m. N.E. of Burnley; cotton, rayon, iron and brick wks., light engin.; p. (1951) *34,368*.

Nelson, *prov.*, S.I. N.Z.; cap. Nelson; a. 10,870 sq. m.; p. (estd. 1958) *72,700*.

Nelson, *c.*, S.I. N.Z.; nr. head of Tasman Bay; fruit packing, timber; cath.; p. (estd. 1958) *23,400*.

Nelson, *R.*, Canada; drains L. Winnipeg to Hudson Bay; length (with its gr. trib. the Saskatchewan) 1,450 m.

Nelsonville, *t.*, Ohio, U.S.A.; on R. Hocking; colliery region; p. (1950) *4,845*.

Nemours, *t.*, Seine-et-Marne, France; glass factories; p. (1946) *5,118*.

Nemunas, *R.*, U.S.S.R.; flowing to the Kurisches Haff, S.E. Kalinıngrad; length 50 m.

Nenagh, *mkt. t.*, *urb. dist.*, Tipperary, N. Riding, Ireland; p. (1951) *4,420*.

Nene, *R.*, Northants, Eng., rises nr. Naseby and flows 90 m. to the Wash, 3 m. N. of Sutton Bridge.

Neosho, *R.*, Kan., U.S.A.; trib. of Arkansas R., length 450 m.

Neosho, *t.*, S.W. Mo., U.S.A.; mkt., lumber, agr., lead-mining; p. (1950) *5,790*.

Nepal, *ind. kingdom*, Himalayas; bounded on N. by Tibet, on E. by Sikkim, on S. and W. by India. exp. cattle, hides and skins, opium and other drugs; cap. Katmandu; a. 54,362 sq. m.; p. (estd. 1958) *8,473,478*.

Nephin, *mtn.*, Mayo, Ireland; alt. 2,646 ft.

Nerbudda, *see* **Narbada**.

Nerchinsk, *t.*, R.S.F.S.R.; on Nertcha R.; p. *6,350*

Nerchinski Zavod, *t.*, Chita Reg., R.S.F.S.R.; rich mineral deposits, little developed; p. *3,153*.

Ness, Loch, *L.*, Inverness, Scot.; occupies N.E. end of Glenmore; forms link in Caledonian Canal; very deep; 22½ m. long.

Neston, *t.*, *urb. dist.*, Cheshire, Eng.; on N. side of Dee estuary; residtl.; p. (1951) *9,727*.

Nestas, *R.*, *see* **Mesta**.

Nesvizh, *t.*, W. Byelorussia, U.S.S.R.; p. *10,000*.

Netherlands, *kingdom*, W. Europe; divided into 11 provinces; bounded by the N. Sea, Germany, and Belgium; ch. cs.: Amsterdam (cap.), Rotterdam (ch. pt.), The Hague (seat of Government), Utrecht, Haarlem, Groningen; country low-lying, cst. protected by dykes; fertile and productive; agr., butter- and cheese-mkg., mkt. gardening, distilling and various mnfs., shipbldg., machin., tobacco, sugar, diamond-cutting, commerce; a. 12,868 sq. m.; p. (estd. 1957) *11,094,736*

Netherlands Antilles (Curaçao), grs. of Is., Caribbean Sea; off N. cst. of Venezuela; consist of the Neth. Windward Is. and the Neth. Leeward Is.; a. 403 sq. m.; cap. Willemstad; p. (1957) *190,916*.

Netze, *see* **Notec**.

Neuchâtel, *can.*, Switzerland; mountainous dist., Jura Mtns.; cattle, cheese, chocolate, watches, cutlery, cottons, hosiery; a. 309 sq. m.; p. (1950) *128,152*.

Neuchâtel, *t.*, *cap.*, Neuchâtel, Switzerland; on N.W. shore of Lake N.; watchmkg., jewellery, condensed milk; p. (1941) *23,799*.

Neuchâtel, *L.*, Switzerland; at S.E. foot of Jura Mtns. at the W. end of the central Swiss plateau; drains N.E. to R. Aar; length 36 m., width 3–5 m.

Neufchâteau, *t.*, Vosges, France; nr. R. Meuse; p. (1946) *4,059*.

Neugersdorf, *t.*, Saxony, Germany; ironwks., textiles; p. *11,165*.

Neuhaldensleben, *t.*, Saxony, Germany; light mnfs., gloves; p. *10,882*.

Neuhausen, *commune*, N. Switzerland; aluminium wks.; p. (1941) *6,355*.

Neuilly-sur-Seine, *sub.*, W. of Paris, France; fine bridge and cas.; p. (1954) *66,095*.

Neumünster, *t.*, Schleswig-Holstein, Germany;

N. of Hamburg; tanning, cloth, machin., chemicals; p. (estd. 1954) *74,200*.
Neunkirchen, *t.*, Saar, Germany; iron, coal; p. *40,000*.
Neuquén, *terr.*, Argentina; agr. and stock-raising; a. 37,245 sq. m.; cap. Neuquén; p. (estd. 1958) *119,100*.
Neu-Ruppin, *t.*, Brandenburg, Germany; on L. Ruppin; fire extinguishers, chemicals; p. (estd. 1954) *29,100*.
Neusalz, *see* **Nowa Sól**.
Neusandetz, *see* **Nowy Sacz**.
Neusatz (Novi Sad), *t.*, Jugoslavia; on R. Danube; formerly a royal free c.; almost destroyed by the Austrians in 1849; literary and comm. ctr.; coal; p. (1953) *83,223*.
Neuse, *R.*, N.C., U.S.A.; flows to Pamlico Sound; length 300 m.
Neuss, *c.*, N. Rhine-Westphalia, Germany; mnfs. iron goods, textiles, paper; rly. junction; p. (estd. 1954) *67,300*.
Neustadt, *see* **Wiener-Neustadt**.
Neustadt, *t.*, Rhineland-Palatinate, Germany; on R. Haardt; metal, paper, textiles; p. (estd. 1954) *28,900*.
Neustrelitz, *t.*, Mecklenburg, Germany; machin.; p. (estd. 1954) *25,900*.
Neutitischeim, *see* **Novy Jičin**.
Neutra, *see* **Nitra**.
Neuwied, *t.*, Rhineland-Palatinate, Germany; on R. Rhine; cas.; ironwk., wood, pumice stone; p. (estd. 1954) *25,600*.
Neva, *R.*, R.S.F.S.R.; drains L. Ladoga S.W. via Leningrad to G. of Finland; 40 m. long.
Nevada, *mtn. st.*, U.S.A.; between Utah, Oregon and Idaho, and bounded S. and W. by California; mining: gold, silver, copper, tungsten, gypsum, iron, lead; livestock, agr., timber; tourism; cap. Carson City; a. 110,540 sq. m.; p. (1950) *160,083*.
Nevada, *c.*, Mo., U.S.A.; zinc-mining and smelting; p. (1950) *8,009*.
Nevers, *c.*, cap. Nièvre, France; on R. Loire; cath.; the Roman Noviodunum; porcelain and faience industry; iron goods; farm implements; aircraft; p. (1954) *35,183*
Neves, *t.*, S. E. Brazil; sugar, coffee; p. (1947) *34,603*.
Nevis, *I.*, Leeward Is., T.W.I.; ch. prod. cotton; ch. t. Charlestown; a. 50 sq. m.; p. *11,383*.
Nevis, Loch, *arm of sea*, off cst. of Inverness, Scot.; 14 m. long.
New Albany, *c.*, Ind., U.S.A.; on R. Ohio; glass, furniture, leather, iron and steel, car bodies; p. (1950) *29,346*.
New Amsted, *t.*, Neth.; nr. Amsterdam; mnfs.; p. (1948) *21,892*.
New Amsterdam, *t.*, Brit. Guiana; on Berbice R.; [p. *9,578*.
New Amsterdam, *t.*, Manhattan I., U.S.A., taken by English from Dutch, 1664, and renamed New York.
New Antwerp, *t.*, on Congo R., Belg. Congo.
New Bedford, *c.*, *spt.*, Mass., U.S.A.; on estuary of R. Acushnet; whale-fishery ctr.; mnfs. cottons, cordage, glass, shoes; p. (1950) *109,189*.
New Bern, N.C., U.S.A.; tr. in timber, tobacco, cotton; p. (1950) *15,812*.
New Braunfels, *c.*, Texas, U.S.A.; cotton goods, leather; lime; beauty spot; p. (1950) *12,210*.
New Brighton, *t.*, Cheshire, Eng.; at entrance to Mersey estuary; residtl.; resort.
New Brighton, *t.*, N.Y., U.S.A., on Staten Is.; warehouses and factories.
New Brighton, *bor.*, Penns., U.S.A.; coal-mining; p. (1950) *9,535*.
New Brighton, *t.*, S.I., *seaside resort*, nr. Christchurch, New Zealand.
New Britain, *lgst. I.*, Bismarck Archipelago, Papua-New Guinea; a. (with adjacent Is.) 14,600 sq. m.; p. (1957) *100,375* (inc. approx. *3,856* non-indigenous).
New Britain, *c.*, Conn., U.S.A.; iron and brass mnfs.; p. (1950) *73,726*.
New Brunswick, *prov.*, Dominion of Canada; largely forest-clad, mtns., with many Ls.; farming, lumbering, fishing, canning, coal, gypsum, natural gas; cap. Fredericton; a. 27,985 sq. m.; p. (1956) *554,616*.
New Brunswick, *c.*, N.J., U.S.A.; on Raritan R.; chemicals, motor lorries, motor parts, leather, hosiery and hardware; p. (1950) *38,811*.
New Caledonia, *I.*, *Fr. Col.*, S. Pacific; coffee copra, chrome ore, nickel, iron, manganese; cap. Nouméa; a. 8,548 sq. m.; p. (1957) *72,478*.
New Castle, *former prov.*, Spain.
New Castle, *t.*, Del., U.S.A.; p. (1950) *5,396*.
New Castle, *t.*, Ind., U.S.A.; steel mnfs., motor parts; p. (1950) *18,271*.
New Castle, *t.*, Penns., U.S.A.; tinplate, glass, steel wire, iron, coal; p. (1950) *48,834*.
New Cumberland, *bor.*, Penns., U.S.A.; tobacco, clothes; p. (1950) *6,204*.
New Cumnock, *par.*, Ayr, Scot.; coal.
New Dongola or **Maraka**, *t.*, Nubia, Sudan; on R. Nile, Africa; p. *10,000*.
New England, the six N.E. Atl. Sts. of U.S.A.
New Forest, *woodland region*, Hants, Eng.; a. 93,000 acres; ch. t. Lyndhurst; Brockenhurst and Beaulieu (with ruined abbey) are villages of note.
New Forest, *rural dist.*, Hants, Eng.; p. (1951) *44,956*.
New Galloway, *burgh*, Kirkcudbright, Scot.; on R. Dee, 12 m. N.W. of Castle Douglas; p. (1951) *305*.
New Glasgow, *spt.*, Nova Scotia, Canada; p. (1956) *9,998*.
New Granada, former name of the United States of Colombia, S. America.
New Guinea (Australian), *see* **Papua-New Guinea**.
New Guinea, Netherlands. W. part of the I. of New Guinea; provisionally adm. by the Neth.; a. (inc. Ternate), 115,861 sq. m.; p. (estd. 1954) *775,000*.
New Hampshire, *st.*, New England, U.S.A., touching the Canadian border; forested and mountainous; agr. and fruit-growing extensively pursued; paper and forest products, textiles; cap. Concord; ch. spt. Portsmouth; principal mftg. ctr. Manchester; a. 9,304 sq. m.; p. (1950) *533,242*.
New Haven, *c.*, *pt.*, Conn., U.S.A.; on New Haven Harbour, inlet of Long I. Sound; Yale Univ.; firearms, clocks, tools, paper; meat-packing; p. (1950) *164,443*.
New Hebrides Condominium, *I.*, Pac. Oc.; roughly 500 m. W. of Fiji and 250 m. N.E. of New Caledonia; administered jointly by France and Britain; 3 active volcanoes, on Tanna, Ambrym and Lopevi; earth tremors frequent; copra, cotton, cocoa; a. 5,700 sq. m.; p. (1957) *49,304*.
New Holland, *ferry, rly. sta.*, on R. Humber, Lincoln, Eng.
New Hunstanton, *t.*, *urb. dist.*, Norfolk, Eng.; on S.E. cst. of The Wash, 15 m. N.E. of King's Lynn; resort; p. (1951) *3,414*.
New Iberia, *t.*, La., U.S.A.; sugar, cotton and rice-growing; timber tr.; p. (1950) *16,467*.
New Ireland, *I.*, Bismarck Archipelago, Papua-New Guinea; a. (with adjacent Is.) 3,800 sq. m.; p. (1957) *36,512* (native), (1954) *713* (non-indigenous).
New Jersey, *Atlantic st.*, U.S.A.; adjoining New York; mixed farming, petroleum-refining, smelting, chemicals, sanitary ware, motor vehicles, paints, shipbldg.; glass sand, zinc, iron ore, clay; cap. Trenton; ch. cs.; Newark and Jersey City; a. 7,836 sq. m.; p. (1950) *4,835,329*.
New Kensington, *t.*, Penns., U.S.A.; p. (1950) *25,146*.
New Lexington, *t.*, Ohio, U.S.A.; coal, oil and natural gas; p. (1950) *4,233*.
New London, *c.*, Conn., U.S.A.; at mouth of R. Thames; fine harbour; silk and woollen factories; p. (1950) *30,551*.
New Mexico, *st.*, U.S.A.; N. of the Mexican Rep., and S. of Colorado st.; traversed by the Rocky Mtns.; uranium, potash salts, pumice, beryllium, copper, petroleum; agr.: cereals, fruit, vegetables, cotton, livestock; cap. Santa Fé; a. 121,666 sq. m.; p. (1950) *681,187* (chiefly of Mexican descent).
New Milford, *t.*, Milford Haven, Pembroke, Wales.
New Milford, *t.*, N.W. Conn., U.S.A.; dairy prods., tobacco, foundries, textiles, chemicals; p. (1950) *2,673*.
New Mills, *industl. t.*, *urb. dist.*, Derby, Eng.; at W. foot of Pennines 6 m. S.E. of Stockport; textile printing, bleaching and dyeing, rayon, paper, emery and glass-cloth mftg., iron and brass mnfs.; p. (1951) *8,473*.
New Norfolk, *t.*, Tasmania, Australia; fruit-growing; p. (1947) *7,921*.
New Orleans, *c.*, *spt.*, La., U.S.A.; on delta of Mississippi R.; the gr. cotton mart of America, and a busy comm. and mftg. ctr.; p. (1950) *570,445*.

New Philadelphia, *c.*, Ohio, U.S.A.; impt. rly. and canal ctr.; p. (1950) *12,948*.

New Plymouth, *spt., cap.*, Taranaki, N.I., N.Z.; on W. cst. at N. foot of Mt. Egmont; ctr. of dairy-farming dist.; p. (estd. 1958) *29,600*.

New Providence, *I.*, Bahama Is., W. Indies; contains cap., Nassau; p. (1953) *46,125*.

New Quay, *t., urb. dist.*, Cardigan, Wales; on cst. of Cardigan Bay, 18 m. S.W. of Aberystwyth; p. (1951) *1,093*.

New Radnor, *rural dist., co. t.*, Radnor, Wales; on slope of Radnor Forest, 6 m. S.W. of Presteign; p. (of dist.) (1951) *2,255*.

New River, *artificial aqueduct*, Herts to Islington, London, Eng.; length 36 m.

New Rochelle, *c.*, N.Y., U.S.A.; on Long I. Sound; residtl.; p. (1950) *59,725*.

New Romney, *t., mun. bor.*, Kent, Eng.; nr. S. cst. to E. of Dungeness; one of the Cinque Ports, in the rich agr. dist. Romney Marsh; old harbour silted up by shingle, and now a mile from sea; p. (1951) *2,356*.

New Ross, *mkt. t., urb. dist.*, Wexford, Ireland; brewing and malting; p. (1951) *4,903*.

New Siberian Is., off Arctic cst., U.S.S.R.

New South Wales, *st.*, S.E. Australia; much mineral wealth in tablelands and mtns.; silver, lead, coal, zinc, iron and steel; agr., corn, potatoes, fruit-growing, sheep, wool, cattle, meat; a. 309,433 sq. m. (exclusive of Australian Capital Terr. of Canberra); p. (estd. 1958) *3,680,397*.

New Waterway (Nieuwe Waterweg), *ship canal*, S. Holland, Neth.; connects R. Lek 7 m. below Rotterdam with N. Sea cst. at Hook of Holland; length 11 m.

New Westminster, *t.*, B.C., Canada; at mouth of R. Fraser; former cap. col.; exp. timber, canned salmon; p. (estd. 1958) *31,665*.

New York, *st.*, U.S.A.; one of the original sts.; touching Canada on the N., and reaching the Atlantic on the S.; known as the "Empire State"; inc. Long I. and Staten I.; mixed agr., Portland cement, iron ore, stone, sand and gravel, zinc, petroleum, gypsum, titanium concentrate, steel; Albany is the State cap. a. 49,576 sq. m.; p. (1950) *14,830,192*.

New York, *c., spt.*, N.Y., U.S.A.; world's lgst. c. and pt.; ch. comm. ctr. of U.S.A. and W. Hemisphere; originally founded by Dutch settlers as New Amsterdam on Manhattan I.; gr. portion situated on Long I.; fine parks and bridges, skyscrapers, gd. harbour; ch. inds.; cloth textiles, printing and publishing, iron and steel work, machin., sugar-refining, meat packing; p. (1957) *7,795,471*.

New York State Barge Canal (Erie Canal), N.Y. st., U.S.A.; links Tonawanda on Niagara R. with Hudson R. via the Mohawk gap through Appalachian Mtns.; provides through water route from N.Y. to Gr. Lakes; opened as Erie Canal 1825, improved 1918; length 339 m. (with branches 525 m.), depth 12 ft.

New Zealand, *Brit. Dominion*, S. Pac. Oc.; E. of S.E. Australia and Tasmania, just over 1,200 m. from Sydney, N.S.W.; it consists of two main Is., N.I. and S.I. (a. 102,375 sq. m.), Stewart I. (670 sq. m.), Chatham Is. (372 sq. m.), Cook I. and several smaller Is.; the Is. are mountainous and contain numerous Ls., thermal springs and geysers; the scenery being varied and beautiful, and the climate generally healthy; there are active and dormant volcanoes in N.I.; cap. Wellington; principal exp.; wool, butter, frozen meat, cheese, hides, skins and pelts; p. (1959) *2,350,250*, inc. *155,546* Maoris.

Newark, *t.*, Del., U.S.A.; univ.; p. (1950) *6,731*.

Newark, *mkt. t., mun. bor.*, Notts, Eng.; on R. Trent 17 m. N.E. of Nottingham; engin., brewing, chemicals, etc.; p. (1951) *22,909*.

Newark, *c.*, N.J., U.S.A; fine flourishing mnfs., inc. chemicals, leather, jewellery; p. (1950) *438,776*.

Newark, *c.*, Ohio, U.S.A.; on R. Licking; rly. carriage wks. and other mnfs.; p. (1950) *34,275*.

Newark, *t.*, N.Y., U.S.A.; horticulture, glass, light mnfs.; p. (1950) *10,295*.

Newberry, *t.*, S.C., U.S.A.; cotton prod., dairying; lumbering; p. (1950) *7,546*.

Newbiggin-by-the-Sea, *t., urb. dist.*, on E. cst., 4 m. N. of Blyth; sm. seaside resort; coal-mining; Northumberland; Eng.; p. (1951) *9,727*.

Newbridge, *see* **Droichead Nua.**

Newburgh, *burgh*, Fife, Scot.; on S. side of Firth of Tay, 8 m. E. of Perth; p. (1951) *2,367*.

Newburgh, *c.*, N.Y., U.S.A.; on Hudson R.; clothing and machin. mftg.; p. (1950) *31,956*.

Newburn, *t., urb. dist.*, Northumberland, on R. Tyne, 3 m. W. of Newcastle; Eng.; pure graphite for nuclear reactors; p. (1951) *21,940*.

Newbury, *mkt. t., mun. bor.*, Berks, Eng.; on R. Kenney, 19 m. S.W. of Reading; malting, impt. wool mkt.; p. (1951) *17,772*.

Newburyport, *c., spt.*, Mass., U.S.A.; on Merrimac R.; boot and shoe factories, comm. and fisheries; p. (1950) *14,111*.

Newcastle, *spt., urb. dist.*, on Dundrum Bay; Down, N. Ireland; p. (1951) *3,076*.

Newcastle, *t.*, W. Natal, S. Africa; coal, iron, steel, wood, grain, hemp; p. *11,700*.

Newcastle, Greater, *c.*, N.S.W., Australia; at mouth of R. Hunter; 2nd c. of st.; gr. coal depot of S. hemisphere and leading provincial industl. ctr. of Commonwealth; iron and steel, engin., shipbldg.; p. (1958) *192,940*.

Newcastle Emlyn, *urb. dist.*, Carmarthen, Wales; on R. Teifi; p. (1951) *763*.

Newcastle-under-Lyme, *t., mun. bor.*, Staffs, Eng.; 2 m. W. of Stoke-on-Trent, on Lyme Brook; iron and steel, mining and quarrying, textiles and non-ferrous metals, bricks, tiles; p. (1951) *70,028*.

Newcastle-upon-Tyne, *c., spt., co. bor.*, Northumberland, Eng.; on N. bank of R. Tyne, 10 m. from the N. Sea; connected by bridges with Gateshead, Durham; great shipbldg. and colly. pt.; cath., many fine public bldgs.; coal-mining, heavy engin., iron and steel, heavy chemicals; p. (1951) *291,723*.

Newchwang (Yingkow), *c., spt.*, Manchuria, China; at head of G. of Chihli; cottons, soap, hosiery, glass; p. (estd. 1936) *106,040*.

Newcomerstown, *t.*, E. Ohio, U.S.A.; coal, steel, tinplate, bricks; p. (1950) *4,514*.

Newent, *mkt. t., rural dist.*, Gloucester, Eng.; 8 m. S. of Ledbury; p. (rural dist. 1951) *8,336*.

Newfoundland, *I.*, prov. Canada; E. of the G. of St. Lawrence; oldest Brit. col. in N. America; in E. low, in W. rugged mtns., many Ls.; coniferous forest; fishing, cod, salmon, halibut, lobster, seal; lumber, wood-pulp, paper; iron deposits; agr. and mining are being extensively developed; climate is severe; cap. St. John's; a. 42,734 sq. m.; p. (1956) *415,074*.

Newhaven, *spt., urb. dist.*, E. Sussex, Eng.; on S. cst. at mouth of R. Ouse, 9 m. E. of Brighton; the passenger pt. for Dieppe; boat bldg. and light inds.; p. (1951) *7,785*.

Newington, *dist.*, London, Eng.; S. of Southwark.

Newlyn, *picturesque vil.*, Cornwall, Eng.; on Mount's Bay, 1 m. W. of Penzance; fishing and fish canning; p. *3,902*.

Newmarket, *t., rural dist.*, Suffolk, Eng.; at foot of E. Anglian Heights, 11 m. N.E. of Cambridge; horse-racing ctr.; famous Heath (partly in Cambridgeshire); mkt. gardening, agr. and agr. engin.; p. (rural dist. 1951) *20,219*.

Newmarket, *t.*, S.E. Ont., Canada; leather mnfs.; p. *4,026*.

Newmilns and Greenholm, *burgh*, Ayr, Scot.; on R. Irvine, 12 m. E. of Kilmarnock; muslin and lace curtain mnf.; p. (1951) *4,043*.

Newport, *t., mun. bor., cap. of I.*, I. of Wight, Eng.; on R. Medina, in gap through central Chalk ridge; mkt.; brewing, joinery and coach wks., bait mnfs.; p. (1951) *20,426*.

Newport, *t., co. bor.*, Monmouth, Eng.; on R. Usk, 5 m. from its mouth; shipbldg., engin., iron and steel, aluminium, coal, paper-board, confectionery; p. (1951) *105,285*.

Newport, *mkt. t., urb. dist.*, Salop, Eng.; 8 m. N.E. of Wellington; p. (1951) *3,744*.

Newport, *burgh*, Fife, Scot.; on S. side of Firth of Tay, opp. Dundee; p. (1951) *3,273*.

Newport, *c.*, Ky., U.S.A.; on Ohio R.; a. residtl. sub. of Cincinnati, with impt. local inds.; p. (1950) *31,044*.

Newport, *c.*, R.I., U.S.A.; on Narragansett Bay; fashionable seaside resort; permanent p. (1950) *37,564*.

Newport News, *c., spt.*, Va., U.S.A.; on north shore of estuary of James R. on Hampton Roads; lge. harbour; shipbldg.; outlet for Virginian tobacco and Appalachian coal; p. (1950) *42,358*.

Newport Pagnell, *mkt. t., urb. dist.*, Bucks, Eng.;

on R. Ouse, 11 m. S.W. of Bedford; p. (1951) *4,366*.
Newquay, *t., urb. dist.*, Cornwall, Eng.; on N. Cornish cst.; seaside resort; p. (1951) *9,928*.
Newry, *t., urb. dist.*, Down, N. Ireland; at head of Carlingford Lough; machin., rope, brewing, granite; p. (1951) *13,264*.
Newton, *c.*, Kan., U.S.A.; silks, worsted; p. (1950) *11,590*.
Newton, *c.*, Mass., U.S.A.; on R. Charles; mnfs.; p. (1950) *81,994*.
Newton Abbot, *mkt. t., urb. dist.*, Devon, Eng.; at head of Teign estuary; rly. junction; pottery, lt. engin.; p. (1951) *16,393*.
Newton-le-Willows, *t., urb. dist.*, Lancs, Eng.; wagon repair and locomotive wks., paper, textiles; p. (1951) *21,862*.
Newton-Stewart, *burgh*, Wigtown, Scot.; on R. Cree, 5 m. N. of Wigtown; wool, creameries and agr. inds.; p. (1951) *2,000*.
Newtown, *c.*, N.S.W., Australia; S. sub. Sydney; ironwks., paint; p. (1947) *25,293*.
Newtown and Llanllwchaiarn, *mkt. t., urb. dist.*, Montgomery, Wales; on R. Severn, 8 m. S.W. of Montgomery; precision instruments, machin. tools; p. (1951) *5,427*.
Newtownards, *spt., mkt. industl. t., mun. bor.*, Down, N. Ireland; 7 m. E. of Belfast; muslin, linen; p. (1951) *12,237*.
Neyland, *t., urb. dist.*, Pembroke, Wales; on Milford Haven; rly. terminus; p. (1951) *2,204*.
Nezhin, *t.*, Ukrainian S.S.R.; rly. junction on Kiev–Moscow line; p. (1954) *50,000*.
Ngami, *L.*, Bechuanaland Prot.; swamp, the remnant of a much larger L.
Ngauruhoe, *mtn.*, N.I., N.Z.; an active volcano; alt. 7,515 ft.
Niagara, *R.*, forming part of boundary between Canada and U.S.A.; flows from L. Erie to L. Ontario; has rapids and the famous falls (167 ft.); gr. hydro-elec. power-sta.; length 35 m.
Niagara Falls, *t.*, Ontario, Canada; opp. the falls; carborundum, canning; p. (1951) *22,735*.
Niagara Falls, *c.*, N.Y., U.S.A.; extending along the summit of cliff for 3 miles; paper, flour, aluminium; p. (1950) *90,872*.
Niamey, *t.*, Niger rep., W. Africa; one of the termini (the other is Zinder) of the trans-Sahara motor routes; p. *18,100*.
Nias, *I.*, W. of Sumatra, Indonesia; 95 m. long.
Niassa, *prov.*, Mozambique, Port. E. Africa; ch. t. Nampula.
Nicaragua, *rep.*, Central America; tropical forest; heavy rain in summer; uniformly hot; coffee, cocoa, sugar, bananas; gold and silver; cap. Managua; a. 57,145 sq. m.; p. (1957) *1,331,000*.
Nicastro, *mftg. t.*, Calabria, Italy; W. of the Apennines; olives, wine; p. *24,869*.
Nice, *c., spt., cap.*, Alpes Maritimes, France; on Mediterranean cst., at the foot of the Alps; beautiful climate and surroundings; joins ancient t. of Cimiez; ceded to France in 1860 by Sardinia; winter health resort; fruit and flower exp., perfume mftg.; p. (1954) *244,360*.
Nicobar Is., *see* **Andaman and Nicobar Is.**
Nicosia, *c., cap.*, Cyprus; the ancient Ledra; fortified, mosques, hand weaving; cap. of administrative dist. same name; p. (estd. 1959) *82,000*.
Nicoya, G. of, *inlet*, Costa Rica.
Nictheroy, *see* Niteroi.
Nidd, *R.*, trib. of R. Ouse, W.R. Yorks, Eng.
Nidwalden, *can.*, Switzerland; a. 106 sq. m.; p. (1950) *19,389*.
Niederhernsdorf, *t.*, S.W. Poland; formerly Germany; coal, explosives; p. *11,706*.
Niederwald, *hill*, opposite Bingen-on-the-Rhine, Germany; national monument commemorating German triumph over France 1870–71, and formation of the G. Empire.
Niederwesel or **Neizel**, *t.*, Germany; below Düsseldorf, on R. Rhine.
Niemen or **Memel**, *R.*, Poland and U.S.S.R.; flowing to the Kurisches Haff; length 500 m.
Nienburg, *t.*, Lower Saxony, Germany; on R. Weser; glass, metal, wood, chemicals; p. (estd. 1954) *21,900*.
Nieuwveld Range, *mtns.*, C. of Gd. Hope, Union of S. Africa; part of S. terminal escarpment of African tableland; overlooks Gr. Karroo to its S.; forms impenetrable barrier to routes; mainly over 5,000 ft., max. alt. 6,276 ft.
Nièvre, *central dep.*, France; traversed by Morvan Mtns.; forests, livestock, coal, iron, steel; cap. Nevers; a. 2,659 sq. m.; p. (1954) *240,078*.
Nigde, *t.*, Turkey; p. *11,855*.
Niger, *gr. R.*, W. Africa; rises nr. the sea in the outer mtn. zone of W. Africa, as the R. Tembi, and sweeps round by Timbuktu to a delta in the G. of Guinea, on a circuitous course of 2,600 m., receiving its gr. trib. the R. Benue, about 250 m. from the mouth; navigable for 1,000 m.
Niger, *aut. rep.* within Fr. Community, W. Africa; millet, groundnuts, rice; sheep, goats; a. 499,410 sq. m.; p. (1948) *2,010,761*.
Nigeria, Federation of, West Africa, sovereign and independent st. within British Commonwealth (1 Oct. 1960); occupying lower basin of R. Niger, with region adj. up to Lake Chad; territorial divs. are Northern (excl. N. Cameroons pending plebiscite), Eastern, Western Regions, the Southern Cameroons and fed. cap. of Lagos; Kaduna, cap. of N. provs., Ibadan of W. provs., and Enugu of E. provs.; ch. prod.: groundnuts, cotton, hides and skins, timber, palm-oil, cocoa; total a. 339,169 sq. m.; p. (estd. 1958) *33,000,000*.
Nightingale, *I.*, most S. of Tristan da Cunha gr., S. Atlantic.
Niigata, *c., port*, Honshu, Japan; coal, petroleum, lacquer ware; p. (1950) *220,901*.
Niihama, *c.*, N. Shikoku, Japan; on cst. of Inland Sea 20 m. S.E. of Imabari; refines copper obtained from Besshi Mines 12 m. to the S.; p. (1947) *42,392*.
Niitakayama, *mtn.*, Formosa I., China; highest mtn. of Niitaka Chain, central Formosa; alt. 12,939 ft.
Nijar, *t.*, Almeria, Spain; fruit, nuts, grain; textiles, porcelain; lead, manganese, iron ore; p. *10,107*.
Nijmegen, *fortfd. t.*, E. Neth.; on R. Waal, nr. Arnhem; univ.; mnfs. ale, Prussian blue, cigars, pottery, metal-work; p. (estd. 1955) *118,000*.
Nijni-Novgorod, *see* **Gorki**.
Nikaria, *I.*, Dodecanese Archipelago, Greece.
Nikko, *t.*, Honshu, Japan; famous temples and shrines; beautiful tourist resort; p. *8,000*.
Nikolayev, *fortfd. t.*, Ukrainian S.S.R.; nr. Kherson, at head of estuary R. Bug; 2nd lgst. shipbldg. ctr. in U.S.S.R.; engin., petroleum refining; p. (1959) *224,000*.
Nikolayevsk, *t., pt.*, R.S.F.S.R.; on R. Amur; iron ore, engin., oil refining; p. (1954) *50,000*.
Nikopol, *t.*, Ukrainian S.S.R.; on R. Dnieper; manganese prod.; engin., steel; p. (1959) *81,000*.
Nikšic, *t.*, Montenegro, Jugoslavia; N. of Cetinje; p. *6,686*.
Nile, *the longest R.* in Africa (*see* **White Nile** (Bahr-el-Abiad) and **Blue Nile** (Bahr-el-Azrek) flows through a longer stretch of basin (over 2,450 m. in a direct line) than any other R. in the world, and along all its windings measures over 4,000 m.; on Upper Nile navigation is hindered by sudd (floating vegetation); R. rises April, overflows Sept.; formerly cultivation entirely dependent on annual floods, but now assisted by dams, at Asyût, Aswan, Sennar, for regulating flow and navigation.
Niles, *t.*, Ohio, U.S.A.; p. (1950) *16,773*.
Nilgiri Hills, Madras, S. India.
Nimach, *t.*, Gwalior dist., Rajasthan, India; p. *10,000*.
Nîmes, *t.*, Gard, France; Roman antiquities, educational institutions; silk, cottons, carpets, machin., wine tr.; p. (1954) *89,130*.
Nineveh, *celebrated ancient c.*, Iraq, stood on the E. bank of the upper R. Tigris, opposite the modern Mosul.
Ningan, *t.*, E. Manchuria; mkt., tobacco, millet, maize; p. *30,000*.
Ningpo, *c., spt.*, Chekiang, China; 100 m. from Shanghai; wood carving, fishing, lace, hardware; principal exp.; cotton, tea; p. (estd. 1942) *249,633*.
Ningsia, former *prov.*, China; now included in Kansu prov.
Ninh Binh, *t.*, Tongking, Viet-Nam, Indo-China; *p. 25,000*.
Ninove, *t.*, Belgium; on R. Dender; industl.; p. (1947) *11,557*.
Niobrara, *R.*, U.S.A.; trib. of Missouri R.; flows from Wyoming to Nebraska; length 450 m.
Niort, *t.*, Deux-Sèvres, France; noted for its mkt. gardens, and leather mnf. (gloves); p. (1954) *33,167*.

Nipigon, *L.*, in Thunder Bay dist., Ontario, Canada; 70 m. long, 50 m. wide, 1,000 Is.; discharges by N. R. to Lake Superior; 30 m.

Nipissing, *L.*, Ontario, Canada; 50 m. long, 35 m. wide.

Niriz, *t.*, Fars prov., S.W. Persia; on old caravan route from Kerman to Shiraz; p. *9,000*

Niš, *t.*, Jugoslavia; on R. Nishava; p. (1953) *60,704*.

Nisa R., *see* Neisse R.

Nišava, *R.*, Jugoslavia; rises in Stara Planina, flows N.W. into R. Morava nr. Nis; valley used by trunk rly. from Belgrade to Sofia and Istanbul (Constantinople); length over 100 m.

Niscenic, *commune*, Caltanissetta prov., Sicily; sulphur, agr.; p. *20,281*.

Nishapur, *prov.*, N. Khurasan, Persia; grows grain, cotton; and contains famous turquoise mines; cap. N., c. with good fruit tr.; mosque with tombs of Omar Khayyám.

Niterói, *t.*, *cap.*, Rio de Janeiro st., Brazil; soap, textiles; p. (1950) *190,147*.

Nith, *R.*, S.W. Scot.; flows to Solway Firth, S. of Dumfries; followed by main rly. from Carlisle to Kilmarnock and Glasgow; length 71 m.

Nitra (Neutra), *R.*, Czechoslovakia; trib. of R. Waag; length 100 m.

Nitra, *t.*, Czechoslovakia; on R. Nitra; p. (1947) *22,589*.

Niue or Savage I., Pac. Oc.; one of Cook Is., but under separate administration; belongs to New Zealand; ch. pt. Alofi; bananas, copra; a. 100 sq. m.; p. (est. 1958) *4,735*.

Nivelles, *t.*, Brabant, Belgium; rly. wkshps., paper; p. (1947) *11,865*.

Nivernais, *old prov.*, France, now forming Nièvre prov. and part of Cher.

Nizampatam, *t.*, *spt.*, Madras, India; formerly called Pettipollee after the neighbouring village of Pedapalle; first trg. establishment made by the British in the Madras presidency in 1611.

Nizheudinsk, *t.*, W. Irkutsk, R.S.F.S.R.; new mftg. t.; p. *10,342*.

Nizhniy Tagil, *t.*, R.S.F.S.R.; in Ural mtns.; iron ore, iron and steel, engin., chemicals; p. (1959) *338,000*.

Njole, *t.*, Congo Rep., Equatorial Africa; on R. Ogowe.

No, *L.*, Bahr-el-Ghazal prov., Sudan, N.E. Africa; vast swamp a. 350 m. S.W. of Khartoum receiving Rs. Bahr-el-Jebel and Bahr-el-Ghazal (to form White Nile); flow of water blocked by papyrus reed and floating weed (sudd); gr. loss of water by evaporation.

Noakhali, *dist.*, and *t.*, Chittagong div., Pakistan; p. (of t.) *13,063*.

Nobi Plain, S. Honshu, Japan; located at head of Ise Bay; composed of: (1) low, badly drained alluvial plain on W. under intensive rice cultivation, (2) higher, drier, terraces on E. under mulberry, vegetables, pine-woods; very dense urban and rural p.; ch. textiles and pottery mftg. a. in Japan; inc. cities Nagoya, Gifu, Yokkaichi; a. 720 sq. m.

Noblesville, *t.*, Ind., U.S.A.; agr., horse breeding; p. (1950) *6,567*.

Nocera Inferiore, *t.*, Italy; nr. Naples; the ancient Nuceria Alfaterna; p. *30,000*.

Nogent-sur-Marne, *t.*, Seine, France; S.E. sub. Paris; chemicals, knives; p. (1954) *23,581*.

Noginsk, *t.*, R.S.F.S.R.; nr. Moscow; textiles; p. (1959) *93,000*.

Noisy-le-Sec, *t.*, Seine, France; p. (1954) *22,337*.

Nola, *t.*, Italy; at foot of Vesuvius, 12 m. N.E. of Naples; was an ancient c. of Campania, noted for its vases; p. *20,253*.

Nombre-de-Dios, *t.*, Mexico; comm. ctr.

Nome, *cst. t.*, Alaska, U.S.A.; gold; p. (1950) *1,852*.

Noordoostelijke Polder, land reclaimed from Zuider Zee, Neth., 1942, not yet included in any prov.; a. 185 sq. m.; p. *2,369*.

Noordwijk, *resort*, W. cst., Neth.; p. (1950) *16,686*.

Noranda, *t.*, Quebec, Canada; 12 m N.E. of Rouyn; goldmines.

Norcia, *t.*, Italy; old walls, cath.; famous for pork and terra-cotta.

Nord, *N. dep.*, France; on Belgian frontier and N. Sea; flourishing agr., mining, iron and coal, textile and chemical mnfs.; cap. Lille; a. 2,229 sq. m.; p. (1954) *2,098,545*.

Nordenham, *pt.*, Lower Saxony, Germany; on Lower Weser opposite Bremerhaven; cables, textiles, metals, shipbldg., fishing pt.; p. (estd. 1954) *28,100*.

Norderney, *I.*, Frisian Is., Germany; popular seaside resort; p. *4,098*.

Nordhausen, *c.*, Thuringia, Germany; in Harz Mtns.; cath.; spirits, tobacco, machin., wood, textiles; rly. junction; p. (estd. 1954) *32,900*.

Nordhorn, *t.*, Lower Saxony, Germany; nr. Neth. frontier; textiles; p. (estd. 1954) *35,400*.

Nordkapp or N. Cape, *most N. point*, Europe; on Magerö I., Norway.

Nordkyn, *most N. point*, with N. Cape, of the European mainland, Norway, opposite N. Cape.

Nordland, *co.*, Norway; a. 14,728 sq. m.; p. (1950) *221,701*.

Nordlingen, *t.*, Bavaria, Germany; carpet factories; p. *8,800*.

Nore, The, *sandbank, lightship*, Thames estuary, Eng.

Nore, *R.*, Ireland; trib. of R. Barrow; length 70 m.

Norfolk, *co.*, E. Eng.; noted for shallow lake expanses known as the Broads, popular yachting region; farming, corn, potatoes, cattle, fisheries (Yarmouth), brewing, boots, mustard, farm machin.; cap. Norwich; a. 2,055 sq. m.; p. (1951) *546,550*.

Norfolk, *c.*, Nebraska, U.S.A.; on Elkhorn R.; in farming country; p. (1950) *11,335*.

Norfolk, *c.*, Va., U.S.A.; impt. naval sta.; spt.; general mnfs., coffee-roasting; battle between the *Monitor* and *Merrimac* fought off N. 1862; p. (1950) *213,513*.

Norfolk I., *fertile Australian I.*, Pac. Oc.; 800 m. E. of N.S.W. partial autonomy 1957; formerly a penal settlement; discovered by Captain Cook, 10 Oct. 1774; pine-trees; exp. citrus fruits; a. 15 sq. m. p. (1954) *942*.

Noric Alps, *mountainous region*, Styria, S. Austria.

Norilsk, *t.*, E. Siberia, R.S.F.S.R.; p. (1959) *108,000*.

Normal, *t.*, Ill., U.S.A.; mkt. gardening, fruit, plants; univ.; p. (1950) *9,772*.

Norman, *t.*, Okla., U.S.A.; oil-field; cotton processing; agr.; univ. of Okla.; p. (1950) *27,006*.

Norman Wells, *t.*, N.W. Terr., Canada; at confluence of R. Mackenzie and G. Bear R., 70 m. W. of G. Bear L.; ctr. of rich oil-field.

Normandy, *old French prov.*, on Eng. Channel; mainly agr.; now divided into deps. Manche, Calvados, Eure, Seine-Maritime and part of Orne; Rouen was cap.; the Roman Lugdunensis; later a powerful Dukedom; conquered England, 1066.

Normanton, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Calder 2 m. E. of Wakefield; coal-mining, rly. wks.; p. (1951) *19,087*.

Norrbotten, *co.*, N. Sweden; a. 40,754 sq. m.; cap. Piteå; p. (1950) *241,596*.

Norris Dam, Tenn., U.S.A.; across R. Clinch at confluence with R. Tenn., N.W. of Knoxville; lgst. dam Tenn. Valley Authority (TVA); built for flood control and hydro-elec.

Norristown, *bor.*, Penns., U.S.A.; textiles, hosiery, carpets; p. (1950) *38,126*.

Norrköping, *t.*, Sweden; N.E. of Linköping; textiles, sugar, paper; p. (1951) *84,939*.

Norte de Santander, *dep.*, Colombia, S. America; a. 8,295 sq. m.; cap. Cucuta; p. (1947) *409,720*.

North Adams, *c.*, Mass., U.S.A.; on R. Hoosac; textiles, boots, and shoes; p. (1950) *21,567*.

North America, *northern continent*, comprising Mexico, Central America, West Indies, U.S.A., Canada, Greenland; cst. much indented; on W. high chain of mtns., lower range in E., and central plain. Climate varies considerably owing to wide range of latitude and altitude; great extremes of temperature; abundant rainfall on E. cst. and N. of W. cst.; S. of W. cst. Mediterranean; Mexico, sub-tropical and tropical. Vegetation diverse, varying with alt., latitude and climate; coniferous forests in N.; originally deciduous forests from E. cst. to approx. 100° W., then grassland to mtn. vegetation of W. range; semi-desert in S.W.; tropical forests Central America. Prairies once home of bison. Agr.: temperate and tropical prod., cereals, cotton, tobacco, sugar-beet, potatoes, etc.; lumbering; rich in minerals, coal, petroleum, iron, manganese, etc. Gen. inds., comm., shipbldg. Formerly inhabited by Red Indians; now mainly occupied by White

races, with many negroes in S.; a. 8,700,000 sq. m.; p. *185,000,000* (estimated).
North Atlantic Drift, drift of surface waters of Atl. Oc. N.E. from Gulf Stream towards Europe; relatively warm; supplies prevailing S.W. winds with warmth and moisture to modify climate of Brit. Is. and countries on N.W. margin of European Continent. *See* Gen. Inf.
North Attleboro, *t.*, Mass., U.S.A.; jewellery mnfs.; p. (1950) *12,146*.
North Bay, *c.*, Ontario, Canada; p. (1941) *15,599*.
North Berwick, *burgh*, E. Lothian, Scot.; on S. side of F. of Forth, 20 m. E. of Edinburgh; seaside resort; famous golf course; p. (1951) *4,001*.
North Brabant, *prov.*, Neth.; cap. s'Hertogenbosch; a. 1,920 sq. m.; p. (1947) *1,192,640*.
North Braddock, *t.*, Penns., U.S.A.; p. (1950) *14,724*.
North Brookfield, *t.*, Mass., U.S.A.; rubber and asbestos mnfs.; p. (1950) *2,599*.
North Cape, *see* Nordkapp.
North Cape, *most northerly point*, N.I., N.Z.
North Carolina, *S. Atlantic st.*, U.S.A., E. of Tennessee and S. of Virginia; agr., maize, cotton-growing and mftg., tobacco culture and mftg., timber, scrap mica; cap. Raleigh; ch. pt., Wilmington; a. 52,712 sq. m.; p. (1950) *4,061,929*, nearly one-third coloured.
North Channel, Brit. Is.; gives access from Atl. Oc. to Irish Sea between S.W. Scotland (Galloway) and N.E. Ireland (Antrim); length 60 m.; narrowest width 15 m.
North Chicago, *t.*, Ill., U.S.A.; on L. Michigan; chemicals, metallurgy, elec. goods; p. (1950) *8,628*.
North Dakota, *N.W. st.*, U.S.A.; mainly rolling prairie; agr., wheat, maize, oats, barley, flax, cattle, horses, sheep; coal, petroleum; cap. Bismarck; a. 70,665 sq. m.; p. (1950) *619,636*.
North Downs, range of low chalk hills across S. Eng., forming cliffs at Dover; gr. alt. about 800 ft.
North Eastern New Guinea, part of New Guinea under Australian administration as Trusteeship terr. under United Nations; a. 69,700 sq. m.
North East Passage, along N. cst. Europe and Asia between Atlantic and Pacific. *See* Gen. Inf.
North Holland, *prov.*, Neth.; on Zuider Zee; a. 1,051 sq. m.; cap. Haarlem; p. (1948) *1,793,966*.
North Little Rock, *t.*, Ark., U.S.A.; p. (1950) *44,097*.
North Osetian, A.S.S.R., U.S.S.R.; a. 3,100 sq. m.; cereals, livestock, petroleum.
North Platte, *c.*, Nebraska, U.S.A., on N. Platte R., trib. of the Nebraska R.; p. (1950) *15,433*.
North Providence, *see* Nassau.
North Rhine-Westphalia, *Land*, Germany; a. 13,153 sq. m.; p. (1950) *13,196,176*.
North Riding, **Yorkshire**, *see* **Yorkshire, North Riding**.
North Sea, arm of the Atlantic, E. of Gr. Brit., W. of Norway, Sweden and N. Germany, and N. of Holland, Belgium and France; length 600 m., width 400 m.; good fisheries.
North Sea Canal, *ship canal*, N. Holland, Neth.; connects Amsterdam to N. Sea at Ijmuiden; depth 46 ft., length 16 m.
North Shields, *mkt. t.*, Northumberland, Eng.; Tyne pt. and part of the borough Tynemouth; marine engines, chain cables, anchors, rope.
North Sydney, *spt.*, C. Breton I., Nova Scotia; Canada; docks, coal; p. (1941) *6,836*.
North Tonawanda, *c.*, N.Y., U.S.A.; on Niagara R.; mnfs.; p. (1950) *24,731*.
North Walsham, *mkt. t.*, *urb. dist.*, Norfolk, Eng.; 13 m. N.E. of Norwich; p. (1951) *4,733*.
North-West Frontier Province, Pakistan; consists of dist. of Hazara, Peshawar, Kohat, Bannu, Dera Ismail Khan and Mardan; a. 13,815 sq. m.; p. (estd. 1951) *3,239,000*.
North-West Frontier Tribal Area, Pakistan; comprises Malakland, Chitral, Khyber, Kurram, N. and S. Waziristan, Amb, Phulera; total a. 27,242 sq. m.; p. (estd. 1951) *2,460,000*.
North-West Passage, between Atlantic and Pacific along Arctic cst. of Canada. *See* Gen. Inf.
North-West Territories, Canada; the N.W. region of Canada between the Yukon on the W., Hudson Bay on the E., and B.C., Alberta, Saskatchewan and Manitoba on the S.; divided into 3 districts, viz., Franklin, Mackenzie and Keewatin; gold- and silver-mining, radium, uranium, petroleum, furs, fisheries; a. 1,304,903 sq. m.; p. (1956) *19,313*.
North Woolwich, *t.*, Essex, Eng.; on R. Thames; mftg.
North York Moors, *limestone plateau*, N.R., Yorkshire; lies S. of estuary of R. Tees; drained N. to R. Tees, S. to R. Derwent and to N. Sea by R. Esk; heather moorland; some pastoral farming on lower slopes; impt. iron-ore quarrying along N. edge in Cleveland dist.; alt. varies from 1,000 to 1,500 ft.
Northallerton, *t.*, *urb. dist.*, N.R. Yorks, Eng.; in broad gap between Cleveland Hills and Pennines; dairy farming and agr. dist.; p. (1951) *6,087*.
Northam, *t.*, W. Australia; on R. Avon, 66 m. from Perth, Australia; p. (1957) *6,305*.
Northampton, *S. Midland co.*, Eng.; chiefly agr.; iron, mining and mftg.; footwear, lace, leather, flax, light engin.; co. t., Northampton; a. 998 sq. m.; p. (1951) *359,550*.
Northampton, *t.*, *co. bor.*, Northampton, Eng.; on R. Nene; footwear mftg., leather goods, light engin.; p. (1951) *104,429*.
Northampton, *c.*, Mass., U.S.A.; textiles, paper; univ.; p. (1950) *29,063*.
Northampton, *t.*, Penns., U.S.A.; cement; beer; clothes; quarrying; p. (1950) *9,332*.
Northbridge, *industl. t.*, Mass., U.S.A.; p. (1950) *10,476*.
Northcote, *t.*, Victoria, Australia; N. sub. Melbourne; mnfs.; p. (1947) *42,713*.
Northeim, *industl. t.*, Lower Saxony, Germany; on R. Ruhme; p. *12,000*.
Northern Bukovina, formerly part of Romania, ceded to U.S.S.R. 1940 and now forms part of Ukrainian S.S.R.
Northern Ireland, consists of the administrative cos. of Antrim, Armagh, Down, Fermanagh, Londonderry and Tyrone, and administrative bors. of Belfast and Londonderry. Has its own parliament and executive Government under a Governor appointed by the Crown. Returns 12 members to British House of Commons; agr., oats, potatoes, etc., flax, fruit, hay, chalk, granite, etc., linen, shipbldg.; new inds. being established; cap. Belfast; a. 5,238 sq. m.; p. (1951) *1,370,709*.
Northern Rhodesia, *Brit. prot.*, Central Africa; became member st. of "Federation of Rhodesia and Nyasaland" in 1953, administered from federal cap. Salisbury, S. Rhodesia; tropical climate, moderate rains; savannah vegetation; maize, tobacco, wheat, coffee, zinc, copper, vanadium, gold, ivory; cap. Lusaka; a. 288,130 sq. m.; p. (1951) *1,977,000*.
Northern Territories, Ghana, West Africa; lies N. of latitude 8° N.; ch. t. Tamale; incl. Togoland a. 41,063 sq. m.; p. (1948) *1,076,696*.
Northern Territory, a large tract of land N. of S. Australia; stock-raising, gold, copper, tungsten, and impt. uranium deposits; a. 523,620 sq. m.; ch. t. Darwin; p. (estd. 1958) *18,898*.
Northfield, *c.*, S. Minn., U.S.A.; agr., dairying; p. (1950) *7,487*.
Northfleet, *t.*, *urb. dist.*, Kent, Eng.; on S. bank of R. Thames, adjoining Gravesend; cement, paper, rubber tyres, cables; p. (1951) *18,803*.
Northumberland, *N. maritime co.*, Eng.; on border of Scot.; pastoral, mining, coal and lead, mftg.; chemicals, glass, engin., and shipbldg. on Tyneside; cap. Newcastle-upon-Tyne; a. 2,019 sq. m.; p. (1951) *798,175*.
Northumberland Straits, separates Prince Edward I. from Nova Scotia and New Brunswick.
Northwich, *mkt. t.*, *urb. dist.*, Cheshire, Eng.; on R. Weaver, 10 m. S.E. of Runcorn; chemicals, salt, engin.; p. (1951) *17,480*.
Norton, *t.*, S.W. Va., U.S.A.; coal, mftg.; p. (1950) *4,315*.
Norton, *t.*, *urb. dist.*, E.R. Yorks, Eng.; on R. Derwent opposite Malton; p. (1951) *4,814*.
Norton Sound, *inlet*, W. cst. Alaska, Behring Sea; 200 m. long.
Norwalk, *t.*, Conn., U.S.A.; on Long I. Sound; good harbour, oysters, iron foundries, clothing; p. (1950) *49,460*.

Norwalk, *bor.*, Ohio, U.S.A.; mftg. ctr. of farming dist.; p. (1950) *9,775*.
Norway, *kingdom*, N. Europe; fjord cst., mountainous; climate influenced by prevailing westerly winds, heavy rain and snowfall coastal regions; barley, forest prod., aluminium, pyrites; fisheries; greatly developed hydro-elec. power; cap. Oslo; a. 124,556 sq. m.; p. (1957) *3,477,786*.
Norwich, *c.*, *co. bor.*, *co. t.*, Norfolk, Eng.; on R. Wensum just above confluence with R. Yare; cath., old cas., cult. ctr., agr. ctr.; boots, shoes, textiles, gen. inds.; p. (1951) *121,226*.
Norwich, *c.*, Conn., U.S.A.; firearms, cutlery and machin., textiles; p. (1950) *23,429*.
Norwich, *t.*, N.Y., U.S.A.; chemicals, dairying, agr., farm tools; p. (1950) *8,816*.
Norwood, S., *sub. div.*, Lambeth, Surrey, Eng.; mainly residtl.
Norwood, Ohio, U.S.A.; *sub.*, Cincinnati; p. (1950) *35,001*.
Norwood, *t.*, Mass., U.S.A.; p. (1950) *16,636*.
Nossi Bé, *Is.*, Indian Ocean; off W. cst. of Madagascar; a. 130 sq. m.; part of Fr. col. of Madagascar; rice, coffee, tobacco.
Notec (Netze), *R.*, Poland; trib. of R. Warta; length 140 m.
Noto, *c.*, Sicily; W. of Syracuse; cath.; wine, olive oil, mnfs.; p. *32,575*.
Notodden, *t.*, S. Norway; hydro-elec. power; iron smelting; nitrates; p. *6,192*.
Notre Dame Bay, N. cst., Newfoundland, Canada.
Nottingham, *midland co.*, Eng.; wheat, oats, barley, cattle, coal; co. t. Nottingham; a. 844 sq. m.; p. (1951) *841,083*.
Nottingham, *c.*, *co. bor.*, *co. t.*, Nottingham, Eng.; on R. Trent, at S.E. end of Pennines; ctr. of English lace ind.; univ., R.C. cath., fine buildings, cas., museum, gr. mkt. square; hosiery, engin., pharmaceutical ind., chemicals, cycles; p. (1951) *306,008*.
Nouméa or **Port de France**, *cap.*, New Caledonia; p. (1946) *10,466*.
Nouzonville, *t.*, Ardennes, France; iron foundries; (1954) *6,155*.
Nova Lima, *t.*, Minas Gerais st., Brazil; in Serra do Espinhaço, 10 m. S. of Belo Horizonte; adjacent to impt. gold-mines of Morro Velho; p. (1940) *10,000*.
Nova Lisboa (Huambo), *t.*, Angola, Africa; E. of Benguela; the future capital; p. *16,288*.
Novara, *Alpine prov.*, N. Italy; a. 2,548 sq. m.; p. (1951) *423,033*.
Novara, *mftg. t.*, nr. Milan; p. (1951) *69,228*.
Nova Scotia, *maritime prov.*, Canada; mainly fertile uplands and rich valleys, but with mtns. along the cst. nr. Bay of Fundy; agr., fruit, livestock, dairying, much mineral wealth, coal and gypsum, and very valuable fisheries; cap. Halifax; a. 21,068 sq. m.; p. (1956) *694,717*.
Nova Zembla (Novaya Zemlya), *lge. Is.*, Arctic Ocean, U.S.S.R.; furs, walrus, whale, seal fisheries, lead, zinc and copper.
Nove Zamky, *t.*, Slovakia, Czechoslovakia; mkt. and mftg.; p. *22,141*.
Novgorod, *t.*, R.S.F.S.R.; sawmills, engin., p. (1959) *61,000*.
Novi Ligure, *t.*, Alessandria, Italy; nr. Genoa; noted for silk mftg.; p. *21,575*.
Novi Pazova, *t.*, Serbia, Jugoslavia; on R. Raskha; p. *12,196*.
Novi Sad (Neusatz), *t.*, Jugoslavia; on R. Danube; opposite Petrovaradin; formerly royal free c., almost destroyed by Austrians 1849; tr. in fruit, wine, vegetables, corn; p. (1953) *83,180*.
Novocherkask, *t.*, R.S.F.S.R.; 20 m. N.E. of Rostov; engin., chemicals; p. (1959) *94,000*.
Novograd Volynski, *t.*, Ukrainain S.S.R.; on R. Sluch; iron and soap wks., busy fairs.
Novogrudok, *t.*, Byelorussian S.S.R.; agr. mkt., leather mnfs.; p. *11,355*.
Novorossiisk, *spt.*, R.S.F.S.R.; on N.E. cst. of Black Sea; engin., textiles; lgst. cement producer in U.S.S.R.; p. (1959) *93,000*.
Novosibirsk, *t.*, R.S.F.S.R.; on R. Ob; hydro-elec., steel, tin smelting, engin., textiles, chemicals, sawmilling; p. (1959) *887,000*.
Novouzensk, *t.*, S.E. Saratov Reg., R.S.F.S.R.; fairs attended by Kirghiz steppe tribes; p. *10,009*.
Novozybkov, *t.*, R.S.F.S.R.; E. of Gomel; tallow, hemp, preserved meat.
Nôvý Jičin (Neutitschein), *t.*, Moravia, Czechoslovakia; farm machin. and engin.; p. *10,667*.
Nowa Huta, *t.*, Poland; S.E. Kraków, on R. Vistula; newly developed metallurgical ctr.; p. (1954) *50,000*.
Nowa Sól (Neusalz), *t.*, Lower Silesia, Poland; on R. Oder; chemicals; p. *13,474*.
Nowata, *t.*, N.E. Okla., U.S.A.; agr., natural gas, oil-field gear; p. (1950) *3,965*.
Nowawes, *c.*, Brandenburg, Germany; textiles, engin., chemicals; p. *26,975*.
Nowra, *t.*, N.S.W., Australia; on E. cst. at mouth of Shoalhaven R.; collecting ctr. for agr. and pastoral prod. of coastal plain; at S. terminus of rly. along E. cst. of Australia.
Nowy Sacz, *industl. t.*, Krakow, S. Poland; on R. Dunajec; lignite; p. *23,000*.
Noya, *spt.*, Spain; lace and linen inds.; p. *12,016*.
Noyon, *t.*, Oise, France; birthplace of Calvin; fine cath.; p. (1946) *6,483*.
Nubia, *ancient Ethiopia*, S. of Egypt, Africa; now included in Sudan; ch. c. Khartoum.
Nubian Desert, Sudan, N.E. Africa; between R. Nile and Red Sea; alt. 1,200–9,000 ft.; a. approx. 90,000 sq. m.
Nuble, *prov.*, Chile; bordering on Argentina; a. 5,484 sq. m.; cap. Chillan; p. (1957) *301,654*.
Nueces, *R.*, Texas, U.S.A.; flows to G. of Mexico; length 400 m.
Nueva Esparta, *st.*, Venezuela; cap. La Asunción; p. (1947) *69,195*.
Nuevo Laredo, *c.*, E. Mexico; agr., cotton, maize, cattle rearing; p. (1940) *28,872*.
Nuevo León, *st.*, Mexico; agr. and stock raising, sugar; cap. Monterrey; a. 25,134 sq. m.; p. (1950) *738,596*.
Nullarbor Plain, S. Australia; low, level, limestone plateau fringing Gr. Australian Bight; arid; treeless, salt-bush scrub; crossed by Trans-continental Rly. between Naretha (W. Australia) and Ooldea; rly. is dead straight, dead level for over 300 m.
Nun, *ch. mouth* of R. Niger, Africa.
Nun, *R.*, Manchuria, China; trib. of the Sungari; length 500 m.
Nun, *R.*, on S. frontier of Morocco, N. Africa; with t. thereon; length 130 m.
Nuneaton, *mkt. t.*, *mun. bor.*, Warwick, Eng.; on R. Anker, 18 m. E. of Birmingham; coal-mining, quarrying, textiles, engin., lt. inds.; p. (1951) *54,408*.
Nunkiang, *prov.*, China; a. 23,912 sq. m.; cap. Lungkiang; p. (1947) *2,094,000*.
Nuremberg (Nürnberg), *t.*, Bavaria, Germany; cas., museum, cultural academy and many historic bldgs.; metals, elec., machin., pencils and crayons, glass, "Lelokuchen", toys; rly. junction; p. (estd. 1954) *398,800*.
Nutley, *t.*, N.J., U.S.A.; p. (1950) *26,992*.
Nyasa, *L.*, Central Africa; southward extension of the Great Rift Valley; 1,500 ft. above sea-level; length, 350 m., breadth 40 m.; drains by R. Shire into R. Zambesi.
Nyasaland Protectorate, Brit. Central Africa; became member st. of "Federation of Rhodesia and Nyasaland" in 1953; along W. cst. L. Nyasa; hot, wet summer, cooler, dry winter; vegetation, savannah, subtropical forest; tobacco, cotton, coffee, ivory; cap. Zomba; a. 49,177 sq. m.; p. (1958) *2,740,000*.
Nyborg, *t.*, Denmark; on Fyn I.; p. *9,559*.
Nyeri, *cap.*, Central Prov. "Kikuyu native reserve" Kenya col. and prot., Africa.
Nyiregyhháza, *mftg. t.*, Hungary; wine, farming, implements; p. (estd. 1957) *55,000*.
Nyköbing, *spt.*, Falster I., Denmark; light engin., food-packing, margarine, and sugar-refining inds.; p. *16,097*.
Nyköping, *spt.*, Sweden; at head of inlet on cst.; furniture, textile, timber mnfs.; p. (1951) *20,477*.
Nystad (Uusikapunki), *spt.*, Abo-Björneborg, Finland; on G. of Bothnia; p. *3,946*.

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Oadby, *urb. dist.*, Leics, Eng.; 3 m. S.E. of Leic.; boots and shoes; p. (1951) *6,206*.
Oahu, *I.*, Hawaiian Is., Pac. Oc.; sugar, pine-apples; tourist tr.; cap. Honolulu; a. 604 sq. m.; p. (1940) *358,911*.
Oak Park Village, *t.*, Ill., U.S.A.; now included in Chicago; p. (1950) *63,529*.
Oakengates, *t.*, *urb. dist.*, Salop, Eng.; 15 m. N.W. of Wolverhampton; iron and steel, pre-cast concrete, engin.; p. (1951) *11,659*.

Oakham, *co. t., urb. dist.*, Rutland, Eng.; 9 m. S.E. of Melton Mowbray; mkt.; hosiery; p. (1951) *3,537*.
Oakland, *c.*, Cal., U.S.A.; on San Francisco Bay; residtl. sub.; motor cars, shipbldg., fruit canning, elec. machin., clothing, tanneries; p. (1950) *384,575*.
Oamaru, *bor., spt.*, S.I., N.Z.; wool, frozen meat; p. (1951) *8,119*.
Oaxaca, *st.*, Pacific cst., Mexico; cereals, rubber, coffee, mining; cap. Oaxaca; a. 36,371 sq. m.; p. (1950) *1,412,772*.
Oaxaca, *c., cap.*, Oaxaca st., Mexico; alt. 4,800 ft.; ctr. of cochineal tr.; table linen weaving, wool zarapes; coffee; silver, gold; cattle; p. (1940) *31,839*.
Ob, *G.*, U.S.S.R.; inlet of Arctic Ocean; length 600 m.
Ob, *R.*, W. Siberia, U.S.S.R.; flows from the Altai Mtns. to the G. of Ob; length (with trib. R. Irtish) 2,600 m.
Oban, *spt., burgh*, Argyll, Scot.; on F. of Lorne; summer resort of Highland tourists; terminus of rly. from Stirling; ctr. for local shipping; woollens, tartans; p. (1951) *6,227*.
Oberlahnstein, *t.*, Germany; at junction of Rs. Rhine and Lahn; old cas., ancient walls; mining.
Oberammergau, *vil.*, Upper Bavaria, Germany; scene of decennial Passion Play; wood and ivory carving; p. *1,500*.
Oberhausen, *t.*, N. Rhine-Westphalia, Germany; nr. Duisburg; cas.; coal, iron, steel, chemicals, rly. junction; p. (estd. 1954) *226,900*.
Obi I., *sm. I.*, between Halmahera and Serang, Indonesia.
Obidos, *t., R. pt.*, Brazil; 500 m. up R. Amazon; cacao, cotton; p. *20,000*.
Obihiro, *t.*, Hokkaido, Japan; p. (1947) *36,555*.
Obok, *spt.*, Fr. Somaliland, N.E. Africa; in the Red Sea; coaling sta.; p. *1,000*.
Obuasi, *t.*, Ghana, W. Africa; p. (1948) *15,833*.
Obwalden, *can.*, Switzerland; a. 190 sq. m.; p. (1950) *22,125*.
Ocaña, *ancient t.*, Toledo, Spain; on Ocaña plateau; cas.; pottery, wine; p. *9,953*.
Ocaña, *t.*, Magdalena st., Colombia; industl.; p. (1947) *9,937*.
Ocean I., Brit. col., Gilbert and Ellice Is., Pac. Oc.; high-grade phosphate; p. (1956) *2,446*.
Oceania, name given to the Is. of the Pacific; comprising Australasia, Polynesia, Melanesia, Micronesia; copra, sugar, fruit, timber; pearl fishing; gold, minerals, phosphates; a. 3,201,000 sq. m.; p. approx. *11,000,000*.
Ochil Hills, Scottish range reaching from the F. of Tay to nr. Stirling; highest peak, Ben Cleugh, 2,363 ft.
Ockmulgee, *R.*, Ga., U.S.A.; trib. of Altamaha R.; length 280 m.
Oconee, *R.*, Ga., U.S.A.; joins the Ockmulgee; length 250 m.
Odawara, *t.*, Japan; nr. Tokyo; gr. tr.; p. *51,838*.
Odda, *t.*, S. Norway; on Haugesund; p. *8,115*.
Odemiš, *t.*, Asiatic Turkey; N.E. of Aydin; tobacco, cereals, silk, cotton, flax, olives, raisins, figs; minerals; p. (1945) *20,088*.
Odendaalsrust, *t.*, O.F.S., S. Africa; gold ctr.; p. *1,600* (white).
Odenkirchen, *t.*, N. Rhine-Westphalia, Germany; cottons, silk.
Odense, *co.*, Denmark; now includes all N.W. Fyn; a. 699 sq. m.; p. (1955) *196,213*.
Odense, *spt.*, cap. of Fyn, Denmark; ancient c. said to have been founded by Odin; birthplace of Hans Andersen; tanneries, dairy prod. bacon, hides, tobacco, machin.; p. (1955) *105,915*.
Odenwald, *mtns.*, Hessen, Germany; wooded; highest point Katzenbuckel, 2,057 ft.
Oder or Odra, *R.*, Central Europe; flowing from Moravia to Baltic through Polish Silesia, forming (since 1945) frontier between Poland and Germany, flows past Wroclaw (Breslau), Frankfurt and Szczecin (Stettin); length 560 m.
Odessa, *spt.*, Ukrainain S.S.R.; on Black Sea; cath., univ.; gr. grain exp.; engin., oil-refining, chemicals; ice-bound for a few weeks in winter; bombarded by English and French 1845; p. (1959) *667,000*.
Odra, *R.*, *see* Oder R.
Oelwein, *c., rly. ctr.*, Iowa, U.S.A.; p. (1950) *7,801*.
Offaly, *co.* (late King's co.), prov. Leinster, Ireland; much marshy land (inc. Bog of Allen), barren uplands (Slieve Bloom and other mtns.); ch. t. Tullamore; a. 772 sq. m.; p. (1956) *51,917*.
Offenbach, *t.*, Hessen, Germany; on R. Main; cas., leather museum; machin., chemicals, leather goods, metals; p. (estd. 1954) *92,400*.
Offenburg, *t.*, Baden-Württemberg, Germany; on R. Kinzig at W. edge of Black Forest; textiles, glass, rly. junction; p. (estd. 1954) *23,800*.
Ogbomosho, *t.*, Nigeria; p. (1953) *140,000*.
Ogden, *c.*, Utah, U.S.A.; nr. the Great Salt L.; rly. ctr.; beet sugar, meat packing, flour milling; p. (1950) *57,112*.
Ogdensburg, *c., pt.*, N.Y., U.S.A.; on St. Lawrence R., opp. Prescott; gd. tr.; p. (1950) *16,166*
Ogeechee, *R.*, Ga., U.S.A.; flows to Atlantic, S. of Savannah; length 200 m.
Oglio, *R.*, Italy; traverses L. Iseo; flows to the Po; length 135 m.
Ogmore and Garw, *t., urb. dist.*, Glamorgan, Wales; in narrow valley, 6 m. N. of Bridgend; industl.; p. (1951) *22,638*.
Ogowe, *R.*, Fr. Equatorial Africa; length 750 m.
Ohau, *L.*, Mt. Cook dist., S.I., N.Z.; fed by glaciers; 12 m. by 2¼ m.
O'Higgins, *prov.*, Chile; a. 2,745 sq. m.; p. (1957) *269,549*.
Ohio, *R.*, U.S.A.; trib. of Mississippi R.; formed in Penns., by the junction of the Monongahela and Allegheny Rs. at Pittsburgh, thence navigable for 975 m. to Cairo in Kentucky, 1,200 m. from the mouth of the Mississippi R.
Ohio, *st.*, U.S.A.; drained by Ohio R. and tribs.; gr. agr. and industl. region; maize, wheat, oats, cattle; lime, sand and gravel, salt, coal, petroleum, gas, iron and steel wks., machin., timber; cap. Columbus; lgst. cs. Cleveland and Cincinnati; a. 41,122 sq. m.; p. (1950) *7,946,627*.
Ohre (Eger), *R.*, Bohemia, Czechoslovakia; rises in Fichtelgebirge, flows N.E. into Labe (Elbe) at Litoměrice; flows through several sm. lignite fields, spas of Karlovy Vary (Karlsbad); length 140 m.
Ohrid, *t.*, S. Jugoslavia; nr. Albanian border; p. *11,419*.
Oich, Loch, *L.*, Great Glen, Inverness, Scot.; 6 m. long, 1 m. wide.
Oil City, Penns., U.S.A.; on Allegheny R.; oil, machin.; p. (1950) *19,581*.
Oise, *dep.*, N. France; traversed by R. Oise; forests, cereals, fruits, iron, textiles; cap. Beauvais; a. 2,272 sq. m.; p. (1954) *435,308*.
Oise, *R.*, trib. of R. Seine, France; canalised, navigable to Chauny; length 186 m.
Oita, *spt.*, Japan; exp. coal; cattle; p. (1947) *74,138*.
Ojos del Salado, *mtn.*, N.W. Argentina; alt. 22,572 ft.
Oka, *R.*, U.S.S.R.; trib. of R. Volga at Gorki; length 929 m.
Oka, *R.*, Siberia, U.S.S.R.; trib. of R. Angora; length 500 m.
Okanagan, *R.* and *L.*, B.C., Canada; fruit-growing dist.
Okasaki, *t.*, Honshu, Japan; nr. G. of Ovari; industl.
Okayama, *t.*, Honshu, Japan; exp. paper, minerals, firebricks; shipbldg.; rly. ctr.; cattle rearing; p. (1950) *162,904*.
Okehampton, *mkt. t., mun. bor.*, Devon, Eng.; on N. flank of Dartmoor; stone; p. (1951) *3,897*.
Okha, *spt.*, E. cst. Sakhalin I., R.S.F.S.R.; exp. petroleum; p. (1954) *50,000*.
Okhotsk, *spt.*, R.S.F.S.R.; minerals; p. *3,500*.
Okhotsk, Sea of, N.E. Asia; 1,000 m. by 500 m.; enclosed by the Siberian mainland, Kamchatka, the Kurils and Sakhalin I.
Oki Is., off cst. of Honshu, Japan; a. 135 sq. m.
Okinawa, *I.*, Ryuku Is., Japan, under U.S. control; lgst. and most impt. of Ryuku Is., cap. Naha; 2 lgst. U.S. air bases Kadena and Naha; a. 579 sq. m.; p. (1956) *665,315*.
Oklahoma, *st.*, U.S.A.; prairie, plains and mtns.; cereals, cotton, stock-raising, petroleum, gas, zinc, coal, gypsum, lead; ch. ind. petroleum refining; cap. Oklahoma City; a. 69,919 sq. m.; p. (1950) *2,233,351*.
Oklahoma, *c.*, Okla., U.S.A.; univ.; cotton goods, flour, machin., iron and steel, oil, elec. equipment, pottery; rly. ctr.; p. (1950) *243,504*.
Okmulgee, *t.*, Okla., U.S.A.; p. (1950) *18,317*.
Oktyabrsky, *t.*, Bashkir., A.S.S.R.; on R. Ik; in new oil-mng. dist., the "New Baku"; p. (1959) *65,000*.

Öland, I., Baltic Sea; off E. cst. Sweden; separated from mainland by Kalmar Sound; a. 533 sq. m.; ch. t. Borgholm, a seaside resort.
Old Castile, *historical div.*, Spain; now divided into Santander, Soria, Segovia, Logrono, Avila, Valladolid, Palencia and Burgos provs.
Old Deer, *par.*, Aberdeen, Scot.; distilling, brewing, woollens; p. *3,380*.
Old Fletton, *urb. dist.*, Hunts, Eng.; on R. Nene opposite Peterborough; bricks, gen. and elec. engin., beet sugar, fruit and vegetable canning, tar distilling; p. (1951) *8,955*.
Old Forge, *bor.*, Penns., U.S.A.; anthracite coal; p. (1950) *9,749*.
Old Kilpatrick, *see* **Kilpatrick, Old.**
Old Meldrum, *burgh*, Aberdeen, Scot.; 4 m. N.E. of Inverurie; p. (1951) *1,104*.
Oldbury, *mun. bor.*, Worcs., Eng.; nr. Birmingham; iron, steel, chemical, brick, glass inds.; p. (1951) *53,895*.
Oldenburg, *t.*, Lower Saxony, Germany; on R. Hunte; grand-ducal palace; impt. horse fair; glass, tobacco, rly. junction; p. (estd. 1956) *122,300*.
Oldham, *mftg. t.*, *co. bor.*, Lancs, Eng.; on R. Medlock, 4 m. N.E. of Manchester; cotton, textile, and machin. mftg.; p. (1951) *121,212*.
Olean, *t.*, N.Y., U.S.A.; on Allegheny R.; oil region; p. (1950) *22,884*.
Olenek, *R.*, Ukrainian S.S.R.; flows W. of the Lena, into Laptev Sea, Arctic Ocean; length 800 m.
Oléron, Ile d', *I.*, Bay of Biscay; lies off estuary of R. Charente, Aquitaine, France; vine, oysters, salt; length 18 m., maximum width 7 m.
Olga, *spt.*, R.S.F.S.R.; on cst. of Japan Sea; iron ore; p. *1,000*.
Olhão, *t.*, Faro, Portugal; fisheries; p. *13,627*.
Olifant, *R.*, Transvaal, S. Africa; trib. of Limpopo.
Olinda, *c.*, Pernambuco st., Brazil; industl.; p. (1947) *31,915*.
Oliva, *t.*, Valencia, Spain; nr. Alicante; wine dist., ducal palace; p. *18,407*.
Olivas, *t.*, Argentina, S. America; nr. Buenos Aires; p. *24,675*.
Olivenza, *t.*, Spain; nr. Portuguese frontier; p. *12,492*.
Olkhon, I., L. Baykal, R.S.F.S.R.; manganese.
Olmutz, *see* **Olomouc.**
Olney, *t.*, N. Bucks, Eng.; 11 m. S.E. Northampton; boots, shoes, lace; dairying; p. *2,651*.
Olomouc (Olmütz), *c.*, Moravia, Czechoslovakia; formerly one of the ch. fortresses of Austria; cath., univ.; iron and steel engin., textiles; p. (1957) *73,899*.
Oloron, *t.*, Basses-Pyrénées, France; on Gave d'Oloron; cath.; p. (1954) *11,407*.
Olsnitz, *t.*, Saxony, Germany; on Weisse Elster; carpet mnfs.
Olsztyn (Allenstein), *t.*, N.W. Poland (formerly E. Prussia); on R. Alle, 100 m. N. of Warsaw; cas.; machin. and wood inds.; p. (1957) *62,000*.
Olt, *R.*, Romania; joins R. Danube at Nikopol.
Olten, *t.*, Switzerland; on R. Aare; rly. junction; motor, cement, machin. wks.; p. (1941) *15,287*.
Oltenita, *t.*, Romania; on R. Danube, nr. Bulgarian border; p. *10,284*.
Olvarria, *t.*, E. Argentina; 200 m. S.W. Buenos Aires; rly. ctr.; p. *24,326*.
Olvera, *t.*, Spain; nr. Cadiz; on R. Guadalete.
Olympia, *plain*, Peloponnesus, Greece, on R. Ellis where the Olympic Games were held.
Olympia, *cap.*, Washington st., U.S.A.; timber, machin., farm prod.; p. (1950) *15,819*.
Olympus, *mtn.*, Thessaly, Greece; W. of G. of Thessalonika; alt. 9,753 ft.; home of ancient Greek Gods.
Olympus, *mtn.*, Turkey; nr. Troy.
Olympus, Mt., Wash., U.S.A.; alt. 8,150 ft.
Olyphant, *bor.*, Penns., U.S.A.; on Lackawanna R.; p. (1950) *7,047*.
Om, *R.*, Siberia, R.S.F.S.R.; trib. of R. Irtish; length 330 m.
Omagh, *t.*, *urb. dist.*, Tyrone, N. Ireland; on R. Strule 28 m. S. of Londonderry; corn, tanning; shirt factories; tourist ctr.; p. (1951) *6,762*.
Omaha, *c.*, Nebraska, U.S.A.; on Missouri R.; gr. tr.,.ctr., one of the lgst. livestock and meat-packing ctrs. in the U.S., gold and silver smelting and refining; p. (1950) *251,117*.
Oman, *see* **Muscat and Oman.**
Oman, G. of, Arabian Sea; connected through strait of Hormuz to Persian G.; length 300 m., width 130 m.
Omaruru, *t.*, S.W. Africa; creamery, aerodrome; p. *1,912*.
Ombai Is., Indonesia; N. of Timor.
Omdurman, *c.*, Sudan on R. Nile, opp. Khartoum; built by the Mahdi; old Dervish cap.; here Kitchener defeated the Dervishes, 1898; tr. in ivory, gum arabic, cattle, camels; p. (estd. 1956) *130,000*.
Ometepe, *I.*, L. Nicaragua, Central America, with volcano; alt. 5,747 ft.
Omine, *t.*, Japan; anthracite coal-mines.
Omsk, *t.*, W. Siberia, R.S.F.S.R.; on the R. Irtish; on Trans-Siberian Rly., caravan ctr.; cath.; engin., chemicals, textiles; p. (1959) *579,000*.
Omuta, *t.*, Kyushu, Japan; coal; p. (1950) *191,978*.
Onate, *t.*, Guipuzcoa, Spain; nr. Bilbao; industl.
Onega, *L.*, R.S.F.S.R.; 85 m. from L. Ladoga; a. 3,765 sq. m.; connection with R. Volga by canal.
Onega, *R.*, R.S.F.S.R.; flows to G. of Onega; length 400 m.
Onega, *spt.*, White Sea, R.S.F.S.R.; sawmills and fisheries; p. *10,000*.
Oneglia, *spt.*, Italy; on G. of Genoa, nr. Nice, Italy; olive-oil tr.
Onehunga, *spt.*, *bor.*, N.I., N.Z.; nr. Auckland; p. (1951) *16,968*.
Oneida, *L.*, N.Y., U.S.A.; nr. Syracuse; 20 m. by 6 m.; discharges via Oneida R. to Seneca R.
Oneonta, *t.*, N.Y., U.S.A.; on Susquehanna R.; rly. wagon wks.; p. (1950) *13,564*.
Onomichi, *t.*, Honshu, Japan; p. (1947) *48,726*.
Onstwedde, *t.*, Groningen, Neth.; mnfs.; p. (1951) *21,853*.
Ontario, *L.*, N. America; smallest of the Gr. Lakes of the St. Lawrence basin, separating the Canadian prov. of O. from N.Y., U.S.A.; a. 7,500 sq. m.; depth 740 ft.
Ontario, *prov.*, Canada; formerly called Upper Canada; St. Lawrence and Ottawa Rs., Gr. Lakes; extreme climate, milder in peninsula in S.; coniferous forest; good communications; hydro-elec. power; wheat, oats, fruit, dairying, cattle, lumbering, gold, silver, copper, lead, nickel, oil, farm implements, rly. rolling stock, machin., textiles, wood pulp, newsprint; cap. Toronto; contains Ottawa; a. 412,582 sq. m.; p. (1956) *5,404,933*.
Onteniente, *t.*, Valencia, Spain; on R. Clariano; industl.; p. *13,564*.
Oodnadatta, *t.*, S. Australia; on uncompleted N. to S. trans-continental rly.; p. *100*.
O'okiep, *t.*, C. of Good Hope, S. Africa; copper-mining dist.; p. (with neighbouring villages—whites and non-whites) *5,000*.
Oosterhout, *t.*, N. Brabant, Netherlands; nr. Breda; mnfs.; p. (1951) *20,761*.
Ootacamund, *t.*, Madras, India; ch. t. in Nilgiri Hills; summer headquarters of Madras Govt.; sanatorium; p. (1941) *29,850*.
Opala, *t.*, Belgian Congo; on Lomami R.; palm-nuts, gum copal.
Opalton, *t.*, Queensland, Australia; opals.
Opatija, (former It. **Abbazia**), *t.*, Jugoslavia, tourist resort known as the "Nice" of the Adriatic.
Opava, (former **Troppau**), *t.*, N. Czechoslovakia; textiles, paper., sugar; p. (1957) *42,308*.
Ophir, *dist.*, N.S.W., Australia; nr. Bathurst; gold.
Ophir, *mtn.*, Malay Peninsula; alt. 5,693 ft.
Ophir, *mining t.*, S.I., N.Z.; nr. Dunedin.
Opladen, *t.*, N. Rhine-Westphalia, Germany; on R. Wupper; metals, textiles, chemicals; p. (estd. 1954) *26,900*.
Opobo, *spt.*, Nigeria; exp. palm-oil and kernels.
Opole (Oppeln), *t.*, Upper Silesia, Poland, German before 1945; on R. Oder; former cap. of principality; remains of palace; seat of administration Upper Silesia; engin.; p. (1946) *27,666*.
Oporto, *spt.*, Portugal; on R. Douro; second c. in Portugal; comm.; royal palace of Torre de Marca; cath.; univ.; ctr. of port-wine tr., sardine fisheries, cottons, woollens, silks, distilling, sugar refineries; fruit; p. (1950) *279,738*.
Opotiki, *bor.*, N.I., N.Z.; ctr. of maize dist.; p. (1951) *1,996*.
Oppeln, *see* **Opole.**

Oppland, *co.*, Norway; a. 9,608 sq. m.; p. (1950) *160,421*.
Oradea, (former Nagyvarad), *t.*, Romania; nr. Hungarian border; rly. junction, farming, pottery, engin.; p. (1945) *82,120*.
Öraefa Jokull, *highest mtn.*, Iceland; alt. 6,409 ft.
Oran, *dep.*, N. Algeria; p. (1948) *1,990,729*.
Oran, *spt.*, Algeria; cath.; mosque; tr. in wines, wool, cereals, cattle, sheep, hides; French naval and military sta.; p. (1948) *256,661* (Greater Oran, *273,402*).
Orange, *t.*, N.S.W., Australia; fruit growing, gold, copper, silver; p. (1958) *19,030*.
Orange, *ancient t.*, Vaucluse, France; silks, sugar, fruit; p. (1954) *17,478*.
Orange, *t.*, Mass., U.S.A.; p. (1950) *4,048*.
Orange, *c.*, N.J., U.S.A.; adj. Newark; calculating machines, radio, textiles, drugs; p. (1950) *38,037*.
Orange, *C.*, N. Brazil, S. America.
Orange, *R.*, C. of Good Hope, S. Africa; flows from Basutoland to the Atlantic; part forms S. bdy. between C. of Good Hope and Orange Free State; length 1,300 m.
Orange Free State, *prov.*, Union of S. Africa; plateau land, Drakensberg to N.E., Rs. Orange, Vaal and Caledon; sheep, cattle, horses, wheat, maize, fruit, tobacco, coal, diamonds; cap. Bloemfontein; a. 49,647 sq. m.; p. (1951) *1,018,207* (inc. *227,587* whites).
Oranienburg, *t.*, Brandenburg, Germany, on R. Havel, nr. Potsdam; industl.; chemicals, metals, machin.; p. (estd. 1954) *18,300*.
Oras, *t.*, Samar, Philippines; p. *20,962*.
Orastie, *t.*, Romania; on R. Muresul; p. *8,817*.
Orbetello, *t.*, Tuscany, Italy; cath.; p. *10,631*.
Ord of Caithness, *hill, headland*, nr. Helmsdale, Scot.; alt. 1,200 ft.
Ordos, *region*, China; deriving its name from Mongol tribe who inhabit same; mean alt. 3,300 ft.
Ordu, *spt.*, Turkey; on N. cst.; gd. tr.; exp. manganese; p. (1945) *10,346*.
Ordzhonikidze, *t.*, Caucasia, R.S.F.S.R.; hydro-elec., lead, silver and zinc smelting; p. (1959) *164,000*.
Ore Mtns., *see* **Erzgebirge**.
Orebro, *co.*, Sweden; timber, machin., matches; cap. Orebro; a. 3,650 sq. m.; p. (1950) *247,023*.
Orebro, *t.*, *cap.*, Orebro, Sweden; shoes, gas; p. (1951) *66,548*.
Oregon, *Pacific st.*, U.S.A.; Cascade, Cst. and Blue Mtns.; Colombia R. and tribs.; L. valleys; rainy cst., drier interior (agr. with irrigation); cereals, sugar-beet, fruit, cattle, gold, silver, copper, coal, uranium; fisheries, canning, meat-packing, timber, milling; cap. Salem; a. 96,981 sq. m.; p. (1950) *1,521,341*.
Oregon City, Ore., U.S.A.; on Willamette R. at the falls; p. (1950) *7,682*.
Orekhovo-Zuyevo, R.S.F.S.R.; E. of Moscow, on R. Klyazma; cottons, woollens, silk, linen and knitted goods; p. (1959) *108,000*.
Orel, *t.*, R.S.F.S.R.; on R. Oka; univ.; iron, engin.; p. (1959) *152,000*.
Orense, *inland prov.*, N.W. Spain; timber and fruit-growing, agr.; cap. Orense; a. 2,694 sq. m.; p. (1950) *467,903*.
Orense, *t.*, cap. Orense, Spain; on R. Minho; flour, leather, iron; p. (1950) *52,837*.
Ore Sound, *str.*, between Sjaelland and S. Sweden; freezes occasionally.
Orford Ness, Suffolk, Eng.; coastal promontory 2¼ m. long.
Oriente, *prov.*, Cuba; a. 14,128 sq. m.; p. (1943) *1,356,489*.
Oriente, *terr.*, S. America; in dispute between Peru and Ecuador; situated E. of Andes, between R. Putumayo and R. Marañon; mainly dense forest, reputedly rich in minerals.
Orihuela, *t.*, Alicante, Spain; on R. Segura; leather, silks, textiles, wine, cereals, fruit; p. (1948) *43,619*.
Orillia, *t.*, Ont., Canada; wood-working, metal; p. (1941) *9,798*.
Orinoco, *R.*, Venezuela; rises in Parima mtns. and flows circuitously to the Atlantic opposite Trinidad; its trib., the Cassiquiare, connects it with the Rio Negro and the Amazon; length 1,480 m.
Orissa, *st.*, India; rice prod.; cap. Bhuvaneshwar; a. 60,136 sq. m.; p. (estd. 1957) *14,645,946*.
Oristano, *spt.*, Cagliaria, Sardinia; cath.; p. *7,350*.
Orizaba, *t.*, Veracruz, Mexico; cotton mills, coffee, cotton, sugar, maize; p. (1940) *47,956*.
Orizaba, *mtn.*, Veracruz, Mexico; volcanic; called Citlatépetl in Aztec times; alt. 18,701 ft.
Orkney, *co.*, Scot.; a gr. of 68 Is. in the N. Sea, 29 being inhabited; principal Is. Pomona, Sanday, Westray; antiquarian remains, stone circles; farming, fishing; cap. Kirkwall; total a. about 360 sq. m.; p. (1951) *21,258*.
Orlando, *c.*, Fla., U.S.A.; winter resort; citrus fruit; industl.; p. (1950) *52,367*.
Orléanais, *old prov.*, France, corresponding mainly to deps. Loire-et-Cher, Eure-et-Loire and Loiret.
Orléans, *c.*, Loiret, France; on R. Loire; cap. of Orléanais; cath.; gr. tr. in wine, brandy, wool, blankets, etc.; farm implements; statue of Joan of Arc; p. (1954) *76,439*.
Orleans, I. of, Quebec, Canada; in St. Lawrence R., nr. Quebec; a. 70 sq. m.
Ormes Head, Great and Little, promontories on cst. Caernarvon, N. Wales.
Ormos, *t.*, Philippines.
Ormskirk, *t.*, *urb. dist.*, Lancs, Eng.; 14 m. N.E. of Liverpool; light engin., clothing, timber, agr.; p. (1951) *20,554*.
Orne, *dep.*, Normandy, France; agr., dairying, stock-keeping, fruit-growing, cider, mineral springs, iron; cap. Alençon; a. 2,372 sq. m.; p. (1954) *274,862*.
Örnsköldsvik, *t.*, Sweden; on G. of Bothnia; p. *6,338*.
Oronsay, *sm. I.*, S. Colonsay, Argyll, Scot.
Orontes, *R.*, Lebanon, Syria, Turkey; rises in Lebanon Mtns., flows N. in deep trench between Lebanon and Anti-Lebanon Mtns. to Plain of Antioch (Antakya), then turns W. and breaks through mtns. to Mediterranean Sea; upper valley above Hama forms cultivated belt, width 10 m., used by Aleppo–Beirut rly.; middle valley is marshy; lower valley and Plain of Antioch intensively cultivated, mulberry, citrus and hard fruits, grain; length over 400 m.
Oroquieta, *t.*, Mindanao, Philippines; p. *26,640*.
Orosháza, *mkt. t.*, S.E. Hungary; in agr. and pig-keeping dist.; p. *27,061*.
Orotava, *t.*, Tenerife, Canary Is.
Oroya, *t.*, Peru, S. America; copper smelting; p. (1947) *17,076*.
Orpington, *urb. dist.*, W. Kent, Eng.; p. (1951) *63,344*.
Orrell, *t.*, *urb. dist.*, Lancs, Eng.; W. of Wigan; p. (1951) *9,317*.
Orsha, *t.*, Byelorussian S.S.R.; on R. Dnieper; textiles; p. (1959) *64,000*.
Orsk, *t.*, R.S.F.S.R.; on R. Ural; growing industl. t. of the Ural industl. reg.; iron and steel, locomotives, iron–chrome–nickel ores; term. of oil pipeline; p. (1959) *176,000*.
Orsono, *prov.*, Chile; a. 3,866 sq. m.; p. (1957) *147,693*.
Orsova, *mkt. t.*, Romania; on R. Danube, nr. the Iron Gates Pass; oil-refining; p. *5,107*.
Orta, *L.*, Italy; W. of Lago Maggiore; a. 7 sq. m.
Orta, *t.*, Foggia prov., Italy; on shore of L. Orta.
Ortegal, *C.*, N. cst. Spain.
Orthez, *t.*, Basses-Pyrénées, France; scene of Wellington's victory over Soult (1814); leather, hams, chocolate; p. (1954) *6,713*.
Ortona, *t.*, Abruzzi Molise, Italy; cap. of ancient Frentani; on Adriatic; cath.; wines; p. *19,104*.
Oruro, *dep.*, Bolivia; a. 20,657 sq. m.; cap. Oruro; p. (1950) *210,260* (large proportion Indians).
Oruro, *t.*, Bolivia; alt. 12,160 ft.; gold, silver, copper, tin; p. (1957) *75,468*.
Orvieto, *t.*, Umbria, Italy; on R. Paglia; cath., Etruscan antiquities; wines, olive oil, cereals; pottery, lace; p. *20,352*.
Orwell, *R.*, Suffolk, Eng.; estuary of R. Gipping; runs from Ipswich to Harwich.
Osaka, *lge. spt.*, *c.*, *comm. ctr.*, Honshu I., Japan; gr. tr.; silk, cotton, rayon cloth, tea, iron, glass, shipbldg., sugar-refining, arsenal; Shinto and Buddhist temples; p. (1955) *2,547,321*.
Oschersleben, *t.*, Saxony–Anhalt, Germany; nr. Magdeburg; sugar, chemicals, engin.; p. (estd. 1954) *22,400*.
Osel I. (Saaremaa), Baltic, Estonian S.S.R.; ch. t. Kuressare.
Osh, *t.*, Kirghiz, S.S.R.; p. (1959) *65,000*.

Oshawa, *t.*, Ontario, Canada; motors; p. (1941) *26,813.*
Oshima, gr. of Is., S. of Kyushu, Japan; a. 3 sq. m.
Oshkosh, *c.*, Wis., U.S.A.; on Fox R.; meat packing, farming, flour, motors; p. (1950) *41,084.*
Oshogbo, *t.*, Nigeria; p. (1953) *123,000.*
Osijek (Esseg), *t.*, Croatia, Jugoslavia; nr. Hungarian front; cottons, silks, beet-sugar, glass, oil refining; p. (1954) *57,320.*
Osipenko (Berdyansk) *spt.*, Ukrainian S.S.R.; on Sea of Azov; a ctr. of the salt ind.; exp. grain, hemp, wool; agr. machin.; engin., oil refining; p. (1959) *65,000.*
Oskaloosa, *t.*, Iowa, U.S.A.; in agr. and colly. region; p. (1950) *11,024.*
Oskarshamn, *spt.*, Sweden; on Kalmar Sound; seldom icebound; shipbldg.; p. *10,810.*
Oslo (formerly **Christiania**), *c.*, *cap.*, *ch. spt.*, Norway; on fjord of same name; cath., univ.; woollens, cottons, condensed milk, paper; exp. timber, fish, matches; p. (1950) *434,047.*
Osnabrück, *c.*, N. Rhine-Westphalia, Germany; cath., cas.; textiles, machin., tobacco, metals; rly. junction; p. (estd. 1954) *121,400.*
Osorno, *t.*, Chile; agr. ctr.; timber; people mainly German; p. (1952) *40,120.*
Osorno, *mtn.*, Chile; volcanic peak, 8,790 ft.
Osorno, *prov.*, S. Chile; p. (1952) *121,990.*
Ossa (Kissavos), *mtn.*, Thessaly; N. of Vale of Tempe and Olympus; alt. 6,194 ft.
Ossett, *mun. bor.*, W.R. Yorks, Eng.; 3 m. W of Wakefield; woollens, coal-mining, engin.; p. (1951) *14,576.*
Ossining, *t.*, N.Y., U.S.A.; on Hudson R.; famous "Sing-Sing" prison; p. (1950) *16,098.*
Ossipevsk (Berdichev), *t.*, Ukrainian S.S.R.; tobacco, soap, leather; p. (1959) *53,000.*
Ostend, *spt.*, Belgium; passenger route between Britain and continent of Europe; popular resort; casino, fisheries, shipbldg., textiles, tobacco; p. (estd. 1957) *54,297.*
Östergötland, *co.*, Sweden; on the Baltic cst.; a. 4,266 sq. m.; cap. Linköping; p. (1950) *347,674.*
Östersund, *t.*, Jämtland, Sweden; on Storr L.; industl.; p. (1951) *21,378.*
Östfold, *dist.*, Norway; a. 1,613 sq. m.; p. (1950) *185,419.*
Ostia, *ancient port*, Italy; at mouth of R. Tiber; marshy situation; arch. remains, cath.; p. *4,000.*
Ostrava, *see* **Moravska Ostrava.**
Ostrog, *t.*, on Horyn R., W. part of Ukrainian S.S.R. (Volhynia), U.S.S.R.
Ostrogochsk, *t.*, R.S.F.S.R.; nr. R. Don; tallow and cattle tr., tanneries; p. *10,000.*
Ostrow, *t.*, Poznan, Poland; agr. machin.; perfume; p. *30,808.*
Ostrow Mazowiecka (Ostrov), *t.*, Poland; nr. Warsaw; p. *14,658.*
Ostrowiec (Ostrovets), *t.*, Kielce, Poland; on trib. Oder; lignite, iron ore, iron; cattle mkt.; p. (1957) *35,000.*
Ostuni, *t.*, Leece, Italy; mnfs. and tr.; p. *27,602.*
Osuna, *t.*, Seville, Spain; p. *24,228.*
Oswaldtwistle, *t.*, *urb. dist.*, Lancs, Eng.; at N. foot of Rossendale Fells, 3 m. E. of Blackburn; cotton weaving, spinning and dyeing; chemicals; p. (1951) *12,133.*
Oswego, *c.*, N.Y., U.S.A.; on L. Ontario; taken by Montcalm 1756, and the British 1814; water-power; hosiery, matches, textiles, engines; p. (1950) *22,647.*
Oswestry, *mkt. t.*, *mun. bor.*, Salop, Eng.; at foot of Welsh mtns., 18 m. N.W. of Shrewsbury; cas.; rly. engine wks.; p. (1951) *10,713.*
Otago, *dist.*, S.I., N.Z.; mtnous., afforested, rich in gold; farming, sheep, fruit; cap. Dunedin (*q.v.*); a. 25,220 sq. m.; p. (estd. 1958) inc. Southland *262,500.*
Otago Harbour, Otago dist., S.I., N.Z.; Dunedin and Port Chalmers are ports on this harbour.
Otaru, *spt.*, Hokkaido, Japan; herring fisheries; coal-mining, lumbering; p. (1950) *178,330.*
Otavalo, *t.*, Ecuador; wool, ponchos, carpets; p. *15,000.*
Otira Tunnel, S.I., N.Z.; carries rly. from Christchurch to Greymouth through S. Alps nr. Arthur's Pass; length 5¼ m.
Otley, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Wharfe, 10 m. N.W. of Leeds; printing, machin., wool, paper mkg., leather, furnishings; p. (1951) *11,568.*
Otranto, *fishing t.*, S. Italy; on Strait O.; cas.; submarine cable sta.; once a flourishing c.; cath., fine mosaic pavement; p. *2,950.*
Otsu, 2 *ts.*, Hokkaido, Japan; busy tr.; ps. *100,000* and *67,532.*
Ottawa, *c.*, Ontario, Canada; cap. of Dominion of Canada; on R. Ottawa, 100 m. W. of Montreal; univ., caths., parliament bldgs.; hydro-elec. power, lumbering, sawmills, paper, flour, leather, matches, machin., ironware; p. (1956) *222,129.*
Ottawa, *R.*, Canada; trib. of St. Lawrence, forming boundary between Ontario and Quebec; length 625 m.
Ottawa, *t.*, Ill., U.S.A.; at mouth of Fox R.; grain, glass; p. (1950) *16,957.*
Ottawa, *t.*, Kan., U.S.A.; on Osage R.; rly. wks.; p. (1950) *10,081.*
Ottery St. Mary, *mkt. t.*, *urb. dist.*, Devon, Eng.; 10 m. E. of Exeter; silk, rope, brushes; birthplace of S. T. Coleridge; p. (1951) *4,015.*
Ottoshoop, *t.*, Transvaal, S. Africa; gold, fluorspar.
Ottumwa, *c.*, Iowa, U.S.A.; on Des Moines R.; in midst of great coalfield and agr. dist.; iron and steel, meat packing; p. (1950) *31,570.*
Otway, *hills*, S.W. extremity of Victoria, Australia; sheep.
Ouachita or **Washita**, *R.*, Arkansas, U.S.A.; trib. of Red R.; length 550 m.
Oudenaarde (Audenarde), *t.*, Belgium; town hall; Allies defeated French 1708; textiles; p. *6,525.*
Oudh, *see* **Uttar Pradesh, India.**
Oudtshoorn, *t.*, C. of Good Hope, S. Africa; on Olifants R.; ostrich farms, tobacco, fruit; p. (1946) *8,174.*
Ougadougou, *dist.*, transferred from Ivory Cst. to Upper Volta, W. Africa.
Ougadougou, *t.*, *cap.*, Upper Volta, Fr. W. Africa; p. *18,000.*
Oughter, L., *lough*, Cavan, Ireland.
Oughterard, Galway, Ireland; marble quarries, farming, fishing.
Oujda, *t.*, Morocco; phosphate dist.; p. (1946) *88,500* (of which *26,500* Europeans).
Oullins, *t.*, dep. Rhône, France; nr. Lyons; locomotive repair shops; textiles, glass, leather; p. (1954) *19,224.*
Oulton Broad, *L.*, Suffolk, Eng.; nr. Lowestoft.
Oulu (Uleåborg), *co.*, N. Finland; partly forest and partly agr.; cap. Oulu; a. 21,887 sq. m.; p. (1950) *360,078.*
Oulu (Ouleåborg), *t.*, *cap.*, Oulu, Finland; on G. of Bothnia (Baltic Sea) at mouth of R. Oulu; lumbering; p. (1950) *37,896.*
Oulu, *L.*, Finland; 40 m. long.
Oundle, *mkt. t.*, *urb. dist.*, Northants, Eng.; on R. Nene, 7 m. S.W. of Peterborough; famous public school; brewing; p. (1951) *2,224.*
Ouro Preto, *t.*, Brazil; former cap. of Minas Gerais st.; iron, manganese, gold; fruit, coffee; textiles, footwear; p. *8,819.*
Ourthe, *R.*, Belgium; trib. of R. Meuse; length 90 m.
Ouse or **Great Ouse**, *R.*, Norfolk, Eng.; flows N.E. to the Wash; length 156 m.
Ouse, *R.*, Yorks, Eng.; formed by Rs. Swale and Ure, flows to Humber estuary; length 130 m.
Ouse, *R.*, Sussex, Eng.; flows to English Channel at Newhaven; length 30 m.
Ovalle, *t.*, Chile; agr. ctr.; fruit, wool; p. *14,807.*
Ovamboland, *native reserve* (*Bantus*), N. of S.W. Africa; agr.
Ovar, *t.*, Beira Litoral, Portugal; on Avera lagoon; onions and other vegetables, sardines, wine, wheat; p. *12,729.*
Overijssel, *prov.*, Neth.; bordering on Zuider Zee; dairying, fishing, cottons; a. 1,299 sq. m.; p. (1948) *644,492.*
Overton, *t.*, *rural dist.*, Flint, N. Wales; 5 m. S.E. of Wrexham; p. (rural dist. 1951) *6,760.*
Oviedo, *maritime prov.*, N. Spain; agr. fruit, sardine, and other fisheries; cap. O.; a. 4,204 sq. m.; p. (1950) *888,149.*
Oviedo, *t.*, *cap.*, Oviedo, Spain; on R. Nalon; Gothic cath., univ.; coal; textiles, leather, matches; gr. mkt.; p. (1950) *102,991.*
Owatonna, *t.*, Minn., U.S.A.; p. (1950) *10,191.*
Owen Falls Dam, Uganda; inaugurated 1 Apr. 1954; converts L. Victoria into reservoir for irrigation of Egypt and Sudan; also to supply Uganda industries with hydro-elec. power.
Owen Sound, *t.*, *L. pt.*, Ontario, Canada; on S.W. cst. of Georgian Bay, L. Huron; E. terminus

of lgst. wheat-carrying L. steamers; linked by rly. to Toronto (125 m.) and Montreal; p. (1941) *14,002*.

Owen Stanley, *range*, Papua, New Guinea; highest peak Mt. Victoria; alt. 13,121 ft.

Owens, L., S. Cal., U.S.A.; on E. flank of Sierra Nevada 20 m. S.E. of Mt. Whitney; water taken by 225-m.-long aqueduct to Los Angeles; a. 120 sq. m.

Owensboro', *t.*, Ky., U.S.A.; petroleum, farming, stock-raising, tobacco; p. (1950) *33,651*.

Owosso, *c.*, Mich., U.S.A.; on Shiawassee R.; timber tr.; p. (1950) *15,948*.

Owyhee, *R.*, Ore., U.S.A.; trib. of Snake R.; length 350 m.

Oxford, *co.*, S. Midlands, Eng.; mainly agr.; cereals, paper, gloves, blankets, agr. implements, motor cars; cap. O.; a. 749 sq. m.; p. (1951) *275,765*.

Oxford, *c., co. bor.*, Oxford, Eng.; on R. Thames, at confluence of Rs. Cherwell and Isis (Thames); famous univ. of 21 colleges; motor cars; p. (1951) *98,675*.

Oxus R., *see* **Amu Darya**.

Oyashio, *see* **Bering Current**.

Oyem, *t.*, Gabun rep., Equatorial Africa; p. *1,000*.

Oyo, *t.*, Nigeria; p. (1953) *72,000*.

Oyster Bay, *t., cst. resort*, N.Y., U.S.A.; on Long I.; home of Theodore Roosevelt; p. (1950) *5,215*.

Ozark Mtns., Okla. and Ark., U.S.A.; lead, zinc; ch. t. Joplin.

Ozd, *t.*, Hungary; p. *21,277*.

Ozieri, *t.*, Sardinia, Italy; p. *10,541*.

Ozorkow, *t.*, Poland; nr. Lodz; mnfs.; p. *11,000*.

P

Paarl, *t.*, C. of Good Hope, S. Africa; summer resort; wines, fruit, tobacco; p. (1946) *10,935*.

Pabianice, *t.*, Poland; nr. Lodz; textiles, farming implements, paper; p. *37,140*.

Pabna, *t.*, Bengal, E. Pakistan; oil, carpets; p. (1941) *32,929*.

Pacasmayo, *spt.*, Peru, S. America; exp. rice, cotton, silver, hides, copper; p. (1947) *6,615*.

Pachino, *t.*, Sicily, Italy; nr. C. Passaro; grapes, basket-mkg., fishing.

Pachitea, *R.*, Peru, S. America; rises in Andes, flows N. to R. Ucayali; sm. German immigrant colonies in upper valley; length 320 m.

Pachmarhi, Madhya Pradesh, India; summer cap., tourist ctr.

Pachuca, *cap.*, Hidalgo st., Mexico; silver; p. (1940) *59,351*.

Pacific Ocean; a. 68,000,000 sq. m.; lgst. ocean in the world; extends from W. cst. of America to E. cst. of Asia and Australia and the S. Ocean in the S.; enters Arctic Ocean via Bering Strait; greatest length N. to S. 8,000 m.; breadth, 10,000 m.; mean depth 12,560 ft., greatest depth 37,800 ft. in the Marianas Trench (1960 dive).

Padang, *spt.*, Sumatra, Indonesia; coffee, spices, rubber, tobacco, copra; p. *52,054*.

Paddington, *metropolitan bor.*, W. London, Eng.; residtl. and industl.; p. (1951) *125,281*.

Paderborn, *c.*, N. Rhine–Westphalia, Germany; cath., other historic bldgs.; foodstuffs, textiles, metals; p. (estd. 1954) *41,900*.

Padiham, *urb. dist.*, Lancs, Eng.; at N. foot of Rossendale Fells, 4 m. S.W. of Nelson; textiles; p. (1951) *10,031*.

Padrón, *t.*, Spain; ruined cath.; grain, grapes and fruit-growing dist.; textile mnfs.

Padstow, *t., spt., urb. dist.*, Cornwall, Eng.; on W. side of Camel estuary 4 m. N.W. of Wadebridge; light inds.; sm. seaside resort; p. (1951) *2,852*.

Padua, *t.*, Italy; cath., arcades, ancient bridges; machin., chemicals, silks, cloth, distilling; p. (1951) *166,072*.

Paducah, *c.*, Ky., U.S.A.; on Ohio R.; saw-mills, tobacco, railway wks.; p. (1950) *32,828*.

Paeroa, *bor.*, N.I., N.Z.; p. (1951) *2,588*.

Pag, *I.* and *spt.*, Jugoslavia; timber, salt; cath.; p. (of I.) *4,349*.

Pagan, *t.*, Burma; ruins; lacquer work.

Pago-Pago, *spt.*, Samoan Is., Pac. Oc.; U.S. naval sta.; p. (1950) *1,586*.

Pahang, *st.*, Federation of Malaya; cap. Kuala Lipis; largely forested; a. 13,280 sq. m.; p. (1957) *321,978*.

Pahiatua, *bor.*, N.I., N.Z.; dairying; p. (1951) *2,096*.

Pahlevi, *t.*, Persia; nr. Resht, on Caspian Sea; rice, hides, skins, fruit; p. (estd. 1949) *48,000*.

Pai Ho (Hai Ho), *R.*, Hopeh, N. China; rises in mtns. of Jehol, flows S.E. into G. of Pohai 40 m. downstream from Tientsin; mouth blocked by sand-bar, but lower R. carries heavy river-boat and barge traffic; length 290 m.

Paignton, *t., urb. dist.*, S. Devon, Eng.; on Tor Bay; seaside resort; farming, cider; p. (1951) *25,369*.

Paimpol, *fishing pt.*, Côtes du Nord, N.W. France; on N. cst. of Brittany, 20 m. N.W. of St. Brieuc; specialises in lobster fishing; p. *2,795*.

Painted Desert, area of bare, multi-coloured rocks, Arizona, U.S.A.

Paisley, *burgh*, Renfrew, Scot.; 5 m. W. of Glasgow; ancient abbey; thread and rope spinning, shipbldg., chemicals, engin., preserves; p. (1951) *93,704*.

Pakhoi, *former treaty pt.*, Kwangtung prov., China; indigo, groundnuts, hides, leather, sugar, fish; p. (1931) *36,000*.

Pakistan, *Islamic rep.*, constituted as dominion 1947, forming part of sub-continent of India; consists of provs. of Baluchistan, E. Bengal (inc. practically all Sylhet), N.W. Frontier, W. Punjab and Sind; products, cereals, tobacco, oil seeds, jute, tea; cap. Karachi; a. 360,780 sq. m.; p. (1956) *83,603,000*.

Paknampoh, *t.*, Siam; on R. Meinam, at upper limit of steam navigation.

Pakokku, *t.*, Burma; comm. ctr.; sugar, rice, tobacco, oil-fields, teak; p. *23,115*.

Palagruz, *I.*, Adriatic Sea; formerly Italian; ceded to Jugoslavia by peace treaty 1947.

Palamau, *t.*, Bihar, India; on R. Koel; shellac, cement; p. (1941) *22,655*.

Palamos, *spt.*, Spain; E. of Gerona; p. *5,037*.

Palanpur, *t.*, Bombay, India; p. *10,000*.

Palau Is., *group of Is.*, in Pac. Oc.; p. (1958) *8,845*.

Palatinate, *see* **Rhineland Palatinate, Germany**.

Palawan, *I.*, Philippines; coffee, resin, timber; a. 4,550 sq. m.; p. *107,000*.

Palembang, *t.*, Sumatra, Indonesia; cap. P. residtl.; cotton, rubber, coffee; p. (1940) *109,000*.

Palencia, *inland prov.*, Old Castile, Spain; partly fertile plain, partly wooded and mountainous; cap., Palencia, a. 3,093 sq. m.; p. (1950) *233,290*.

Palencia, *t., cap.*, Palencia, Spain; N. of Valladolid; ctr. of rich wheat-growing dist.; iron-founding and weaving; p. (1949) *40,028*.

Palermo, *spt.*, Sicily, Italy; cath., univ.; machin., chemicals, wines, fruit, tobacco; p. (1951) *483,777*.

Palestine or **The Holy Land** (*see also* **Israel**), *ancient and biblical c.*, bounded by Syria and Lebanon on the N., Jordan on the E., the Egyptian prov. of Sinai on the S., and the Mediterranean on the W.; a. when under British mandate 10,429 sq. m.; p. (estd. 1948) *782,000*.

Palestine, *t.*, Texas, U.S.A.; agr. and forest region; p. (1950) *12,503*.

Palghat, *t.*, Madras, India; p. (1941) *46,000*.

Palitana, *t.*, Bombay, India; a. c. of Jain temples inhabited by priests and their servants; p. (1941) *76,432*.

Palk Strait, India; separating India from Ceylon.

Palm Beach, *t.*, Fla., U.S.A.; winter resort; grapefruit; p. (1950) *3,886*.

Palma, *spt.*, Majorca I., Spain; caths., palaces; wine, fruit, silk; cap. Balearic Is.; p. (1950) *136,814*.

Palmarola I., Pontine Is., Italy; vineyards.

Palmerston North, *c.*, N.I., N.Z.; dairying, sheep; rly. junction; p. (estd. 1958) *39,800*.

Palmira, *t.*, Colombia; tobacco, coffee, rice, cocoa, sugar, grain; p. (1947) *21,235*.

Palmyra (ancient Tadmor), *c.*, in Syrian desert, 120 m. N.E. of Damascus; extensive ruins; p. *10,000*.

Palmyra Is., Pac. Oc., U.S.A.; coral islets; coconuts; p. *32*.

Palni Hills, *range*, between E. and W. Ghats, S. Deccan, India; highest peak 7,050 ft.

Palos, *spt.*, Huelva, S. Spain; on Rio Tinto; starting point for Columbus in 1492.

Palos, C. de., Mediterranean, S.E. cst. of Spain.

Pamiers, *t.*, Ariège, France; elec. steel furnaces; wine; leather; p. (1954) *12,822*.

Pamir Mtns., Tadzik S.S.R.; "Roof of the World"; plateau region in Central Asia; Stalin Peak 24,590 ft.

Pamlico Sound, *lge. lagoon*, on E. cst. of N.C., U.S.A.; length 75 m., width 25 m.

Pampa, La, *terr.*, Central Argentina; stock-rearing; cap. Santa Rosa; a. 55,669 sq. m.; p. (1947) *166,929*.

Pampas, Argentina; vast plains stretching from the Rio Negro on the S. to the Gran Chaco in the N., and E. from the Andes to the Atlantic; woodless, level country; rich pastures in E., supporting countless numbers of sheep and cattle, W. mostly barren.

Pamplona, *t.*, Colombia; dyewoods, resin, gums, coal, gold, coffee, cocoa, wheat, brewing, textiles; p. (1947) *13,126*.

Pamplona, *t.*, Spain; cath., fortress; textiles, leather, paper, flour, soap, earthenware; p. (1950) *72,483*.

Panagyurište, *t.*, Bulgaria; p. *12,015*.

Panama, *rep.*, Central America; mountainous; climate hot throughout year, abundant rains; languages Spanish; religion R.C.; communications poor; cattle-raising, farming; pearls, bananas, cocoa, coconuts, rubber, sugar, coffee, timber, shrimps; cap. Panama; a. 28,575 sq. m.; p. (1950) *756,631*.

Panama, *spt.*, Panama; cath.; harbour at S. entrance to Canal; p. *123,000*.

Panama, *canal zone*, Panama; strip of land 47 m. long by 10 m. wide, extending 5 m. on either side Panama Canal, under U.S. jurisdiction; p. (1954) *38,953* (excluding Forces personnel).

Panama Canal, Canal Zone, Panama; length 51 m. ranging in width from 300 to 1,000 ft., minimum depth 41 ft.; time of transit through canal 7–8 hours; canal starts at Cristobal (Atlantic), to Gatun locks, through Gatun Lake, Culebra cut, Pedro Miguel locks, Miraflores locks to Balboa (Pacific).

Panaria, *I.*, Lipari Is., Italy; a. 1 sq. m.; hot springs, vineyards, olives.

Panarukan, *spt.*, Java, Indonesia; exp. tobacco, sugar; p. *7,455*.

Panay, *I.*, Philippines; between Negros I. and Mindoro I.; a. 4,446 sq. m.; cotton, rice, sugar, coffee.

Pancevo, *t.*, Voivodina, Jugoslavia; wheat, maize, timber, glass, textiles, ironwks.; p. (1953) *30,103*.

Pandharpur, *t.*, Bombay, India; on R. Bhima; temple, pilgrimages; p. (1941) *25,000*.

Pando, *dep.*, Bolivia; p. *18,600*; cap. Cobija; p. (1950) *19,804*.

Pando, *t.*, Uruguay; p. *9,600*.

Panevežys, *t.*, Lithuanian S.S.R.; textiles; p. (1954) *60,000*.

Pangalanes Canal (Canal Des Pangalanes), Madagascar; follows E. cst. from Farafangana to Tamatave, through series of lagoons; length 300 m.

Pangani, *spt.*, Tanganyika Terr., Africa; copra, sisal hemp, maize; p. *3,000*.

Pangkalanbrandan, *spt.*, Sumatra, Indonesia; oil-refining and exp.

Panipat, *t.*, E. Punjab, India; silver and brass, cotton goods, blankets, carpets, pottery; p. (1941) *37,837*.

Panjsher Valley, Afghanistan; silver-mines, unexploited; mica-mine.

Pantar I., Lesser Sunda Is., Indonesia; mtns.; p. *8,000*.

Pantelleria, *volcanic I.*, Mediterranean, Italy; midway between W. Sicily and Tunisia; a. 58 sq. m.; ch. t. P. on N.W. cst.; figs, raisins, vines, capers, cereals; fishing; p. *10,000*.

Pantin, *sub.*, Paris, France; glasswork, sugar ref., tobacco factories, chemicals, leather, tallow; p. (1954) *36,963*.

Paola, *cst. t.*, Calabria, Italy; oil and wine tr.; p. *13,625*.

Paoting, *one of the chief cs.*, Hopei prov., China; on the Yungting R.; gr. tr.; p. *120,000*.

Paotow, *t.*, Suiyan, N.W. China; on left bank of Hwang Ho at W. end of Peiping–Suiyan rly.; terminus of caravan routes through Gobi Desert and Tarim Basin to Turkestan; gr. tr. ctr.

Papeete, *cap.*, Tahiti I., Society Is., Pac. Oc.; French col.; connected by air service with Noumea (New Caledonia); exp. copra and phosphates; p. (1946) *12,428*.

Paphos, *administrative dist.*, Cyprus; ancient c., ruins; serious earthquake 1953; p. *5,866*.

Papua–New Guinea, *terr.*, S.E. New Guinea; provisionally administered by the Commonwealth of Australia, consists of the S.E. part of the I. of New Guinea; cap. Port Moresby; gold, copra, rubber, timber; total a. 183,540 sq. m.; p. (1957) *1,779,128* (inc. approx. *22,558* non-indigenous).

Pará, *st.*, Brazil; densely forested; rubber, fruits, cacao, Brazil nuts; cap. Bélem; a. 464,780 sq. m.; p. (1950) *1,142,846*.

Pará, *spt.*, Brazil, *see* **Bélem**.

Paraguari, *t.*, Paraguay; tobacco, cotton, cattle, potteries, tanneries, distilleries; p. (1945) *11,775*.

Paraguay, *rep.*, S. America; undulating cty., swamps, forests; Rs., Paraguay, Pilcomayo, Paraná; climate, hot summers, warm winters, moderate rainfall; religion, R.C.; communications poor; fertile; cattle, yerba maté, oranges, sugar, maize, cotton, tobacco, lumber, quebracho extract; iron, manganese, copper; meat packing; cap. Asunción; a. 157,006 sq. m.; p. (1950) *1,328,452*.

Paraguay, *R.*, S. America; rises in plateau of Mato Grosso, flows S. and joins R. Paraná nr. Corrientes; forms bdy. between Brazil and Bolivia, Brazil and Paraguay; approx. length 1,200 m.

Paráiba, *st.*, Brazil; cotton, cocoa, sugar, rubber, tobacco; cap. João Pessóa; a. 21,730 sq. m.; p. (1950) *1,730,784*.

Paráiba, *R.*, Brazil; flows to Atlantic in st. of P.; length 200 m.

Paráiba, *R.*, S. Brazil; rising in São Paulo st., and flowing between Rio de Janeiro and Minas Gerais to the Atlantic N.E. of Rio de J.; length 658 m.

Paramaribo, *spt.*, *cap.*, Neth. Guiana; (Surinam); on R. Surinam; ch. exp., bauxite, timber, rubber, rice, fruit; p. (estd. 1956) *130,000*.

Paraná, *cap.*, Entre Rios prov., Argentina; p. (estd. 1956) *183,897*.

Paraná, *st.*, Brazil; extensively forested; cap. Curitiba; a. 77,717 sq. m.; p. (1950) *2,149,509*.

Paraná, *R.*, Brazil; formed by junction of Rs. Rio Grande and Parnaiba; flows W. between Paraguay and Argentina; flows into Rio de la Plata; navigable to Brazil frontier nr. Iguassú Falls; length 2,000 m.

Paranaguá, *spt.*, Paraná st., Brazil; ch. pt. for Paraná; in lagoon harbour; exp. maté, timber, coffee, bananas, maize, potatoes; p. (1947) *23,000*.

Pardes Hanna, *vil.*, Israel; citrus fruits, mineral water, cheese, plastics; p. *3,500*.

Pardubice, *t.*, Czechoslovakia; saw-milling; brewing, distilling; p. (1957) *54,077*.

Parenzo, *spt.*, Italy; cath.; fishing; Roman remains.

Pariñas, *C.*, Peru, S. America.

Paris, *c.*, *cap.*, France; on R. Seine; 5th c. of Europe; Notre Dame, Louvre, Palais de Justice, Palais Tuileries, Palais Royal; 4 triumphal arches; Eiffel Tower 985 ft. high; network of canals, rivers, roads, railways; Latin quarter with Sorbonne (univ. founded 1253); siege Germans 1870–71, occupied by Germans 1940–45; inds.; clothes, boots, perfumes, watches, fancy articles, instruments, books, flour, cottonseed oil; p. (1954) *2,850,189*.

Paris, *t.*, Ontario, Canada; p. *4,637*.

Paris, *t.*, Ill., U.S.A.; p. (1950) *9,460*.

Paris, *t.*, Texas, U.S.A.; cotton, fruit, canned goods; p. (1950) *21,643*.

Parkersburg, *c.*, W. Va., U.S.A.; on Ohio R.; iron- and steel-wks., oil and natural gas, coal, glassware, rayon, porcelain; p. (1950) *29,684*.

Parkes, *t.*, N.S.W., Australia; p. (1958) *8,380*.

Parma, *prov.*, Emilia, Italy; a. 1,258 sq. m.; p. (1951) *390,601*.

Parma, *t.*, N. Italy; between the Apennines and the R. Po; univ., cath.; flourishing tr.; food processing, wine, cheese; precision instruments; agr. machin., footwear, felt hats; p. (1951) *122,212*.

Parnaiba, *R.*, rises in Brazil, flows into N. Atlantic Ocean, forms bdy. between Maranhão and Piaui; length 750 m.

Parnaiba, *spt.*, Piaui, Brazil; cotton, cattle; p. (1947) *22,671*.

Parnassos, *mtn. ridge*, Greece; 83 m. N.W. of Athens, nr. the ancient Delphi, the modern

Liakhura; highest summit, Licoreia, alt. 8,068 ft.
Parnu, *t.*, Estonian S.S.R.; on G. of Riga; resort; flax, timber, wood pulp, woollens; p. *22,000*.
Páros, *I.*, Grecian Archipelago; W. of Naxos; a. 63 sq. m.; cap. P.
Parramatta, *c.*, N.S.W., Australia; fruit, oranges; p. (1954) *76,100*.
Parrett, *R.*, Somerset, Eng.; flows to Bristol Channel, nr. Bridgwater; length 35 m.
Parry (Mauke), *I.*, Pac. Oc.; part Cook Is., N.Z.; p. *773*.
Parry Sound, *t.*, Ontario, Canada; lumbering; p. *5,765*.
Parsons, *t.*, Kan., U.S.A.; coal, natural gas, machin.; p. (1950) *14,750*.
Partinico, *t.*, Sicily, Italy; silk; p. *22,080*.
Pasadena, *c.*, Cal., U.S.A.; N. of Los Angeles; in fruit-growing region, base of San Gabriel Mtns.; 200-in. telescope on Mt. Palomar; largest in world; p. (1950) *104,577*.
Pasco, *t.*, Wash., U.S.A.; on Snake R.; p. (1950) *10,228*.
Pasco, *see* **Cerro de Pasco**.
Pas-de-Calais, *dep.*, N. France; coal, iron; farming, sugar distilling, paper, pottery; cap. Arras; a. 2,606 sq. m.; p. (1954) *1,276,833*.
Pasig, *t.*, Luzon, Philippines; comm. ctr. of the L. region; p. *29,170*.
Pasir Mas, *t.*, Kelantan, Malaya; rly. junction.
Passage West, *urb. dist.*, *spt.*, Cork, Ireland; shipping, fishing; p. (1951) *2,658*.
Passaic, *c.*, N.J., U.S.A.; silk, chemicals, dyes, rubber goods, mill machin., springs, steel cabinets, tin cans; p. (1950) *57,702*.
Passaic, *R.*, N.J., U.S.A.; flows 100 m. to Newark Bay.
Passau, *t.*, Germany, at confluence of Rs. Danube, Inn and Ilz; near Austrian frontier; trans-shipment base, inds. inc. leather, porcelain, tobacco and brewing; p. (estd. 1954) *34,500*.
Passchendaele, *t.*, Belgium; impt. strategic point in First World War.
Passero I., Mediterranean Sea; off S.E. cst. of Sicily, Italy.
Pasto, *t.*, *cap.*, Naviño dep., Colombia; on flank of Pasto volcano; difficult of access; gold near by; p. (1947) *27,534*.
Pasuruan, *spt.*, Java, Indonesia; exp. sugar, tapioca; p. *36,973*.
Patagonia, Argentina; extensive region, E. of Andes; elevated plateau, arid, sterile; principal Rs., Colorado, Rio Negro and Chubut; minerals, unworked; lge. tracts of grazing for sheep, horses and cattle.
Patan, *t.*, Bombay, India; swords, silk and cotton goods; p. *10,000*.
Patan, *valley t.*, Nepal; p. (1941) *104,928*.
Patani, *spt.*, S. Siam; tin exp., fishing; p. *109,252*.
Paterno, *t.*, Sicily, Italy; N.W. of Catania; mineral springs, wines; p. *31,090*.
Pater Noster Is., Indonesia; coconuts.
Paterson, *c.*, N.J., U.S.A.; principal ctr. silk mftg.; aeroplane engines; textiles; machin.; p. (1950) *139,336*.
Pathankot, *t.*, E. Punjab, India; fruit preserving; p. (1941) *12,354*.
Patia R., Colombia; gold, platinum found.
Patiala and East Punjab States (Pepsu), India. *See* **Punjab**.
Patiala, *t.*, India; iron and steel mftg.; flour; p. (1941) *69,850*.
Patino Mines, *see* **Uncia**.
Patkai, *hills*, India; Chaukan; alt. 9,020 ft.
Patmos, *I.*, one of the Dodecanese, Aegean Sea; a. 13 sq. m.; p. (estd.) *3,000*. (According to Rev. 1. 9. the exiled St. John wrote the Revelation here.)
Patna, *cap.*, Bihar, India; seat of High Court; univ.; rice, indigo, cotton, salt.; p. (1951) *283,479*.
Patna, *t.*, Orissa, India; manganese; p. (1941) *16,757*.
Patras, *spt.* "Peloponnese", Greece; citadel and cas.; currants, raisins, figs, olives, wine, skins, etc.; p. (1951) *88,414*.
Patricroft, *industl. t.*, nr. Manchester, Lancs, Eng.
Pau, *t.*, Basses Pyrénées, France; on Gave du Pau; cas.; health resort; linen, chocolate, hams, wine; p. (1954) *48,320*.
Paulis, *t.*, N.E. Belg. Congo; admin. offices; cotton ginneries; rly. repair shops; p. *4,399*.
Paulo Affonso, *falls*, São Francisco R., Brazil; 260 ft.
Pavia, *t.*, Italy; cath., univ.; walled city; battle site 1525; olives, silk, wine; Parmesan cheese; p. (1951) *63,225*.
Pavlodar, *pt.*, Kazakh. S.S.R.; on R. Irtysh; chemicals, sulphates; p. (1959) *90,000*.
Pavlovo, *t.*, R.S.F.S.R.; on R. Oka; iron and steel, engin., surgical instruments; p. *10,000*.
Pawtucket, *c.*, R.I., U.S.A.; on P. R. used for water-power, woollen, cotton and silk goods; machin.; chemicals; first cotton-spinning factory established in the U.S.A. 1790; p. (1950) *81,436*.
Paysandu, *dep.*, Uruguay; p. (1953) *92,417*.
Paysandu, *t.*, Uruguay; meat, cattle, sheep, wool; p. (estd. 1956) *60,000*.
Pazardzhik, *t.*, Bulgaria; on main rly. line to Istanbul; p. (1947) *30,430*.
Peace, *R.*, Canada; rises in Rocky Mtns., and flows to L. Athabaska; length 1,000 m.
Peak, The, *Pennine hill dist.*, mid-Eng.; extending from Chesterfield to Buxton, and Ashbourne to Glossop; mainly composed of limestone with typical Karst features; tourists; highest point Kinder Scout, alt. 2,080 ft.
Pearl, *R.*, *see* **Chu Kiang**.
Pearl Harbour, *spt.*, Oahu I., Hawaiian Is., U.S. Naval base. Attacked by Japanese on 7 Dec. 1941.
Peary Land, Greenland.
Peč, *t.*, Jugoslavia; nr. Albanian border; tobacco, fruit; p. *17,175*.
Pechenga (Petsamo), *spt.*, R.S.F.S.R., U.S.S.R.; on left bank of R. Petsamon 10 m. upstream from Barents Sea; formerly Finnish, ceded to U.S.S.R. Sept. 1944; ice-free throughout year, thanks to influence of N. Atlantic Drift; exp. nickel, timber, cobalt.
Pechora, *R.*, flowing into Arctic Ocean, R.S.F.S.R. 1,000 m. long, 700 m. navigable.
Peckham, *S.E. sub.*, London, Eng.
Pecos, *R.*, N.M. and Texas, U.S.A.; trib. of Rio Grande; length 764 m.
Pécs, *t.*, Hungary; coal, chemicals, majolica; cath., univ., airport; p. (estd. 1957) *110,000*.
Peebles, *bor.*, *co. t.*, Peebles, Scot.; on upper course of R. Tweed; hydro, woollen cloth, knitwear; p. (1951) *6,013*.
Peebles, *co.*, Scot.; hilly, Proud Law, 2,754 ft.; sheep, woollen cloth, knitwear; a. 346 sq. m.; p. (1951) *15,226*.
Peekshill, *t.*, N.Y., U.S.A.; on Hudson R.; iron-wks.; p. (1950) *17,731*.
Peel, *t.*, I. of Man, Eng.; midway along W. cst.; cas., cath., ruins; resort; fisheries; p. *2,612*.
Peel Fell, *mtn.*, Northumberland, Eng.; 1,964 ft.
Pegasus, *Bay*, S.I., N.Z.
Pegu, *dist.*, Lower Burma; annexed by Brit. 1852; teak forests; p. *2,961,249*.
Pegu, *t.*, Burma; founded in A.D. 573; pagoda 320 ft. high, temple; rice; bronze statuettes mnfd.; p. *21,712*.
Pegu Yoma, *mtns.*, Burma; separate valleys of Rs. Irrawadi and Sittang.
Pei-Ho, *R.*, Hopei, China; unites with R. Hun-ho at Tientsin and flows to G. of Chihli; length 300 m.
Pei Kiang, *R.*, Kwangtung, S. China; rises in Nan Ling mtns., flows S. into Canton delta; valley used by road and rly. to approach Meiling and Cheling Passes from Canton; length approx. 300 m.
Peine, *t.*, Lower Saxony, Germany; N.W. of Brunswick; iron, furniture, textiles; p. (estd. 1954) *27,600*.
Peiping, *see* **Peking**.
Peipus, *L.*, between R.S.F.S. Rep. and Estonia, U.S.S.R.; 70 m. long.
Peiraieus, *spt.*, Greece; pt. of Athens; principal pt. of Greece; arsenal; wines, brandy, currants, vinegar; marble; machin.; p. (1951) *184,980*.
Pekalongan, *t.*, N. cst. Java, Indonesia; exp. sugar, rubber; p. *65,982*.
Pekan, *t.*, Pahang, Malaya; p. *5,000*.
Pekin, *t.*, Ill., U.S.A.; cereal prods., distilling, leather, metal goods; p. (1950) *21,858*.
Peking, *c.*, *cap.*, China; cultural ctr. and c. of gr. arch. beauty; for thousands of years seat of the Chinese emperors (Mongol, Ming and Manchu régimes); surrounded by 22 m. of towering walls broken by 16 gates; p. (estd. 1958) *5,420,000*.

Pelée, *mtn.*, Martinique; active volcano, devastated town of St. Pierre 1902, loss of over 30,000 lives, later eruption caused further 2,000 deaths; alt. 4,400 ft.
Pelew Is., Caroline Is., Pac. Oc.; coral, primitive agr.; bauxite; p. *12,798.*
Pella, *prefecture*, Macedonia, Greece; cap. Edessa; p. (1951) *116,688.*
Pelly, *R.*, trib. of R. Yukon, N.W. Terr., Canada.
Peloponnesos, *peninsula*, S. part of Greece, separated from mainland proper by G. of Corinth; a. 8,356 sq. m.; p. (1951) *1,127,467.*
Pelotas, *t.*, Rio Grande do Sul, S. Brazil; at S. end of Lagõa dos Patos; tr. in sheep, cattle from interiors; mnfs. woollens, leather, wine.
Pelvoux, *mtn.*, France; between Isère and Hautes Alpes; alt. 12,920 ft.
Pemba, *I.*, Kenya Protectorate, E. Africa; 34 m. N. of Zanzibar; a. 380 sq. m.; cloves and copra, coconuts; p. (1958) *133,858.*
Pembroke, *t.*, Ont., Canada; lumbering; p. (1941) *11,159.*
Pembroke, *mtn.*, S.I., N.Z.
Pembroke, *co.*, Wales; fertile; stock-raising, steel, fishing, shipbldg.; a. 617 sq. m.; p. (1951) *90,896.*
Pembroke, *mkt. t.*, *mun. bor.*, Pembroke, Wales; on S. side of Milford Haven; cas., ruins of Monkton Priory; naval dockyard, light engin., metal ind., woollens; p. (1951) *12,296.*
Pembroke Dock, Pembroke, Wales.
Penang, *st.*, Federation of Malaya; formerly Brit. settlement known as Prince of Wales I.; cap. Georgetown; declared a free pt. June 1946; coconuts, rice, spices, tin; a. 110 sq. m.; p. (1957) *571,923.*
Penarth, *urb. dist.*, Glamorgan, Wales; on Severn estuary 2 m. S. of Cardiff; ship repairing, wood, cement, bricks; p. (1951) *18,528.*
Pendembu, *inland*, *t.*, Sierra Leone, W. Africa; p. *1,000.*
Pendleton, *t.*, Ore., U.S.A.; p. (1950) *11,774.*
Penedo, *t.*, Brazil tr. ctr.; p. *12,651.*
Penge, *urb. dist.*, Kent, Eng.; S.E. sub. of London; residtl.; p. (1951) *25,009.*
Pengpu, *c.*, Anhwei, China; on Hwai Ho 105 m. N.W. of Nanking; on Tientsin–Nanking rly.; p. (estd. 1934) *105,237.*
Penicuik, *burgh*, Midlothian, Scot.; on N. R. Esk, 7 m. S. of Edinburgh; paper, iron; p. (1951) *4,255.*
Penistone, *mkt. t.*, *urb. dist.*, W.R. Yorks., Eng.; on R. Don, 10 m. N.W. of Sheffield; steel; p. (1951) *6,389.*
Penmaenmawr, *t.*, *urb. dist.*, Caernarvon, Wales; on N. cst. 4 m. W. of Conway; seaside resort; p. (1951) *4,218.*
Pennine Alps, Switzerland; division of Alpine system; ch. peaks; Matterhorn (14,782 ft.), Weisshorn (14,804 ft.), Mischabelhörner (14,942 ft.); includes Zermatt; winter sports.
Pennine Range, *mtn. range*, running N. to S. from Cheviot Hills to Derby, Eng.; length 140 m.
Pennsylvania, *st.*, U.S.A.; originally proprietary colony of Penn family, and later one of the 13 original sts. in the Union; traversed N.E. to S.W. by Appalachians; ch. Rs.: Delaware, Susquehanna, Allegheny and Monongahela; iron and steel, coal (bituminous and anthracite), natural gas, petroleum; maize, wheat, oats, rye; textiles, machin., motor cars, tobacco; cap. Harrisburg; ch. ts.: Pittsburgh, Philadelphia; a. 45,333 sq. m.; p. (1950) *10,498,012.*
Penrhyn, *dist.*, Caernarvon, Wales; nr. Bethesda; slate quarries.
Penrith, *mkt. t.*, *urb. dist.*, Cumberland, Eng.; at N. foot of Shap Fell, 18 m. S.E. of Carlisle; ruined cas.; agr. mkt.; agr. implements, egg-packing sta.; tourist ctr.; p. (1951) *10,490.*
Penryn, *t.*, *mun. bor.*, Cornwall, Eng.; on estuary of R. Fal, 2 m. N.W. of Falmouth; fishing; granite quarries; p. (1951) *4,088.*
Pensacola, *spt.*, Fla., U.S.A.; safest land-locked harbour in G. of Mexico; naval sta.; fish, naval requisites, wool, hides, cotton and lumber mills; p. (1950) *43,479.*
Penticton, *t.*, B.C., Canada; fruit farming, canning; p. (estd. 1958) *11,894.*
Pentire Point, headland, Cornwall, Eng.
Pentland Firth, strait between Orkney and the Caithness cst., N. Scot.
Pentland Hills, *range*, Scot.; running from Lanark–Edinburgh–Peebles; highest point Scald Law, 1,898 ft.
Pentland Skerries, *small Is.*, Pentland Firth, Scot.
Penybont, *rural dist.*, Glamorgan, Wales; coal-mining; p. (estd. 1955) *30,721.*
Pen-y-Ghent, peak in Pennine Range, W.R. Yorks, Eng.; 2,231 ft.
Penza, *t.*, R.S.F.S.R.; between Penza and Kuibyshev; grain, sawmills, paper, soap and candles, engin.; p. (1959) *254,000.*
Penzance, *t.*, *mun. bor.*, Cornwall, Eng.; on Mounts Bay; seaside resort, good harbour; pilchard fishing, copper, tin, and china clay, textiles, lt. engin.; p. (1951) *20,648.*
Peoria, *c.*, Ill., U.S.A.; river pt.; farming implements, grain; p. (1950) *111,856.*
Pepsu, *see* **Punjab.**
Perak, Federation of Malaya; ch. product, tin; cap. Ipoh; a. 7,980 sq. m.; p. (1957) *1,220,633.*
Perekop, Isthmus of, connects Crimea with Ukraine, and separates Sea of Azov from N.E. Black Sea.
Pergamino, *t.*, Buenos Aires prov., Argentina; on Pampas 60 m. S. of Rosario; impt. road and rail focus in ctr. of ch. maize-growing dist.
Périgueux, *t.*, *cap.*, Dordogne, France; on R. L'Isle; cath.; china, iron, woollens, figs, truffles; pâtés de foie gras; marshalling yards; rly. repair shops; p. (1946) *40,865.*
Perim, *I.*, located in straits of Bab el Mandeb at entrance to Red Sea; part of Brit. col. of Aden; a. 5 sq. m.; p. (1946) *360.*
Perlis, *st.*, Federation of Malaya; cap. Kangar; rice, tin, coconuts; a. 310 sq. m.; p. (1957) *90,834.*
Perm, *see* **Molotov.**
Pernambuco, *see* **Recife.**
Pernambuco, *st.*, Brazil; sugar, fruits; mountainous interior, cst. fertile; cotton, coffee; cap. Recife; a. 37,458 sq. m.; p. (1950) *3,430,630.*
Perovo, *t.*, R.S.F.S.R.; nr. Moscow; p. (1959) *143,000.*
Perpignan, *fortfd. t.*, Pyrénées-Orientales, France; cath.; wine, brandy, silk, wool; p. (1954) *70,051.*
Perreux-sur-Marne, *t.*, Seine, France; p. (1954) *26,745.*
Persepolis, *ruins*, ancient cap. of Persia.
Pershore, *mkt. t.*, *rural dist.*, Worcs, Eng.; on R. Avon, 8 m. S.E. of Worcester; abbey church; preserves, machin.; p. (1951) *16,355.*
Persia (Iran), *kingdom*, Asia; tableland 6,000–8,000 ft., ch. range Elburz Mtns.; Demavend 18,500 ft.; Rs. unimportant; ctr. barren, N. cst. fertile; climate, summer, days very hot, nights cool, winters warm; religion Islam; poor communications, dates, rice and other cereals, cotton, tobacco, wool, carpets, impt. oil-fields, cap. Tehran; a. 628,000 sq. m.; p. (1956) *18,944,821.*
Persian G., Asia; a. 80,000 sq. m.; inland sea between Arabia and Persia; shores barren.
Perth, *t.*, Ont., Canada; farming ctr., dairying, oats; p. *4,458.*
Perth, *co.*, Scot.; Trossachs and P. of Killiecrankie; noted for beautiful scenery; crossed by Grampians in N. and W.; ch. peaks, Ben More, Ben Lowers, Schiehallion; ch. Rs.: Tay, with tribs. Isla, Garry, Tummel, Sarn; pastoral; fruit; distilling; textiles; a. 2,493 sq. m.; p. (1951) *128,072.*
Perth, *burgh*, Perth, Scot.; on R. Tay, in gap between Sidlaw and Ochil Hills; cap. of Scot. till assassination of James I in 1437; near by is Scone Palace; cath.; linen, winceyettes, brewing, rope, dyeing; p. (1951) *40,466.*
Perth, *t.*, cap. W. Australia; 12 m. above pt. of Fremantle; univ., observatory, race-courses; p. (1957) *355,150*; of c. of Fremantle *20,850.*
Perth Amboy, *spt.*, N.J., U.S.A.; terracotta wks.; shipyards and dry docks; p. (1950) *41,330.*
Peru, *rep.*, S. America; traversed N. to S. by the Andes, attaining 22,000 ft.; ch. Rs., Marañon, Ucayali; in S.E., L. Titicaca (12,450 ft.) lgst. L. in S. America; climate, eastern, very hot, drenching rains, central or mountain zone, sun intensely hot, but shade temperatures low; W. and Pacific cst., heat not excessive, scanty rainfall; religion R.C.; poor communications; sugar, cotton, coffee, wool, hides, timber, cocoa, wheat, tobacco, petroleum, silver, copper; cap. Lima; a. 482,258 sq. m.; p. (1947) *7,991,777.*
Peru (Humboldt), Current, *ocean current*, S. Pac.

Oc.; flows N. along cst. of N. Chile and Peru; relatively cold water causes lower air temperatures and produces cloud and fog.

Perugia, *spt.*, Umbria, Italy; on R. Tiber; univ., observatory; woollens, silks, lace; foodstuffs, furniture, pottery, chemicals, agr. machin.; p. (1951) *94,504*.

Pervouralsk, *t.*, R.S.F.S.R.; in Urals, 25 m. W. of Sverdlovsk; p. (1959) *90,000*.

Pesaro, *Adriatic spt.*, Italy; N.W. of Ancona; resort; figs, wines, oil, silks; majolica ware; sulphur; sugar-refining; p. (1951) *53,900*.

Pescadores Is., *group of Is.*, 30 m. W. of Formosa; total a. about 51 sq. m.; since 1945 Chinese, formerly Japanese.

Pescara, *t.*, Italy; at estuary of R. Aterno, E. cst.; olive oil, soap, pasta, pottery; fishing; p. (1951) *64,802*.

Peshawar, *t.*, N.W. Frontier Province, Pakistan; on rly. to Khyber Pass commanding route Afghanistan–India; military sta.; coal, fruit, sugar; cottons, embroidery, wood carving, copper ware, boat bldg., marble; p. (1951) *151,776*.

Pesquilerto, *R.*, trib. of Rio Grande del Norte, Mexico.

Pessac, *t.*, Gironde, France; grid transf. sta.; wines; p. (1954) *19,226*.

Pest, *c.*, Hungary; on left bank of R. Danube, opposite Buda, and connected therewith by suspension bridge, the two cs. forming the Hungarian cap. of Buda-Pest (*see* **Budapest**).

Petah Tiqva, *t.*, Israel; agr. ctr.; oranges; textiles, chemicals, metal goods, tanning; p. (1946) *18,160*.

Peter I., *uninhabited I.*, Antarctic Ocean; belonging to Norway; a. about 94 sq. m.

Peterborough, *t.*, Ont., Canada; flour milling, elec. machin., hardware; p. (1951) *38,166*.

Peterborough, Soke of, *administrative co.*, Eng.; a. 84 sq. m.; p. (1951) *63,784*.

Peterborough, *c.*, *mun. bor.*, Soke of Peterborough, Eng.; on R. Nene at the margin of The Fens; cath.; rly. ctr.; engin., bricks, paper, milling; p. (1951) *53,412*.

Peterhead, *spt.*, *burgh*, E. Aberdeen, Scot.; on E. cst., 27 m. N.E. of Aberdeen; herring fisheries, tweed, lt. engin.; p. (1951) *12,765*.

Peterlee, *t.*, Durham, Eng.; on plateau of E. Durham, 11 m. E. of Durham; one of "New Towns" designated 1948; ctr. of coal-mng. dist.; lt. engin.; p. (estd. 1959) *10,000*.

Petermann Peak, Greenland; alt. 9,175 ft.

Petersburg, *t.*, Alaska, U.S.A.; p. (1951) *1,605*.

Petersburg, *c.*, Va., U.S.A.; tobacco, meat-canning, cotton; optical goods; p. (1950) *35,054*.

Petersfield, *t.*, *urb. dist.*, Hants, Eng.; on R. Rother, 12 m. N.W. of Chichester; college; malting, brewing; p. (1951) *6,616*.

Petit Morin, *R.*, France; trib. of R. Marne.

Petra, *ancient t.*, Jordan; temples, rock tombs and Roman ruins.

Petra, *t.*, Majorca, Spain; birthplace of founder of San Francisco.

Petric, *t.*, S. Bulgaria; nr. Jugoslav border; p. *13,456*.

Petriu, *t.*, Siam; rice mills.

Petropavlovsk, *spt.*, Kamchatka Pen., U.S.S.R.; p. (1959) *86,000*.

Petropavlovsk, *t.*, Kazakh. S.S.R.; on R. Ishim; flour, leather, meat canneries; furs, engin.; p. (1959) *131,000*.

Petropolis, *t.*, Rio de Janeiro, Brazil; health resort, 2,300 ft. above sea-level; p. *46,829*.

Petrosani, *t.*, Romania; S. of Deva; coal; p. *14,138*.

Petrovgrad, *t.*, N.W. Jugoslavia; p. *32,838*.

Petrovsk, *t.*, S.E. Siberia, R.S.F.S.R.; iron and steel, non-ferrous metallurgy; p. (1954) *50,000*.

Petrozavodsk, *t.*, R.S.F.S.R.; on W. side of L. Onega; mica, paper, engin.; p. (1959) *135,000*.

Petsamo, *see* **Pechenga**.

Petworth, *mkt. t.*, *rural dist.*, nr. Chichester, W. Sussex, Eng.; in Rother valley, 12 m. N.E. of Chichester; building stone; p. (rural dist. 1951) *9,184*.

Pevensey Levels, *marshy area*, E. Sussex, Eng.; lie behind coastal sand-bars between Eastbourne and Bexhill, extend 5 m. inland to Hailsham; now largely drained, cattle pastures; a. 24 sq. m.

Pewsey, *vil.*, *rur. dist.*, Wilts, Eng.; in Vale of Pewsey, 7 m. E. of Devizes; farming, iron, bricks, tiles; p. (rural dist. 1951) *18,232*.

Pforzheim, *t.*, Baden-Württemberg, Germany; S.E. of Karlsruhe; gold, silver, metal wks.; p. (estd. 1954) *61,100*.

Phanrang, ctr. of irrigation scheme, Annam, Viet-Nam, Indo-China.

Phanthiet, *spt.*, S. Annam, Viet-Nam, Indo-China; exp. dried and salt fish; p. *5,000*.

Pharsala, *c.*, Thessaly, Greece; S. of Larissa; Cæsar's triumphs over Pompey.

Philadelphia, *c.*, *spt.*, Penns., U.S.A.; univ., R.C. cath., masonic temple; mint, academy of fine arts; shipbldg., locomotives, woollens, cottons, worsteds; sugar, and petroleum refining; exp. petroleum, maize, coal, and wheat; ctr. of War of Independence, from 1790 to 1809; fed. cap. founded by Wm. Penn 1682; p. (1950) *2,071,605*.

Philae, *I.*, Upper Egypt; in Nile above Aswan Dam; temples, most noteworthy "Temple of Isis"; bldgs. usually submerged by dam waters.

Philippeville, *t.*, *spt.*, Algeria; wine, sheep, cattle, cereals, cork, cigarettes, mineral water, macaroni, fish canning; p. (1948) *57,091*.

Philippeville, *t.*, Namur, S. Belgium; p. *1,230*.

Philippine Is., *rep.*, Asia; comprising over 2,000 Is., lgst. being Luzon, Mindanao, Mindoro and Palawan; mountainous, many volcanoes, highest Apo, 10,312 ft.; coal, iron, copper, gold; dye-woods, rice, maize, tobacco, coffee, cotton, Manila hemp; coconuts, cigars, pearl fisheries; cap. Manila; p. (1948) *19,234,182*.

Philippopolis, *see* **Plovdiv**.

Philipstown, *see* **Daingean**.

Phillipsburg, *c.*, N.J., U.S.A.; on Delaware R.; water-power, machin., rly. wks.; silk and pulp; p. (1950) *18,919*.

Phitsanulok, *t.*, central Siam; temples; weaving; p. *25,000*.

Phlorina (Florina), *pref.*, Greece; occupied by Bulgaria, April 1941, restored to Greece by peace treaty of 1947; cap. Phlorina; p. (1951) *69,367*.

Phlorina (Florina), *t.*, Phlorina, Greece; in basin at alt. 3,000 ft., 10 m. from Jugoslav border, 15 m. from Albanian border, purely agr. interests; p. (1951) *12,278*.

Phnom Penh, *t.*, cap. Cambodia, Indo-China; on Mékong R.; rice, cotton; p. (estd. 1949) *260,000*.

Phoenix, *t.*, Arizona, U.S.A.; winter resort; cotton, fruits, livestock; p. (1950) *106,818*.

Phoenix Group, *Is.*, Pac. Oc.; part of Gilbert and Ellice I. colony; a. 16 sq. m.; U.S. now have some rights over Canton and Enderbury; Canton used as international airport; p. (1956) *1,257*.

Phthiotis and Phocis, *pref.*, Greece; cap. Lamia; p. (1951) *199,145*.

Piacenza, *prov.*, Emilia, Italy; a. 965 sq. m.; p. (1951) *299,036*.

Piacenza, *t.*, Italy; cath., palaces, arsenal; motor cars, chemicals, cement; p. (1951) *72,769*.

Pianosa I., Italy; penal settlement; cereals, vineyards, olives; p. *1,000*.

Pias, *t.*, Alentejo Baixo, S. Portugal; E. of Beja.

Piata, *spt.*, N. Peru; exp. cotton, hides, skins, Panama hats; p. *6,958*.

Piatra, *t.*, Moldavia, Romania; timber, pharmaceuticals, soap; p. *30,183*.

Piaui, *st.*, Brazil; cattle, cotton, sugar, tobacco, rubber; silver, iron and lead; a. 96,262 sq. m.; cap. Teresina; p. (1950) *1,064,438*.

Piave, *R.*, N.E. Italy; flows to Adriatic; length 125 m.

Piazza Armerina, Sicily, Italy; oil, wines and nuts; remarkable Roman mosaics (recently discovered); p. *28,420*.

Pibor, *t.*, S.E., Sudan; p. *1,000*.

Picardy, *old prov.*, France; which included all the Somme dep. and parts of Pas de Calais, Aisne and Oise; old battle sites, Agincourt and Crécy.

Pichincha, *prov.*, Ecuador; cap. Quito—the cap. of Ecuador; a. 6,218 sq. m.; p. (1950) *386,520*.

Pickering, *mkt. t.*, *urb. dist.*, N.R. Yorks, Eng.; on N. margin of Vale of Pickering, 6 m. N. of Malton; church with murals; iron, bricks; p. (1951) *4 332*.

Pickering, Vale of, E.R. Yorks, Eng.; wide, flat-floored vale, once occupied by glacial lake; bounded to N. by N. York Moors, to S. by York Wolds; drained W. by R. Derwent, which leaves Vale through Kirkham gap; alluvial

soils, marshy in ctr.; crop-farming along margins, grain, fodder crops; cattle grazing on damper meadows in ctr.; ch. ts. Pickering, Malton, Helmsley.
Pico da Bandeira, *mtn.*, Brazil; alt. 9,462 ft.
Picton, *t.*, S.I., N.Z.; freezing wks.; tourist and fishing ctr.; p. (1951) *1,928.*
Pictou, *spt.*, Nova Scotia, Canada; coal; p. (1941) *3,069.*
Pidurutalagala, *mtn.*, Ceylon; alt. 8,295 ft.; highest peak in Ceylon.
Piedmont, *region*, N. Italy; rice, wheat, vines, fruits; silk, cottons, woollens; a. 9,813 sq. m.; p. (1951) *3,513,111.*
Piedras Negras, *frontier t.*, Mexico; cattle mkt., coal, silver, zinc and copper; p. *15,663.*
Pierre, *t.*, *cap.*, S.D., U.S.A.; on Missouri R.; p. (1950) *5,715.*
Pietermaritzburg, *t.*, *cap.*, Natal, S. Africa; 30 m. N.W. of Durban; named after Piet Retief and Gerhardus Maritz, two Boer leaders; p. (1951) *74,399.*
Pietersburg, *t.*, Transvaal, S. Africa; gold, asbestos, tin; cereals, tobacco, cotton, oranges, lemons; p. *15,961.*
Piet Retief, *t.*, Transvaal, S. Africa; tobacco, fruit, mealies, wattle gr. in dist.; p. *4,721.*
Pikes Peak, *mtn.*, Col., U.S.A.; alt. 14,109 ft.
Pila (**Schneidemühl**), *t.*, W. Prussia, Poland; German before 1945; textiles; rly. junction; p. (1946) *10,671.*
Pilar, *t.*, Paraguay; p. *10,000.*
Pilatus, *mtn.*, Switzerland; alt. 6,988 ft.
Pilau, *see* **Pilawa.**
Pilawa (**Pilau**), *t.*, *spt.*, R.S.F.S.R.; shipbldg., fishing.
Pilbarra, *dist.*, W. Australia; metal ores inc. gold, copper, tin; ch. mining ctr., Marble Bar.
Pilcomayo, *R.*, rising in S. Bolivia, and flowing through the Gran Chaco, separates W. Paraguay from Argentina; trib. of the Paraguay; length 1,400 m.
Pilibhit, *t.*, Uttar Pradesh, India; rice, pepper, sugar; p. (1941) *25,000.*
Pilion, *celebrated mtn.*, S. of Mt. Ossa, Thessaly, Greece; alt. 5,310 ft.
Pillon Pass, Switzerland; alt. 5,092 ft.
Pimentel, *spt.*, Peru; hol. resort; exp. sugar; p. *2,000.*
Pimlico, *dist.*, Westminster, London, Eng.
Pinar del Rio, *prov.*, W. Cuba, W. Indies; tobacco; a. 5,211 sq. m.; p. (1943) *398,794.*
Pinar del Rio, *t.*, Cuba, W. Indies; tobacco; p. (1943) *77,051.*
Pind, *t.*, W. Punjab, Pakistan; coal; p. (with Dadan Khan) *11,445.*
Pindus, *mtn. chain*, between Thessaly and Albania, Greece; highest peak 8,050 ft.
Pine Bluff, *c.*, Ark., U.S.A.; cotton, motor-cars; p. (1956) *39,795.*
Pine Creek, *t.*, Arnhem Land, N. Terr., Australia; gold; p. *115.*
Pinerolo, *t.*, Italy; S.W. of Turin; cath.; silk, cotton, woollens; p. *22,890.*
Pines, Is. of, *dependency* of Fr. col. New Caledonia; a. 58 sq. m.; convict settlement; p. about *570.*
Pinetown, *t.*, Natal; residtl. township; citrus fruits; p. *5,434.*
Pingyang, *see* **Pyongyang.**
Pinios R., Greece; flows into G. of Thessaloniki.
Pinjarra, *t.*, W. Australia; rly. junction; timber and stock-raising dist.
Pinkiang, *see* **Harbin.**
Pinneberg, *t.*, Schleswig-Holstein, Germany; N.W. of Hamburg; rose cultivation, metals, leather; p. (estd. 1954) *25,900.*
Pinos I. (**I. of Pines**), Caribbean Sea; S. of Cuba; a. 1,180 sq. m.
Pinsk, *t.*, Byelorussia, U.S.S.R.; paper; p. *25,000.*
Piombino, *t.*, Italy; port for Elba I.; p. *26,238.*
Piotrkow, *industl. t.*, Poland; S. of Lodz; p. *40,000.*
Pique, *t.*, Ohio, U.S.A.; N. of Dayton; ironwks., woollens; p. (1950) *17,447.*
Piraeus, *see* **Peiraieus.**
Piran, *spt.*, Istria, Jugoslavia; salt, wines, olives; p. *14,875.*
Piracicaba, *t.*, São Paulo, Brazil; sugar, cattle, coffee, oranges; p. *31,923.*
Pirmasens, *t.*, Rhineland-Palatinate, Germany; S.W. of Mannheim; leather goods; p. (estd. 1954) *44,200.*
Pirna, *t.*, Saxony, Germany; on R. Elbe; textiles, paper; p. (estd. 1954) *38,500.*
Pirot, *t.*, Jugoslavia; nr. Bulgarian border; Jugoslavia; p. *13,033.*
Pisa, *prov.*, Italy; a. 1,180 sq. m.; p. (1951) *348,518.*
Pisa, *c.*, Italy; at head of Arno delta, 12 m. N.E of Leghorn; famous leaning tower, cath., univ.; mineral baths, cotton, silk; p. (1951) *76,572.*
Pisagua, *spt.*, N. Chile; p. *2,199.*
Pisco, *spt.*, Peru, S. America; cotton; p. *17,222.*
Pisek, *t.*, Czechoslovakia; brewing, iron foundries, textiles; p. *16,858.*
Pistoia, *t.*, Tuscany, Italy; on Arno plain, N.W. of Florence; iron and steel goods, silk, macaroni; p. (1951) *77,434.*
Pitcairn I., E. Pacific; British col.; incs. Henderson, Ducie, and Oeno Is.; sweet potatoes, bananas, oranges, coconuts; a. 2 sq. m.; p. (1958) *143*, mostly descendants of the mutineers of the *Bounty.*
Pitch Lake, Trinidad I., T.W.I.; located in the S. of the I., 10 m. S.W. of San Fernando; natural deposit of asphalt; tourist attraction; a. 212 acres.
Pitea, *spt.*, N. Sweden; on G. of Bothnia; p. *6,961.*
Pitesti, *t.*, Romania; on Arges R.; petroleum, fruit, grain.
Pitlochry, *burgh*, Perth, Scot.; on R. Tummel, 4 m. S. of Pass of Killiecrankie; summer resort; distilleries, hydros; p. (1951) *2,384.*
Pittenweem, *burgh*, Fife, Scot.; at entrance to Firth of Forth; fisheries; p. (1951) *1,642.*
Pittsburgh, *c.*, Penns., U.S.A.; R.C. cath., coll., Carnegie Library and Institute; port on Ohio R.; ctr. of richest American coalfield; natural gas, petroleum, iron and steel, machin., metal goods, meat packing, glass; p. (1950) *676,806.*
Pittsfield, *c.*, Mass., U.S.A.; textiles, paper, plastics, elec. machin., hol. resort; p. (1950) *53,348.*
Pittston, *t.*, Penns., U.S.A.; anthracite, coal, machin.; p. (1950) *15,012.*
Piura, *N. dep.*, Peru; a. 15,190 sq. m.; p. (1947) *491,516.*
Piura, *t.*, Peru; p. (1947) *23,221.*
Placentia, *spt.*, Newfoundland, Canada; p. *538.*
Plainfield, *c.*, N.J., U.S.A.; sub. New York City; printing, motor lorries, machin., chemicals, hosiery; p. (1950) *42,366.*
Plaistow, *dist.*, E. London, Eng.
Planitz, *t.*, Saxony, Germany; S.W. of Zwickau; textiles, tobacco; p. (estd. 1954) *25,100.*
Plate R., or **Rio de la Plata,** estuary of the Rs. Paraná and Uruguay flowing to the Atlantic between Argentina and Uruguay, length 170 m.; width at head 25 m., at mouth 138 m.
Plattsburg, N.Y., U.S.A.; pt. of L. Champlain; tourist ctr.; military post; p. (1950) *17,738.*
Plauen, *t.*, Saxony, Germany; textiles, machin., cable, leather, paper, radios; rly. junction; p. (estd. 1954) *85,500.*
Plenty, Bay of, N.I., N.Z.; on E. cst.; 130 m. wide.
Plettenberg, *t.*, N. Rhine-Westphalia, Germany; on R. Lenne; iron wks.; p. (estd. 1954) *24,700.*
Pleven, *fortfd. t.*, Bulgaria; many mosques; famous siege 1877; woollens, silks, wines; p. (1956) *57,758.*
Plock, *t.*, Poland; on R. Vistula, nr. Warsaw; agr.; p. *28,508.*
Ploesti, *t.* Prahova dist., Romania; petroleum, engin.; p. (1956) *114,560.*
Plombières, *t.*, Vosges, France; wat. pl.; p. *1,565*
Plonsk, *c.*, Poland; N.W. of Warsaw; grain, sugar-beet; p. *7,866.*
Plovdiv (**Philippopolis**), *c.*, Bulgaria; on R. Marica; univ., Greek cath.; wheat, fruit, silks, woollens, tobacco, leather, attar of roses; p. (1956) *162,518.*
Plumstead, *dist.*, S.E. London, Eng.
Plymouth, *c.*, *spt.*, *co. bor.*, S. Devon, Eng.; on Plymouth Sound; comprises the "three towns" of Plymouth, Devonport and Stonehouse; R.C. cath., guildhall, museum; shipbldg.; seaside resort; fishing and fish canning, light inds.; pt. of call for trans-Atlantic liners; p. (1951 *208,985.*
Plymouth, *spt.*, Mass., U.S.A.; Pilgrim Hall, Pilgrim Fathers landed in 1620 from *Mayflower*, established first English colony; textiles, cordage, machin., cottons, woollens; p. (1950) *10,540.*

Plymouth, *ch. t.*, Montserrat I., T.W.I.; p. (1957) *2,500.*
Plymouth, *t.*, Penns., U.S.A.; coal; p. (1950) *13,021.*
Plynlimmon, *mtn.*, Montgomery and Cardigan, Wales; alt. 2,469 ft.
Pizeñ (Pilsen), *t.*, Czechoslovakia; coal, iron ore, steel, engin. chemicals; p. (1957) *134,273.*
Po, *R.*, Italy; flows from Monte Viso, through Piedmont and Lombardy to the Adriatic; length, 340 m.
Pocatello, *t.*, Idaho, U.S.A.; rly. wks.; livestock; cheese; p. (1950) *26,131.*
Pocklington, *mkt. t., rural dist.*, E.R. Yorks, Eng.; at foot of York Wolds, 12 m. E. of York; milling, malting, bricks, tiles, agr.; p. (rural dist. 1951) *14,265.*
Podolsk, *t.*, R.S.F.S.R.; S. of Moscow; engin., tin smelting; p. (1959) *124,000*
Podrinye, *dist.*, W. Serbia, Jugoslavia; antimony.
Pohai (Chihli), G. of, N. China; together with G. of Liaotung forms shallow expanse of water almost cut off from Yellow Sea by Liaotung and Shantung peninsulas; receives water and silt of Hwang Ho; a. approx. 15,000 sq. m.
Pointe-à-Pitre, *ch. t.*, Grande Terre I., Guadeloupe, Lesser Antilles; p. (1946) *41,823.*
Pointe-des-Galets, *ch. pt.*, Ile de la Réunion, Indian Ocean (Fr.).
Pointe-Noire, *impt. spt.*, Congo Rep., Equatorial Africa; aerodrome; exp. copper ore, timber, groundnuts; p. *9,164.*
Poitiers, *t.*, Vienne, France; univ.; Black Prince defeated French (1356); brewing, hosiery, cloth; p. (1954) *52,633.*
Pola, *see* Pula.
Poland, *rep.*, Europe; bounded by Germany, the Baltic Sea, Russia, and Czechoslovakia; largely lowland, rising from Baltic to Carpathians on S. border; ch. Rs.; Vistula and tribs.; climate: hot summers, very cold winters, moderate rainfall; good communications; agr.: cereals, potatoes, sugar-beet, forests, cattle, sheep, horses, pigs; minerals: coal, iron, steel, petroleum, natural gas, potash; cap. Warsaw; a. 121,131 sq. m.; p. (1957) *28,234,000.*
Pollokshaws, *burgh*, Renfrew, Scot.; sub. of Glasgow; industl. and residtl.
Pollokshields, *S.W. sub.*, Glasgow, Scot.; residtl.
Poltava, *industl. t.*, Ukrainian S.S.R.; horses, cattle, grain, engin., textiles; p. (1959) *141,000.*
Polynesia, *sub-div.*, Oceania; I. groups in Pacific within 30° N. and S. of the equator; between 135° E. and W. longitude.
Pomerania, *former prov.*, N. Germany; part left to Germany, on left bank of the R. Oder, now in land of Mecklenburg, Soviet Zone; farming, shipbldg., fishing.
Pomona or **Mainland,** one of the Orkney Is., Scot.
Pomona, *c.*, Cal., U.S.A.; fruit-culture; p. (1950) *35,405.*
Pomorze, *prov.*, Poland; cap. Bydgoszcz; a. 8,012 sq. m.
Pompeii, *ruined c.*, Italy; stood 13 m. S.E. of Naples, at foot of Vesuvius; destroyed A.D. 79 by volcanic eruption, site re-discovered in 1748; many most interesting excavations; also modern c. near by; fine church with famous collection of silver and gold plate.
Ponape I., Caroline Is., Pac. Oc.; copra, ivory, nuts, starch, bauxite; a. 134 sq. m.; p. (1958) *14,335.*
Ponca City, *t.*, Okla., U.S.A.; p. (1950) *20,180.*
Ponce, *t.*, Puerto Rico, W. Indies; coffee, sugar, rum; p. (1950) *99,190.*
Pondicherry, *cap.*, former Fr. Settlements in India; united with India 1954; cotton, rice; a. of dist. 115 sq. m.; p. (estd. 1948) (of settlements) *222,572* (of c.) *53,101.*
Pont-à-Mousson, *t.*, Meurthe-et-Moselle, France; R. Moselle; ironwks., paper, velvet, cement wks.; p. (1954) *11,416.*
Ponta Delgada, *ch. t., spt.*, San Miguel I., Azores; p. (1940) *21,048.*
Ponta Grossa, *t.*, Paraná, Brazil; rly. junction; maté, rice, timber, tobacco, bananas, cattle, jerked beef; p. *39,600.*
Pontardawe, *vil.*, Glamorgan, S. Wales; on R. Tawe, 9 m. N.E. of Swansea; zinc smelting and refining, steel wks.
Pontchartrain, Lake, *shallow lake*, lower Mississippi flood plain, U.S.A., connected by indus. canal to New Orleans which lies 6 m. to the south, and by deltaic channels to the gulf of Mexico.
Pontefract, *t., mun. bor.*, W.R. Yorks, Eng.; 7 m. E. of Wakefield; cas. ruins; coal, furniture, confectionery; p. (1951) *23,173.*
Pontevedra, *prov.*, Spain, on Atlantic cst., and bordering Portugal; agr., livestock, fisheries; cap. Pontevedra; a. 1,695 sq. m.; p. (1950) *671,609.*
Pontevedra, *spt.*, cap. Pontevedra prov.; Spain; fishing; p. (1949) *46,168.*
Ponthierville, *t.*, Belg. Congo, Africa; nr. Stanley Falls, Congo R.; Belg. Congo; p. *1,000.*
Pontiac, *t.*, Ill., U.S.A.; agr. machin.; p. (1950) *8,990.*
Pontiac, *c.*, Mich., U.S.A.; on Clinton R.; fishing and shooting, motor cars, rubber goods, machin., varnish; p. (1950) *73,681.*
Pontianak, *t., cap.*, Borneo, Indonesia; exp. rubber, copra; p. *45,196.*
Pontine Is., off W. cst. of Italy; in Tyrrhenian Sea; a. 4½ sq. m.; p. *6,000.*
Pontine Marshes, *region*, Latium, S. Italy; coastal zone S.E. of Rome extending from Velletri to Terracina; formerly highly malarial fens, largely drained and colonised 1930–35; 3,200 new farms, 4 new ts.; ch. t. Littoria; a. approx. 250 sq. m.
Pontresina, *t.*, Grisons, Switzerland; E. of St. Moritz; tourist resort.
Pont-y-mister, *vil.*, Monmouth, Eng.; in valley of R. Ebbw, 6 m. N.W. of Newport; lge. steel-wks., zinc refineries.
Pontypool, *t., urb. dist.*, Monmouth, Eng.; coal, iron, steel, glass, bricks, tin galvanising, nylon at Manhilad; p. (1951) *42,683.*
Pontypridd, *t., urb. dist.*, Glamorgan, Wales; on R. Taff, 12 m. N.W. of Cardiff; coal, iron; p. (1951) *38,622.*
Ponza I., Pontine Is., Italy; wine, wheat, flax; fishing; bentonite-mining; a. 3 sq. m.
Poole, *mkt. t., spt., mun. bor.*, E. Dorset, Eng.; on Poole Harbour, 4 m. W. of Bournemouth; seaplane base; yachting; marine engin., tent mkg., bricks, chemicals; p. (1951) *82,958.*
Poolewe, *par.*, Ross and Cromarty, Scot.; fisheries, farming; p. *1,294.*
Poona, *t.*, Bombay, India; seat of Bombay government during rainy season; cotton, sugar, rice; p. (1951) *480,982.*
Poopo, *L.*, Oruro dep., Bolivia; S. America; situated in Andes at alt. 12,120 ft.; very shallow; fed from L. Titicaca by R. Desaguadero, which flows over saline beds; no outlet, therefore salt-water; max. length 50 m., width 30 m.
Popayan, *cap.*, Cauca Dep., Columbia; cath., univ.; gold, silver, platinum, copper near by; p. (1947) *35,690.*
Poperinghe, *t.*, W. Flanders, Belgium; woollens, linens, hops; p. *12,393.*
Poplar, *metropolitan bor.*, E. London, Eng.; Thames-side; industl. dist.; p. (1951) *73,544.*
Popocatepetl, *volcano*, nr. Puebla, Mexico; alt. *17,887* ft.
Porbandar, *spt.*, Bombay, India; cement, silk, cotton; imports coal, dates, timber, machin., petroleum; birthplace of Mahatma Gandhi; p. *65,000.*
Porcupine Hills, *t.*, Ontario, Canada; on branch rly. 40 m. S. of Cochrane; ctr. of impt. gold-mining dist.
Pordenone, *t.*, Italy; cath.; cottons, silks, pottery; p. *82,506.*
Pori (Björneborg), *spt.*, S. Finland; at mouth of R. Kokemäen; copper refinery, rolling mills, match, paper and pulp wks.; p. (1950) *43,137.*
Porjus, *t.*, Norrbotten, N. Sweden; on R. Lulea, where it leaves Stora Lulevatten; impt. hydro-elec. power-sta. supplies power to iron-ore mining dists. of Gällivare and Kiruna, also to Narvik rly.
Porrentruy, *t.*, Berne, Switzerland; watches; p. *6,121.*
Porsgrunn, *spt.*, Norway; timber, shipping, engin., porcelain, explosives; p. *8,980.*
Port Alfred, *t.*, C. of Good Hope, S. Africa; resort; harbour entrance too shallow for lge. boats; p. *5,937.*
Port Amelia, *spt.*, Mozambique; sisal, coconuts, cotton, maize, groundnuts; p. (1946) *34,885.*
Port Antonio, *t.*, Jamaica, W. Indies; p. *5,482.*
Port Arthur (Lushun), *spt.*, Manchuria, China;

Chinese naval base; p. (estd. 1936) *141,291.* (*See* Lüta.)
Port Arthur, *L. pt.*, Ontario, Canada; on N.W. cst. of L. Superior; lumbering, mining, grain, milling, exp. ctr.; p. (1941) *24,426.*
Port Arthur, *t.*, Texas, U.S.A.; p. (1950) *57,530.*
Port au Prince, *spt.*, Haiti, W. Indies; coffee, cacao; p. *125,000.*
Port Augusta, *t.*, *spt.*, S. Australia; at head of Spencer G.; fine harbour; exp. wheat, fruit; p. (1947) *3,270.*
Port aux Basques, *pt.*, Newfoundland, Canada; p. *2,108.*
Port Chalmers, *t.*, *bor.*, S.I., N.Z.; docks, shipyards; p. (1951) *2,680.*
Port Chester, *t.*, N.Y., U.S.A.; on Long I. Sound; summer resort, cottons and woollens; p. (1950) *23,970.*
Port Colborne, *t.*, Ont., Canada; port on L. Erie; iron smelting; nickel, copper refining; p. (1941) *6,993.*
Port Elizabeth, *spt.*, C. of Good Hope, S. Africa; on Algoa Bay; exp. skins, wool, ostrich feathers, mohair; foundries, soap, chemicals, food preservation, sawmills; p. (estd.) *150,000.*
Port Erin, *vil.*, I. of Man, Eng.; on S.E. cst.; seaside resort, fisheries.
Port Essington, *N. point*, of Coburg Peninsula, N. Terr., Australia.
Port Francqui, *t.*, Belg. Congo; present terminus of Congo rly. on Kasai R.; p. *5,000.*
Port Fuad, *t.*, Egypt; N. entrance to Suez Canal; p. *1,000.*
Port Gentil, *spt.*, Gabrun rep., Eq. Africa; exp. palm oil, mahogany, ebony; sawmills, fishing; p. *5,000.*
Port Glasgow, *burgh*, *spt.*, Renfrew, Scot.; on S. bank of R. Clyde, 17 m. below Glasgow; ship-bldg. and repairing, textiles, rope, canvas mftg.; p. (1951) *21,612.*
Port Harcourt, *spt.*, Nigeria; 30 m. from sea on E. branch of Niger delta; terminus of E. Nigerian rly. system; exp. tin, palm oil, groundnuts; p. (1953) *72,000.*
Port Hedland, *sm. spt.*, W. Australia; on N.W. cst. 285 m. S.W. of Broome; exp. gold and other metals from Pilbarra gold-field; imports food and machin.; linked to Marble Bar by narrow-gauge rly.
Port Herald, *t.*, Nyasaland Prot., Africa, pt. no Shire R.
Port Hope, *t.*, Ont., Canada; midway along N. shore of L. Ontario, fruit, dairying, radium refining; p. (1940) *5,055.*
Port Hunter, N.S.W., Australia; port for Newcastle.
Port Huron, *t.*, Mich., U.S.A.; on L. Huron; summer resort, mineral springs, dry docks, grain elevators; motor-car parts; p. (1950) *35,725.*
Port Jackson, N.S.W., Australia; *natural harbour* for Sydney.
Port Kembla, *spt.*, N.S.W., Australia; S. of Wollongong; iron and steel wks., textiles.
Port Laoighise, *mkt. t.*, Laoighis, Ireland; corn-mills; p. (1946) *3,166.*
Port Lincoln, *spt.*, S. Australia; exp. wheat, frozen meat, tallow, wool; p. (1947) *3,963.*
Port Louis, *cap.*, Mauritius, Indian Ocean; ch. comm. ctr. of col.; p. (estd. 1957) *101,145.*
Port Lyautey, *t.*, Morocco; developed since 1912; exp. grain; p. (1946) *56,604.*
Port Macquarie, *t.*, N.S.W., Australia; on Hastings R.; p. (1947) *2,906.*
Port Mahon, *see* **Mahon.**
Port Moody, *terminus*, Canadian Pacific Rly., Vancouver, Brit. Columbia; p. *1,512.*
Port Moresby, *spt.*, *ch. t.*, Papua, New Guinea; promising copper deposits; exp. copra, sandalwood, coffee, rubber, shell; p. *2,503.*
Port Natal, *see* **Durban.**
Port Nelson, *spt.*, Manitoba, Canada; on cst. of Hudson Bay at mouth of R. Nelson; linked by rly. to trans-continental systems via The Pas; exp. wheat, minerals; closed by ice for 7 months each year.
Port Nolloth, *spt.*, C. of Good Hope, Union of S. Africa; pt. serving copper- and diamond-mining dists.
Port of Spain, *cap.*, Trinidad, T.W.I.; cocoa, sugar, asphalt; p. (estd. 1957) *120,650.*
Port Okha, *spt.*, Bombay, India; exp. cement, salt, oilseeds, chemicals.
Port Philip, *lge. inlet*, Victoria, Australia; land-locked bay, with Melbourne on N., Geelong on W.
Port Pirie, *spt.*, S. Australia; smelting ores; exp. wheat, minerals; p. (1947) *12,030.*
Port Radium, *t.*, N.W. Terr., Canada; on Gr. Bear L.; pitchblende deposits; p. *300.*
Port Royal, *t.*, Jamaica, T.W.I.; nr. Kingston; dock-yard.
Port Said, *spt.*, Egypt; N. end Suez Canal; coaling sta.; p. (1947) *178,432.*
Port St. Mary, *vil.*, I. of Man, Eng.; on S.E. cst.; resort; fisheries, boat-bldg.
Port Shepstone, *t.*, Natal, S. Africa; sugar, bark, fibre, maize, fruit, dairying, poultry; cement; p. *2,209.*
Port Sudan, *spt.*, Sudan; 30 m. N. of Suakin; linked by rail to Atbara and Khartoum; p. (1947) *47,000.*
Port Sunlight, Cheshire, Eng.; modern garden village founded 1888 by Lord Leverhulme for the employees of Lever Brothers' Port Sunlight factories; p. *6,000.*
Port Swettenham *spt.*, Selangor, Malaya; exp. tin, rubber, copra, pineapples; p. *11,300.*
Port Talbot, *t.*, *mun. bor.*, Glamorgan, S. Wales; on E. side of Swansea Bay; impt. iron and steel ind., copper, coal; p. (1951) *44,024.*
Port Taufiq, *spt.*, Egypt; S. end of Suez canal; p. *1,000.*
Port Vendres, *spt.*, Pyrénées-Orientales, France; nr. Perpignan; p. (1954) *4,180.*
Portadown, *t.*, *mun. bor.*, Armagh, N. Ireland; on R. Bann, 25 m. S.W. of Belfast; linen, lace, farming; p. (1951) *17,202.*
Portaferry, *spt.*, Down, N. Ireland; shipping, fisheries; p. (1951) *1,275.*
Portage, *t.*, Wis., U.S.A.; iron; p. (1950) *7,334.*
Portage la Prairie, *spt.*, Manitoba, Canada; grain exp.; p. (1956) *10,525.*
Portalegre, *t.*, Portugal; cath.; mkt.; p. (1940) *12,046.*
Portarlington, *t.*, Offaly, Ireland; farming; first place to have elec. power-sta. using local peat fuel; p. (1951) *2,246.*
Portbou, *t.*, on Fr. side of Franco–Spanish border, opposite Rosas on Mediterranean cst.
Porthcawl, *t.*, *urb. dist.*, Glam., Wales; on cst. 10 m. S.E. of Pt. Talbot; resort; p. (1951) *9,529.*
Portici, *spt.*, Campania, S. Italy; on Bay of Naples 5 m. S.E. of Naples; dockland sub. of Naples.
Portishead, *t.*, *urb. dist.*, Somerset, Eng.; on Severn estuary 3 m. S.W. of Avonmouth; shipping; p. (1951) *4,454.*
Portknockie, *burgh*, Banff, Scot.; on N. Buchan cst., 5 m. E. of Buckie; sm. fishing pt.; p. (1951) *1,457.*
Portland, *naval pt.*, *urb. dist.*, Dorset, Eng.; 4 m. S. of Weymouth on sheltered N.E. side of I. of Portland; lge. artificial harbour; lime, stone; p. (1951) *11,324.*
Portland, *t.*, *spt.*, Me., U.S.A.; comm. cap. of Me.; packing, canning, engin., silverware, paper, woollens, matches, cod, mackerel; p. (1950) *77,634.*
Portland, *c.*, Ore., U.S.A.; gr. wheat and flour exp.; iron foundries, meat packing; p. (1950) *373,628.*
Portland Canal, *fjord*, N.W. cst. of America, forming boundary between Alaska and B.C.
Portland, I. of, *peninsula*, Dorset, Eng.; limestone mass, linked to mainland by shingle spit, Chesil Bank, terminatas S. in Portland Bill; bldg.-stone quarries, cement wks.
Portmadoc, *spt.*, *urb. dist.*, Caernarvon, Wales; on Tremadoc Bay; linked by light rly. to Ffestiniog; copper and slate exp.; p. (1951) *4,060.*
Porto, *see* **Oporto.**
Porto Alegre, *c.*, *cap.*, Rio Grande do Sul st., Brazil; exp. lard, preserved meats, rice, timber, tobacco; textiles, chemicals, furniture, brewing, metallurgy; p. (1950) *401,213.*
Porto Empedocle, *spt.*, Sicily, Italy; sulphur refining, flour, furniture, lime, gypsum; p. *14,764.*
Porto Marghera, *spt.*, Venezia, N. Italy; extends along cst. S. from landward end of the causeway linking Venice to the mainland; the modern pt. of Venice, reached by ship canal dredged through shallow lagoon; oil-refineries.

Porto Novo, *t.*, *cap.*, Dahomey, W. Africa; nr. Bight of Benin; p. (1948) *30,827*.
Porto Vecchio, *t.*, Corsica; on E. cst.; p. *5,304*.
Porto Velho, *cap.*, Guaporé st., Brazil; p. *5,000*.
Portobello, *resort*, Midlothian, Scot.; on Firth of Forth, 3 m. E. of Edinburgh; bricks, pottery, paper.
Porto Torres, *spt.*, Sardinia, Italy; exp. iron ore; p. *7,251*.
Portree, *t.*, *par.*, I. of Skye, Scot.; on sound of Raasay; fishing, small tweed mill; p. *2,120*.
Portrush, *spt.*, *urb. dist.*, Antrim, N. Ireland; on N. cst. 5 m. N. of Coleraine; p. (1951) *4,166*.
Portsdown Hill, *chalk ridge*, Hants, Eng.; extends E. to W. behind Portsmouth from Fareham to Havant; water-storage reservoirs supply Portsmouth; lined with early 19th-century fortifications for defence of Portsmouth; length 6 m., alt. 400 ft.
Portsea Is., *fortfd. I.*, between Portsmouth and Langston Harbours.
Portslade-by-Sea, *urb. dist.*, E. Sussex, Eng.; 1 m. W. of Hove; p. (1951) *13,572*.
Portsmouth, *c.*, *co. bor.*, *naval pt.*, Hants, Eng.; opposite I. of Wight; has lgst. naval establishment in the world; Portsmouth is the garrison t.; Portsea has the naval dockyards, Landport is residtl., and Southsea is a popular wat. pl. within the bor. a.; across the harbour is Gosport; aircraft, light engin.; p. (1951) *233,464*.
Portsmouth, *t.*, N.H., U.S.A.; summer resort, naval dockyard, cotton; the 1905 Peace Treaty between Japan and Russia was negotiated here; p. (1950) *18,830*.
Portsmouth, *c.*, Ohio, U.S.A.; iron and steel goods, aircraft, boots, shoes, bricks; p. (1950) *36,798*.
Portsmouth, *spt.*, Va., U.S.A.; naval dockyard; farm produce, cotton, rly. wks.; p. (1950) *80,039*.
Portsoy, *spt.*, *burgh*, Banff, Scot.; on N. Buchan cst., 5 m. W. of Banff; fisheries, meal milling; p. (1951) *1,787*.
Portugal, *rep.*, Iberian peninsula, S.W. Europe; interior mountainous, with wide, fertile valleys; mild winter, hot summers; agr.: cereals, fruit, etc.; livestock; cork, pine and other timbers; copper; fisheries; textiles, pottery, tanning, wine, olive oil; cap. Lisbon; a. 35,404 sq. m.; p. (1950) *8,441,312* (inc. Azores and Madeira).
Portugalete, *spt.*, Biscay prov., Spain; nr. Bilbao; p. *10,612*.
Portuguesa, *st.*, Venezuela; cap. Guanare; p. (1941) *87,151*.
Portuguesa, *R.*, Venezuela, trib. of R. Apure; length 200 m.
Portuguese East Africa, *see* **Mozambique**.
Portuguese Guinea (*Senegambia*), W. Africa; on Atlantic cst. of Africa and surrounded by French terr.; cap. Bolama; ch. spt. Bissau; palm nuts, groundnuts, rubber, wax; a. 13,948 sq. m.; p. (1950) *510,777*.
Portuguese Timor, *col.*, E. Indies; mtns.; copra, coffee, cocoa beans, maize, rice, hides, wax, timber; cap. Deli; a. 7,330 sq. m.; p. (1950) *442,378*.
Portuguese West Africa, *see* **Angola**.
Porvenir, *spt.*, Chile; chief t. Tierra del Fuego; wool; p. mainly Jugoslav.
Porvoo, *spt.*, Finland; engin., forest inds.; p. *7,684*.
Porz, *t.*, N. Rhine–Westphalia, Germany; on R. Rhine, S.E. of Cologne; glass, metals, paper; p. (estd. 1954) *33,700*.
Posadas, *t.*, Spain; on R. Guadalquivir, nr. Cordova; p. *7,350*.
Posados, *cap.*, Misiones Terr., Argentina; on Alto Paraná R., on border of Paraguay; p. (1947) *36,623*.
Posen, *see* **Poznan**.
Pössneck, *t.*, Thuringia, Germany; S.E. of Weimar; porcelain, textiles, leather; p. (estd. 1954) *22,100*.
Postillon Is., Lesser Sunda Is., Indonesia; coconuts.
Potchefstroom, *t.*, Transvaal, S. Africa; on the Mooi R.; univ.; p. *26,986*.
Potenza, *t.*, Italy, cap. of prov. Potenza; situated on hill above R. Basento 2,700 ft. above sea-level; agr. and ind. ctr.; p. (estd.) *19,000*.
Potgietersrust, *t.*, Transvaal, S. Africa; agr. ctr.; cattle; citrus fruits; p. *5,656*.
Poti, *spt.*, Georgian S.S.R.; manganese, saw-mills; p. *15,782*.
Potomac, *R.*, U.S.A.; dividing Virginia from Maryland; flowing past Washington to Chesapeake Bay; length 400 m.
Potosi, *dep.*, Bolivia, adjoining Chile and Argentina; famous for silver- and tin-mines; cap. Potosi; a. 45,031 sq. m.; p. (1950) *534,399*.
Potosi, *c.*, Bolivia; on slope of Cerro Gordo de Potosi, 13,350 ft. above sea-level; flourishing tr.; p. (1957) *51,065*.
Potrerillos, *t.*, Chile; copper.
Potsdam, *cap.*, Brandenburg, Germany; in Soviet sphere of influence; beautiful parks and gardens, and many palaces, inc. former Imperial residence; scene of imperial conference between Allies on boundary questions, 1945; brewing, sugar, optical instruments; p. (estd. 1954) *113,800*.
Potteries, The, *dist.*, N. Staffs, Eng.; ctr. of earthenware ind., comprising ts. Burslem, Hanley, Fenton, Tunstall, Stoke, and Longton.
Potters Bar, *t.*, *urb. dist.*, N. Middlesex, Eng.; residtl.; p. (1951) *17,163*.
Pottsdown, *t.*, Penns., U.S.A.; iron and steel, farm implements, silk; p. (1950) *22,589*.
Pottsville, *c.*, Penns., U.S.A.; iron and steel, rly. wks.; p. (1950) *23,640*.
Poughkeepsie, *c.*, N.Y., U.S.A.; on Hudson R.; clothing and iron factories; agr. implements; oil clarifiers; p. (1950) *41,023*.
Poulton-le-Fylde, *urb. dist.*, Lancs, Eng.; 4 m. N.E. of Blackpool; farming; p. (1951) *7,672*.
Povenets, *t.*, R.S.F.S.R.; on L. Onega; cellulose, paper; p. *2,000*.
Powis, Vale of, Montgomery, Wales; runs 12 m. N.E. from Montgomery between Welsh Mtns. and Long Mtn.; drained by R. Severn; cattle-rearing; ch. t. Welshpool; av. width 2 m.
Poyang Hu, *lge. L.*, Kiangsi, China; on S. margin of Yangtze-Kiang plain; receives water of Kan Kiang and tribs., drains N. into Yangtze-Kiang; surrounded by flat, intensively cultivated land, rice, sugar, mulberry; size varies greatly with season, max. a. (in late summer) 1,800 sq. m.
Poznan, *prov.*, W. Poland; stock-raising, mining, mnfs. inc. locomotives; a. 15,152 sq. m.; p. (estd. 1950) *2,128,419*.
Poznan, *t.*, *cap. of prov.*, *oldest cap. of* Poland; on R. Warta; cath., univ.; engin., iron founding, chemicals; p. (1957) *383,000*.
Pozoblanco, *t.*, Spain; cattle fairs, lead-mines; p. *16,702*.
Pozzuoli, *t.*, Italy; 2 m. W. of Naples; ancient Puteoli; mineral baths, ordnance wks.; notable Roman ruins; p. *27,150*.
Praded (Altvater), *Mtns.*, Czechoslovakia.
Praest, *t.*, Zealand, Denmark; on Fakse fjord; p. *1,516*.
Prague (Praha), *c.*, *cap.*, Czechoslovakia; picturesque ancient c. on R. Vitava; univ., founded in 1348; extensive mnfs.; machin., sugar, leather, milling, chemicals; p. (1957) *978,634*.
Prahova, *R.*, Walachia, Romania; rises in Transylvanian Alps, flows S. through impt. Ploesti oilfield into R. Ialomita; length approx. 110 m.
Prato, *t.*, Italy; 8 m. N.W. of Florence; cath., medieval cas. and fortifications; straw plaiting, cottons, woollens, machin.; p. *67,800*.
Prebalkhash (Balkhash), *t.*, Kazakh. S.S.R.; copper; p. (1954) *50,000*.
Predeal Pass, Romania; carries main road and rly. across Transylvanian Alps from Bucharest to Brasov; alt. over 4,000 ft.
Preesall, *urb. dist.*, Lancs, Eng.; N. of Blackpool; p. (1951) *2,231*.
Pregel, *R.*, Poland; flows to Frisches Haff, nr. Kaliningrad; length 125 m.
Prenzlau, *see* **Przemyslaw**.
Prerov, *t.*, Czechoslovakia; S.E. of Olomouc; hardware, textiles; p. *21,510*.
Prescelli Myndd, *mtns.*, N.E. Pembroke, Wales.
Prescot, *mftg. t.*, *urb. dist.* S.W. Lancs, Eng.; 4 m. S.W. of St. Helens; mkt., elec. cable ind.; p. (1951) *12,474*.
Prescott, *pt.*, Ontario, Canada; on R. St. Lawrence; p. *3,223*.
Presidio St. Vicente, *t.*, N.M., U.S.A.; on Rio Grande del Norte.
Prešov, *t.*, Czechoslovakia; linen mnfs.; p. (1957) *31,100*.

Prestatyn, *t., urb. dist.*, Flint, Wales; on N. cst., 3 m. E. of Rhyl; seaside resort; p. (1951) *8,809*.
Prestea, *t.*, Ghana; gold-mining region.
Presteign, *mkt. t., urb. dist.*, Radnor, Wales; on R. Lugg, 10 m. N.W. of Leominster; p. (1951) *1,257*.
Preston, *t.*, Ont., Canada; furniture; p. *6,704*.
Preston, *t., pt., co. bor.*, Lancs, Eng.; on R. Ribble; textiles, engin.; p. (1951) *119,243*.
Prestonpans, *burgh*, E. Lothian, Scot.; on S. side of Firth of Forth, 9 m. E. of Edinburgh; "Bonnie Prince Charlie" defeated British here in 1745; bricks, soap, brewing; p. (1951) *2,907*.
Prestwich, *industl. t., mun. bor.*, Lancs, Eng.; in valley of R. Irwell, 3 m. N.W. of Manchester; cotton bleaching and dyeing, soap, furnishings; p. (1951) *34,387*.
Prestwick, *burgh*, Ayr, Scot.; on Firth of Clyde, 3 m. N. of Ayr; impt. golfing ctr. and trans-Atlantic airport; holiday resort; p. (1951) *11,386*.
Pretoria, *administrative cap.*, Transvaal, Union of S. Africa; fine administrative bldgs., wide boulevards; impt. tr. ctr.; p. (1951) *283,148*.
Préveza, *prefecture*, Greece; cap. Préveza; p. (1951) *56,710*.
Préveza, *fortfd. t.*, Préveza, Greece; on G. of Arta; gd. shipping tr.; p. (1951) *12,257*.
Pribalkhash, *t.*, Kazakh S.S.R., U.S.S.R.; situated midway along N. shore of L. Balkhash; ch. copper-mining and smelting ctr. in U.S.S.R., linked to Kagaranda coalfield by rail.
Pribram, *t.*, Bohemia, Czechoslovakia; lead-, silver-mining, zinc, barium, antimony.
Price, *c.*, Utah, U.S.A.; coal, asphalt; p. (1950) *6,010*.
Prieska, *t.*, C. of Gd. Hope, S. Africa; on Orange R.; sheep, cattle, horses; blue asbestos; p. *3,442*.
Prijedor, *t.*, Croatia, Jugoslavia; on E. flank of Dinaric Alps, 65 m. S.E. of Zagreb; iron-ore mines.
Prilep, *t.*, Macedonia, Jugoslavia; p. (1953) *32,614*.
Prince Albert, *t.*, Saskatchewan, Canada; lumbering, furs; p. (estd. 1957) *22,000*.
Prince Albert, *t.*, C. of Gd. Hope, S. Africa; fruit; p. *2,520*.
Prince Albert Peninsula, *dist.*, Victoria I., Arctic Canada.
Prince Albert Sound, *inlet*, Victoria I., Arctic Canada.
Prince Edward I., *prov.*, Canada; dairying, fishing, and mnfs.; fox farms; much forest land; cap. Charlottetown; a. 2,184 sq. m.; p. (1956) *99,285*.
Prince George, *t.*, B.C., Canada; p. (1948) *5,500*.
Prince of Wales I., off cst. of C. York Peninsula, Queensland, Australia.
Prince of Wales, *C.*, Bering Strait, Alaska.
Prince Rupert, *c.*, B.C., Canada; Pacific pt. of the Canadian National Rly.; p. (1951) *8,546*.
Princes Risborough, *mkt. t.*, Bucks, Eng.; at N. foot of Chiltern Hills, in gap used by main rly.; chairs, brewing; p. *2,438*.
Princeton, *bor.*, N.J., U.S.A.; seat of Princeton Univ.; p. (1950) *12,230*.
Princetown, *vil.*, Devon, Eng.; nr. Dartmoor prison.
Principe and S. Tomé, *Portuguese Is.*, G. of Guinea, Africa; products, cacao, coffee, coconuts, etc.; a. 372 sq. m.; p. (1940) *60,490*.
Pringles, *t.*, Argentina; agr. ctr.; p. *12,700*.
Pripet (Pripyat), *R.*, Byelorussian S.S.R.; trib. of R. Dnieper; length 350 m.
Pripet Marshes, Byelorussian S.S.R.; a. 30,000 sq. m.; greater part reclaimed.
Priština, *t., cap.*, Kosmet, Jugoslavia; on R. Sitnic; many mosques; sugar and coffee; p. (1953) *24,229*.
Progreso, *spt.*, Yucatan, Mexico; sisal; warehousing; p. (1940) *11,990*.
Prokopevsk, *t.*, S.W. Siberia, R.S.F.S.R.; nr. Stalinsk; metallurgy, coal; p. (1959) *282,000*.
Prome, *t.*, Burma; on R. Irrawaddy; silk, rice, cotton, tobacco; p. *28,295*.
Proskurov, *t.*, Ukrainian S.S.R.; on R. Bug; mnfs.; p. (1959) *62,000*.
Prosna, *R.*, Poland; trib. of R. Warta; length 120 m.
Prostějov, *t.*, Moravia, Czechoslovakia; match-mkg., brewing, malt and sugar; geese-breeding; p. (1957) *33,853*.
Provence, *old maritime prov.*, S.E. France; now deps. Var, Basses-Alpes, Bouches-du-Rhône, and part of Vaucluse.
Providence, *c.*, R.I., U.S.A.; at head of Narragansett Bay; impt. mnfs. and educational institutions; textiles, engin., jewellery; distributing, ctr. for New England; seat of Brown Univ.; p. (1950) *284,674*.
Provo, *c.*, Utah, U.S.A.; at base of Wasatch mtns., nr. shore of Utah Lake; flour, bricks, blast furnaces; p. (1950) *28,937*.
Prudhoe, *urb. dist.*, Northumberland, Eng.; coal; p. (1951) *9,571*.
Prussia, *old st.*, former kingdom, Germany; cap. Berlin; E. Prussia partitioned between Russia and Poland.
Pruszkow, *t.*, Poland; nr. Warsaw; elec. plant; engin; p. *25,096*.
Prut, *R.*, flows between Romania and Bessarabia from the Carpathian Mtns. to the Black Sea; length 360 m.
Przemysl, *frontier t.*, Poland; on bdy. between Poland and Ukrainian S.S.R.; timber, leather, corn, chemicals; p. *37,000*.
Przemyslaw, *t.*, Poland; nr. Szczecin; beer, tobacco, sugar, woollens; p. *22,357*.
Psel, *R.*, U.S.S.R.; flows to the R. Dnieper at Kremenchug; length 300 m.
Pskov, *t.*, R.S.F.S.R., U.S.S.R.; on R. Velykaya; flax tr., leather, sawmills, flour mills, cordage; p. (1959) *81,000*.
Pucalpa, *R. pt.*, Peru; on R. Ucayali; oilfield; p. *2,368*.
Pudsey, *t., mun. bor.*, W.R. Yorks, Eng.; between Leeds and Bradford; mnfs., woollens; p. (1951) *30,276*.
Pudukkottai, *Madras st.*, S. India; a. 1,179 sq. m.; p. *438,348*.
Puebla, *st.*, Mexico; agr.; coffee and sugar growing; a. 13,124 sq. m.; p. (1950) *1,628,638*.
Puebla, *c.*, Mexico; one of the oldest and most impt. cs.; alt. 7,137 ft.; gr. tr. cottons, woollens; p. (1950) *229,975*.
Pueblo, *c.*, Col., U.S.A.; on R. Arkansas; coal; iron- and steel-wks.; copper, gold and silver smelted; p. (1950) *63,685*.
Puentearéas, *t.*, Spain; nr. Vigo; vine growing, porcelain; p. *14,634*.
Puente Genil, *t.*, Córdoba, Spain; olive oil; p. *27,552*.
Puerto Aysen, *t.*, Chile; ctr. of sheep-farming a.; p. *3,767*.
Puerto Berrio, *R. pt.*, Colombia; on R. Magdalena; serves Medellin; p. *5,487*.
Puerto Cabello, *spt.*, Venezuela; on the Caribbean S., nr. Valencia; lge. exp.; p. (1947) *22,087*.
Puerto Colombia, *t.*, Colombia; resort; former ocean pt. for Barranquilla; p. (1947) *4,896*.
Puerto Cortes, *spt.*, Honduras rep., Central America; p. (1945) *8,000*.
Puerto de Santa Maria, *spt.*, Cadiz, Spain; wine, glass.
Puerto México, *see* **Coatzacoalcos.**
Puerto Montt, *spt.*, Chile; in sheep-farming dist.; term. of longitudinal rly.; p. (1940) *19,060*.
Puerto Natales, *spt.*, Chile; wool, frozen meat; p. *5,273*.
Puerto Plata, *t.*, Dominican rep. Central America; p. (1935) *17,059*.
Puerto Real, *spt.*, Andalusia, Spain; summer resort; wine and oil tr.; p. *14,854*.
Puerto Rico, *W. Indian I.*, Greater Antilles; ceded by Spain to U.S.A. in 1898 (since 1952 free cmwlth. ass. with U.S.A.); sugar, tobacco, rum, textiles, iron ore, salt, marble, white clay; cap. San Juan; a. 3,423 sq. m.; p. (1950) *2,210,703*, mainly natives of mixed Spanish and aboriginal descent.
Puerto Salinas, *spt.*, Venezuela; oil-transhipment.
Puerto Saurez, *R. pt.*, Bolivia; on R. Paraguay; collecting ctr. for rubber, coffee, Brazil nuts.
Puerto Varas, *t.*, Chile; tourist ctr. in Chilean "Switzerland"; p. (1940) *44,024*.
Puget Sound, Washington, U.S.A.
Puket, *t.*, ch. Siamese pt. on Malay Peninsula; tin-mines; p. *30,000*.
Pula, *spt.*, Croatia, Jugoslavia; arsenal, naval base; cement; ship-breaking; footwear, tar, flour, tobacco, fishing; p. (1953) *28,512*.
Pulacayo, *t.*, Bolivia; alt. 13,600 ft.; silver-mines; p. *8,000*.
Pulo Tantalam, name of strip of land by which Burma is connected with Malay Peninsula, Siam.
Pulo Wai I., Sumatra, Indonesia; hilly, forests; ch. pt. Sabang.

Pultusk, *t.*, Poland; on R. Narew; copper-wks., woollens, hosiery; p. *8,787*.
Puna, bleak, uninhabited plateau of Peru and Bolivia; alt. 12,000–18,000 ft.
Punjab, *geographical region*, comprising N.W. of Indus plains, Indian sub-continent; extensive irrigation from the "five rivers"—Jhelum, Chenab, Ravi, Bias, Sutlej; cotton, sugar, cereals; now divided politically between India and Pakistan.
Punjab (East), *st.*, India, incorporating Himachal Pradesh and Pepsu, 1 Nov. 1956; cap. Chandigarh; a. 47,456 sq. m.; p. (estd. 1957) *16,134,890*
Punjab (West), *prov.*, Pakistan; cap. Lahore; a. 62,987 sq. m.; p. (estd. 1951) *18,814,000*.
Punta Arenas, *t.*, Magallanes prov., Chile; most S. c. in the world; mutton, wool; whaling; coal near by; p. (1952) *34,440*.
Puntarenas, *prov.*, Costa Rica; p. (1950) *88,168*.
Puntarenas, *spt.*, Costa Rica, Central America; one of the ch. comm. pts. of the country, stands on Gulf of Nicoya; p. (1946) *26,375*.
Purbeck, I. of, *dist.*, Dorset, Eng.; Corfe cas. in ctr.; limestone (Purbeck "marble") quarries.
Puri, *dist.*, Orissa, India; cap. P. famous for its temple and festival of the god Vishnu and his monster car, Juggernaut; p. *25,000*.
Purley, *urb. dist.*, Surrey, Eng.; residtl.; p. (with Coulsdon) (1951) *63,770*.
Purnea, *t.*, Bihar, Indian Union; tobacco; p. (1941) *19,036*.
Pursat, *mkt. t.*, Cambodia, Indo-China; between Pnompenh and Siamese frontier; p. *96,000*.
Purús, *R.*, Peru; trib. of R. Amazon; length 1,400 m.
Pusan (Fusan), *pt.*, S. Korea; on S.E. cst.; formerly ch. pt. for tr. with Japan mainland; silk, hides, rice; p. (1949) *473,619*.
Puteaux, *sub.*, Paris, France; woollens, dyes; p. (1954) *41,097*.
Putney, *S.W. residtl. and industl. Thames-side sub.*, London, Eng.
Putrid Sea, *see* **Gulf of Siwash**.
Puttalam, *t.*, Ceylon; on W. cst.; pearl oysters, salt; p. *7,792*.
Putumayo, *R.*, Ecuador; trib. of R. Amazon; length 700 m.
Puy-de-Dôme, *peak*, Auvergne Mtns., France; alt. 4,806 ft.
Puy-de-Dôme, *dep.*, France; drained by R. Allier; generally mountainous; agr., vineyards; coal, silver, lead; cap. Clermont-Ferrand; a. 3,090 sq. m.; p. (1954) *481,380*.
Puy, Le, *cap.*, Haute-Loire, France; lace-mkg.; p. (1954) *23,453*.
Puymorens Tunnel, Pyrenees, on bdy. between France and Spain; carries main rly. between Toulouse and Barcelona.
Pwllheli, *spt.*, *mun. bor.*, Caernarvon, N. Wales; on S. cst. of Lleyn peninsula; seaside resort; inshore fishing, boat bldg.; p. (1951) *3,861*.
Pyatigorsk, *t.*, Caucasus, R.S.F.S.R.; spa, sulphur springs; engin., radio equipment; p. (1959) *69,000*.
Pyinmana, *t.*, Burma; rly. junction; p. *17,656*.
Pylos, *t.*, S. Greece; W. of Kalamai; p. *3,315*.
Pyongyang, *cap. c.*, N. Korea; located 40 m. up Taedong R.; coal and iron ore deposits; p. (estd. 1942) *389,105*.
Pyrenees, *range of mtns.*, S.W. Europe; dividing France from Iberian Peninsula; 270 m. long; highest peak Pic d'Anéto, or Maladetta, 11,174 ft.
Pyrenées, Basses, *dep.*, S.W. France; mainly agr. and livestock rearing; cap. Pau; a. 2,978 sq. m.; p. (1954) *420,019*.
Pyrénées, Hautes, *dep.*, S. France; agr., vines, nuts, livestock, marble quarries; cap. Tarbes; a. 1,750 sq. m.; p. (1954) *203,544*.
Pyrénées-Orientales, *dep.*, S. France; on Mediterranean; wheat, wine, silk-worm culture, stock-rearing; cap. Perpignan; a. 1, 599 sq. m.; p. (1954) *230,285*.
Pyrgos, *t.*, Elis, Greece; prov. Elis, nr. Patras; has suffered from earthquakes; p. (1951) *20,066*.

Q

Qaiyara, Al, *t.*, Iraq; route ctr.; oil resources undeveloped.
Qalqiliya, *vil.*, Jordan; rly. junction.
Qalyub, *t.*, Egypt; rly. junction; p. *5,000*.
Qalyûbîya, *administrative div.*, Egypt; a. 364 sq. m.; p. (1947) *690,156*.
Qara Dagh, *t.*, Iraq; gum.
Qara Qum, *sand desert*, Turkmen, U.S.S.R.
Qarun (Karum), *see* **Birket el Qarun**.
Qasr el Azraq, *t.*, Jordan; oasis; rice.
Qasvin, *c.*, Persia, p. (1956) *66,386*.
Qatar, *sheikdom*, Arabia; includes Q. Peninsula, Persian G.; under British protection; oil-mining; a. about 8,000 sq m.; p. about *25,000*.
Qatif, *fortfd. t.*, El Hasa, Saudi Arabia.
Qatlava Depression, N. Egypt; a. 7,000 sq. m.
Qena, *t.*, Egypt; on R. Nile; water jars and bottles; p. (1947) *39,672*.
Qishm, *I.*, Aden Protectorate, Arabia; off S. cst. of Persia, at entrance of Persian G.; hilly; highest pk., 1,331 ft.; cereals, vegs., fruit, salt; p. *15,000*.
Qisil-Qum, *desert region*, central Asia; covering dried-up a. of the extended Pleistocene Aral Sea.
Qizan, *spt.*, Saudi Arabia; cereals, pearl-fishing, salt.
Quantock Hills, Somerset, Eng.; S. of Bridgwater Bay; highest pt., 1,262 ft., officially designated (1957) as a place of "outstanding natural beauty."
Quaregnon, *t.*, Hainaut prov., Belgium; Mons colly. dist.; ironwks. and tobacco factories.
Quarnero, *G.*, Adriatic Sea; between Croatian cst. and Istria.
Quarto, G. of, *arm*, G. of Cagliari, Sardinia.
Quathlamba Mtns., *see* **Drakensberg**.
Quatre Bras, *nr.* Waterloo, S. Brabant, Belgium.
Queanbeyan, *t.*, N.S.W., Australia; pastoral, dairying and mixed farming dist.; gold, silver, copper; p. (1958) *8,380*.
Quebec, *prov.*, Canada; agr., cereals, fruit, dairying, pulpwood, asbestos, gold, copper, fishing; cap. Quebec, lgst. c. Montreal; a. 594,860 sq. m.; p. (1956) *4,628,378*.
Quebec, *c. cap.*, Quebec, Canada; on St. Lawrence R.; fine harbour, handsome government bldgs.; furs, textiles, leather, paper; p. (1956) *170,703*.
Quedlinburg, *c.*, Saxony-Anhalt, Germany; at foot of Hartz Mtns.; cas., cath.; cheese; aniline dyes, metals; p. (estd. 1954) *35,300*.
Queen Alexandria Ra., Antarctica; highest pk., Mt. Kirkpatrick, 14,600 ft.
Queenborough, *t.*, *mun. bor.*, Kent, Eng.; on R. Swale, I. of Sheppey; chemicals, glass, pottery, glue, iron; p. (1951) *3,137*.
Queen Carola Harbour, W. cst. Buka Is., Solomon Is., Pac. Oc.
Queen Charlotte's Is., *group*, N. of Vancouver I., off cst. of Brit. Columbia; ch. Is.: Graham I., Moresby I.; valuable halibut fishing ind.
Queen Charlotte Sound, *strait* separating Vancouver I. from Brit. Columbia mainland, a continuation of Johnstone Strait.
Queen Maud Land, Antarctica; claimed by Norway; ice crystal mtns., 10,000 ft. high for 100 m. along cst.
Queens, *bor.*, N.Y City, U.S.A.; p. (1957) *1,758,204*.
Queenscliff, *t.*, Victoria, Australia; on Pt. Phillip Bay; resort; p. *1,969*.
Queensferry, *burgh*, W. Lothian, Scot.; on S. side of Firth of Forth, 8 m. N.W. of Edinburgh; S. end of Forth Bridge and ferry across Firth; whisky; tourism; p. (1951) *2,486*.
Queensferry N., *vil.*, Fife, Scotland.
Queensland, *st.*, N.E. Australia; great grassy plains and cst. highlands; agr.: maize, wheat, sugar-cane, cotton, pineapples, bananas; dairying; cattle, sheep, wool; timber; minerals; coal, copper, gold; cap. Brisbane; a. 670,500 sq. m.; p. (estd. 1958) *1,405,432*.
Queenstown, *see* **Cobh**.
Queenstown, *t.*, C. of Good Hope, S. Africa; in the Great Kei R. valley; prosperous agr. region; p. (1946) *8,136*.
Queenstown, *t.*, Tasmania, Australia; p. *3,400*.
Quelimane, *pt.*, Port. E. Africa; rly. term.; rubber, almonds, copra, coffee, cotton, sisal, tea, tobacco, sugar, wax, ivory; p. *8,000*.
Quelpart (Cheju Do), *I.*, Yellow Sea; 60 m. S. of Korea (40 m. by 17 m.) belonging to S. Korea; agr. and pearl-fishing.
Quemoy, *gr. of Is.*, off Chinese mainland near Amoy, held by Nationalist forces; p. (estd.) *50,000* (plus garrison of *40,000*).
Que Que, *t.*, S. Rhodesia; alt. 3,979 ft.; gold-mining, farming, ranching dist. ctr.; iron and

steel; tobacco, vegs., citrus fruit; p. *10,500* (incl. *3,200* Europeans).
Quequen, *t.*, E. Argentina; seaside resort.
Queretaro, *st.*, Mexico; cereals, fruit, minerals; a. 4,432 sq. m.; p. (1950) *285,766*.
Queretaro, *c.*, Mexico; 134 m. N.W. of the c. of Mexico; at alt. 6,346 ft., pottery, cottons, woollens; fine government bldgs. and cath.; here Emperor Maximilian was executed; p. (1940) *72,951*.
Querimba Is., off Mozambique.
Quesnel, *t.*, B.C., Canada; on R. Frazer, 360 m. N. of Vancouver; impt. alluvial gold workings.
Quesnoy, Le, *t.*, Nord, France; nr. Valenciennes; p. *3,346*.
Quetta, *t.*, Baluchistan, Pakistan; at end of Bolan Pass, on road to Kandahar; rly. junction; tr. and military ctr.; rebuilt after destruction by earthquake, 1935; p. (1951) *84,343*.
Quezaltenango, *co.*, Guatemala, Central America; on slopes of Cerro Quemado volcano; ctr. of tr. for W. part of the rep.; textiles; p. *36,804*.
Quezon City, *new cap.* of rep. of the Philippines; built just N.E. of Manila; p. (1948) *107,977*.
Quibdo, *t.*, Colombia, S. America; on R. Atrato; p. (1947) *30,370*.
Quiberon, *t.*, Morbihan, France; on Quiberon Bay, nr. Lorient; p. *3,556*.
Quibor, *t.*, Venezuela; 40 m. S.S.W. Barquisimeto.
Quicamao, *t.*, st. Rio de Janeiro, Brazil; nr. Camos; industl.
Quilimane, *see* **Quelimane**.
Quillota, *comm. t.*, Valparaiso, Chile; nr. Santiago; p. *17,232*.
Quilmes, *t.*, Argentina; nr. Buenos Aires; p. *57,390*.
Quilon, *t.*, Kerala, India; on Malabar cst., gd. tr.; coconuts, pepper, timber; p. (1941) *33,739*.
Quimper, *fortfd. t.*, Finistère, France; nr. Brest; pilchards, pottery, paper, leather, brewing; p. (1954) *19,352*.
Quimperlé, *t.*, Finistère, France; 34 m. E.N.E. Quimper; industl.; p. (1954) *10,030*.
Quincy, *t.*, Ill., U.S.A.; milling, tobacco, ironware, machin.; p. (1950) *41,450*.
Quincy, *t.*, Mass., U.S.A.; granite, foundries, shipbldg.; p. (1950) *83,835*.
Quindio, *pass*, Columbia; provides impt. routeway through Cordillera Central; 11,099 ft.
Qui Nhon, *t.*, Annam, Viet Nam, Indo-China; exp. rice, coconut oil, copra, dried fish, groundnuts; p. *10,000*.
Quintana Roo, *terr.*, Mexico; cap. Chetumal; a. 19,438 sq. m.; p. (1940) *18,752*.
Quintero, *t.*, Chile; naval air sta.; p. *2,047*.
Quintin, *t.*, dep. Côtes-du-Nord, France; nr. St. Brieuc.
Quinto, *R.*, Argentina; flows S.E. from the Sierra de San Luis and becomes lost in a morass; length 250 m.
Quinzano, *t.*, nr. Brescia, Italy; p. *5,625*.
Quiringua, *ruined ancient t.*, nr. Isabel, Guatemala, Central America; on R. Mohtagua.
Quistello, *t.*, Mantua, Italy; on R. Secchia; p. *9,450*.
Quito, *c.*, *cap.*, Ecuador; in the Andes, 15 m. S. of the Equator; alt. 9,402 ft.; rubber and hide exp., carpet, leather and other mnfs.; p. (1950) *212,873*.
Qum, *c.*, Persia; pilgrim ctr.; mkt.; carpets, porcelain, cotton; p. (1956) *96,463*.
Quorndon, or **Quorn**, *sm. t.*, Leicester, Eng.; on R. Soar, 3 m. S. of Loughborough; ctr. of fox-hunting dist.
Quorra, *R.*, Africa; one of the names given to the R. Niger; below Timbuktu.
Quseir, *t.*, Egypt; on Red Sea cst.; caravan tr. ctr.; p. *1,000*.
Quyquyo, *t.*, S. Paraguay; copper, manganese; p. *6,590*.
Qvarken, Oestra, and **Vestra**, *straits*, in the G. of Bothnia off the Swedish cst.

R

Raab, *see* **Györ**.
Raalte, *t.*, Overyssel, Neth.; nr. Zwolle; industl.; p. *10,882*.
Raasay, *I.*, E. of Skye, Inverness, Scot.; 13 m. long, 3½ m. wide.
Rab I., at head of Adriatic, Jugoslavia; marble, silk mnfs.; holiday resort; a. 74 sq. m.; p. *6,354*.
Rabat or **New Salle**, *c.*, *spt.*, Morocco; at mouth of Bu Regreg; cath., univ.; leather and carpet mnfs.; p. (1947) *164,416*.
Rabaul, *t.*, New Britain, Papua-New Guinea; former seat of administration; copra ctr.; p. *4,500*.
Rabot, *t.*, Malta; on Gozo I.
Racalmuto, *t.*, Girgenti, Sicily; agr. interests; p. *13,825*.
Race, *C.*, S.E. Newfoundland, Canada.
Racibórz (Ratibor), *t.*, Upper Silesia, Poland; German before 1945; on R. Oder; textiles, metals, wood, engin.; p. (1946) *19,065*.
Racine, *c.*, Wis., U.S.A.; on L. Michigan, 10 m., S. of Milwaukee; motor cars, farm implements; p. (1950) *71,193*.
Radauti, *t.*, Bukovina, Romania; paper, glass, engin.; p. *14,530*.
Radcliffe, *mun. bor.*, Lancs, Eng.; nr. Manchester; paper-mkg., cotton weaving, engin.; p. (1951) *27,551*.
Radebeul, *t.*, Saxony, Germany; sub. Dresden, on R. Elbe; machin.; p. (estd. 1954) *41,400*.
Radford, *t.*, Va., U.S.A.; iron smelting, lumbering; p. (1950) *9,026*.
Radnorshire, *inland co.*, N. Wales; oats, wheat; sheep rearing, breeding Welsh ponies, mineral springs; cap. Presteign; a. 471 sq. m.; p. (1951) *19,998*.
Radom, *industl. t.*, Kielce, Poland; nr. Warsaw; engin.; p. (1957) *120,000*.
Radomsko, *t.*, Poland; nr. Lodz; p. *19,000*.
Radomsyl, *t.*, Ukrainian S.S.R.; textiles.
Radstock (Norton Radstock), *t.*, *urb. dist.*, Somerset, Eng.; 10 m. S.E. of Bristol; collieries; p. (1951) *11,934*.
Rafah, *t.*, Egypt; on Israel bdy.
Raffadali, *t.*, Girgenti, Sicily, Italy; agr. interests; p. *10,825*.
Ragaz, Bad, *t.*, *resort*, St. Gall, Switzerland; on R. Tamina; hot springs; ancient Abbey of Pfäfers, 2,697 ft. above sea-level.
Ragusa, *c.*, Syracuse, Italy; cheese factories; oil; p. (1951) *48,391*.
Ragusa, *see* **Dubrovnik**.
Rahad, *R.*, Sudan; trib. of Blue Nile.
Rahmániya, El, *t.*, Lower Egypt; nr. Rosetta; on R. Nile.
Rahway, *c.*, N.J., U.S.A.; on R. Rahway; residtl. for New York business men; p. (1950) *21,290*.
Raiatéa, *I.*, Society Is., Pac. Oc.; lgst. of the Fr. Leeward group, 130 m. N.W. Tahiti.
Raichur, *t.*, Hyderabad, India; pottery; p. about *27,910*.
Raigarh, *t.*, *cap.*, Raigarh st. Madhya Pradesh, India; silk mnfs.; rice; p. (1941) *20,327*.
Rainford, *urb. dist.*, Lancs, Eng.; nr. St. Helens; coal; p. (1951) *4,805*.
Rainier, *mtn.*, Washington, U.S.A.; 14,530 ft.
Rainton, E. and W., *colly. dists.*, nr. Durham, Eng.
Rainy, *L.*, on border of Canada and Minn., U.S.A., drained by Rainy R. to the Lake of the Woods.
Raipur, *t.*, Madhya Pradesh, India; p. (1941) *63,465*.
Raismes, *t.*, Nord, France; nr. Valenciennes; lace ind.; p. (1954) *14,577*.
Rajahmundry, *t.*, Madras, India; on the delta of the Godivari R.; p. (1951) *105,276*.
Rajasthan, *st.*, India; farming, millet, cotton, pulses, textiles, ivory; ch. towns, Jaipur, (cap.), Udaipur, Alwar, Jodhpur; a. 132,077 sq. m.; p. (estd. 1957) *15,970,774*.
Rajkot, *t.*, Bombay, India; p. (1951) *132,069*.
Rajpipla, *t.*, Bombay, India; E. of Broach.
Rajputana, formerly collection of 23 native India sts. under the charge of a political agent to the Viceroy and the Brit. dist. of Ajmer Merwara.
Rajsjahi, *div.*, E. Bengal st., Pakistan; p. (estd. 1951) *14,078,000*.
Raki-Ura I., *see* **Stewart I.**
Rakka, *t.*, Nigeria, Brit. W. Africa; on Lower Niger R.
Rakos Palota, *t.*, Hungary; nr. Budapest; p. *49,000*.
Rakovnik, *t.*, Bohemia, Czechoslovakia; mkt., mining; p. *11,073*.
Raleigh, *c.*, N.C., U.S.A.; educational ctr.; rly. wks., cotton-mills; p. (1950) *65,679*.
Ralick, *chain of Is.*, Marshall gr., Pac. Oc.; parallel with Ratack chain.

Ramacca, *commune*, E. Sicily; marble; linen; agr.; p. *12,521*.
Ramah, *spt.*, Canada; on cst. of Labrador.
Rambervilliers, *t.*, Vosges, France; nr. Nancy; p. (1954) *6,257*.
Rambouillet, *t.*, Seine-et-Oise, France; nr. Versailles; ancient chateau; p. (1954) *8,923*.
Rameswaram, *t.*, S. India; on Rameswaram I., Palk Strait; contains a great Dravidian temple, one of the Hindu holy places of pilgrimage; p. *8,423*.
Ramgunga, *R.*, India; trib. of R. Ganges, which it joins nr. Cawnpore; length 300 m.
Ramle, *t.*, Israel; S. of Lydda; p. (1946) *16,380*.
Ramleh, *t.*, Egypt; E. of Alexandria; p. *52,000*.
Ramme, *t.*, Ringkjobing, Jutland, Denmark.
Ramnad, *t.*, Madras, India; on peninsula projecting towards Rameswaram I.
Râmnicu-Sărat, *t.*, Romania; scene of several battles; petroleum; p. *19,267*.
Râmnicu-Vâlcea, *c.*, Romania; on R. Olt; cath., monasteries; salt-mining; hot springs; p. *15,162*.
Rampur, *t.*, Uttar Pradesh, India; N.W. of Bareilly; damask, sugar, pottery; p. (1951) *134,277*.
Rampur Boalia, *t.*, E. Bengal, Pakistan; on R. Ganges; silk inds.; government college; suffered from earthquake, 1897; p. about *25,000*.
Ramree I., Bay of Bengal, Indian Ocean; off cst. Arakan, Lower Burma; 50 m. long.
Ramsbottom, *t.*, *urb. dist.*, Lancs, Eng.; on R. Irwell, 4 m. N. of Bury; cottons, bleaching, dyeing, engin., paper mftg.; p. (1951) *14,587*.
Ramsey, *mkt. t.*, *urb. dist.*, Hunts, Eng.; on edge of The Fens, 7 m. N. of St. Ives; engin., agr.; p. (1951) *5,772*.
Ramsey, *t.*, *spt.*, I. of Man; on N.E. cst.; holiday resort; p. (1956) *4,621*.
Ramsey, *residtl. bor.*, N.J., U.S.A.; ctr. of dairying region; p. (1950) *4,760*.
Ramsey I., off cst. of Pembroke, Wales.
Ramsgate, *t.*, *mun. bor.*, Kent, Eng.; on S. cst. of I. of Thanet; seaside resort; p. (1951) *35,748*.
Rancagua, *c.*, Colchagua prov., Chile; p. (1952) *39,972*.
Ranchi, *hot-weather seat of govt.*, Bihar, India; technical institute; rice, tea, shellac; p. (1951) *106,849*.
Rand, *gold-mining dist.*, Transvaal, S. Africa (*see* **Witwatersrand**).
Randazzo, *t.*, Catania, Sicily; on S. slopes of Mt. Etna; 2,474 ft. above sea-level; p. *16,325*.
Randers, *t.*, Denmark; medieval monastery; machin., foundries; exp. dairy produce; p. (1955) *41,720*.
Råneå, *t.*, *R.*, Sweden; on N. cst. of G. of Bothnia.
Ranenburg, *t.*, U.S.S.R.; on R. Voronezh; p. *10,000*.
Ranger, *t.*, Texas, U.S.A.; p. (1950) *3,989*.
Rangiora, *t.*, S.I., N.Z.; 20 m. N.W. of Christchurch; ctr. of a lge. agr. dist.; p. *2,240*.
Rangitaiki R., N.I., N.Z.; flows N. into Bay of Plenty.
Rangoon, *c.*, *cap.*, Burma; on E. arm of Irrawaddy delta; 2 caths., many mosques, temples and pagodas; gr. tr., and many impt. mnfs.; rice, oil, lumber; ivory and wood carving; textiles; p. (1955) *737,079*.
Rangpur, *t.*, E. Bengal, Pakistan; on R. Ghaghat; jute; p. (1941) *34,039*.
Raniganj, *t.*, Bengal, India; iron, coal-mines; p. *10,000*.
Rani-Nur, *famous rock-cave*, Khandgiri Hill, Puri dist., Orissa, India.
Rannoch, *Loch*, Perth, Scot.; 9 m. long, 1 m. wide; drained to R. Tay.
Rapallo, *t.*, *wat. pl.*, Liguria, N.W. Italy; on G. of Genoa, 22 m. E. of Genoa; most celebrated resort on Italian Riviera di Levante; p. (1946) *14,675*.
Rapanui or **Easter I.**, *I.*, Pac. Oc.; W. of Chile.
Raphoe, *par.*, co. Donegal, Ireland; cath.; mkt.; woollens, esp. tweeds; p. *2,600*.
Rapid City, *t.*, S.D., U.S.A.; p. (1950) *25,310*.
Rappoltsweiler, *t.*, Bas Rhin, France; nr. Selestat; walled; known as "the pipers' town."
Raqqa, *t.*, Syria; on R. Euphrates; p. *2,000*.
Raritan, *t.*, N.J., U.S.A.; p. (1950) *5,131*.
Rarotonga, *I.*, Pac. Oc.; one of the Cook Is.; 53 m. round, lgst. of the gr.; p. (1948) *5,549*.
Ras-al-Had, *C.*, E. extremity Arabia.
Ras-al-Khaima, *t.*, on Persian G., st. of Bahrain, Arabia.
Rasgrad, *t.*, Bulgaria; nr. Ruschuk, on R. Ak-Lom.
Ras Mohammed, *S. point*, Sinai Peninsula.
Ras Tannura, *spt.*, Nejd, Saudi Arabia; lge. oil-refinery.
Rashin, *t.*, N. Korea; nr. U.S.S.R. frontier.
Rasskazovo, *t.*, Tambov reg., U.S.S.R.; ironwks.; wheat; p. *25,168*.
Rastrick, *industl. t.*, W.R. Yorks, Eng.; on R. Calder, nr. Halifax.
Rat Is., *group of Is.*, Aleutian Archipelago.
Ratack, *chain of Is.*, Marshall Gr., Pac. Oc., parallel with Ralick chain.
Rath Luirc (Charleville), *t.*, Cork, Ireland; on bdy. of Limerick; p. (1951) *1,582*.
Rathenow, *t.*, Brandenburg, Germany; on R. Havel; optical glass; p. (estd. 1954) *27,700*.
Rathkeale, *mkt. t.*, *rural dist.*, Ireland; nr. Limerick; p. (1951) *12,778*.
Rathlin, *I.*, off Fair Head, N. Antrim, N. Ireland; 5 m. by 1 m.
Rathven, *par.*, Banff, Scot.; farming, sandstone, limestone, slate; p. *15,404*.
Ratibor, *see* **Raciborz**.
Ratingen, *t.*, N. Rhine–Westphalia, Germany; N.E. of Düsseldorf; textiles, machin., glass; p. (estd. 1954) *26,500*.
Ratisbon, *see* **Regensburg**.
Ratnagiri, *t.*, Bombay st., India; cst. tr. pt.; p. (1941) *23,906*.
Ratnapura, *t.*, Ceylon; graphite; p. *12,441*.
Rattray Head, Aberdeen, Scot.
Rauma, *spt.*, Finland; on G. of Bothnia; p. *10,083*.
Raunds, *t.*, *urb. dist.*, Northants, Eng.; 5 m. N.E. of Wellingborough; p. (1951) *4,616*.
Rava Ruskaya, *t.*, Ukrainian S.S.R.; oil processing; quarrying; lignite; p. *12,000*.
Ravenglass, *t.*, Cumberland, Eng.; nr. mouth of R. Esk.
Ravenna, *region*, Emilia, Italy; a. 715 sq. m.; p. (1951) *294,419*.
Ravenna, *c.*, Emilia, N. Italy; on marshy plain, nr. the Adriatic, 45 m. E. of Bologna; cath., archiepiscopal palace, famous mosaics; agr. mkt. and ctr. for sugar-beet and beet sugar; sericulture; p. (1951) *91,539*.
Ravenna, *t.*, N.E. Ohio, U.S.A.; engin., rubber; p. (1950) *9,857*.
Ravensburg, *t.*, Baden–Württemberg, Germany; nr. Konstanz; p. (estd. 1954) *26,900*.
Ravensthorpe, *industl. t.*, W.R. Yorks, Eng.; nr. Dewsbury.
Ravi, *R.*, Punjab, India; trib. of the Chenab; used for irrigation; length 450 m.
Rawalpindi, *div.*, W. Punjab, Pakistan; between Lahore and Peshawar; p. (estd. 1951) *5,134,000*.
Rawalpindi, *c.*, W. Punjab, Pakistan; on R. Leh; fortfd.; active tr. with Kashmir; rly. wks., brewing, foundries, oil refining; Fed. cap.; p. (1951) *237,219*.
Rawicz, *industl. t.*, Poznan, Poland; p. *9,000*.
Rawlins, *t.*, S. Wyo., U.S.A.; mkt., coal, oilfields, ranching; p. (1950) *7,415*.
Rawmarsh, *t.*, *urb. dist.*, W.R. Yorks, Eng.; 2 m. N.E. of Rotherham; engin.; p. (1951) *18,793*.
Rawson, *spt.*, *cap.*, Chubut terr., Argentina; S. of Valdes Peninsula; oil; p. *2,500*.
Rawson, *industl. t.*, nr. Leeds, Yorks, Eng.
Rawtenstall, *t.*, *mun. bor.*, Lancs, Eng.; on R. Irwell in ctr. of Rossendale Fells; cotton weaving; p. (1951) *25,426*.
Ray, *C.*, S.W. Newfoundland, Canada; beginning of Long Range, of which the highest peak is 2,673 ft.
Rayleigh, *t.*, *urb. dist.*, Essex, Eng.; 5 m. N.W. of Southend; light inds.; p. (1951) *9,388*.
Raynham, *t.*, S.E. Mass., U.S.A.; mkt. ctr. for agr. products, poultry, eggs; p. *2,141*.
Razeim, *L.*, Dobrodea, Romania; 25 m. long.
Ré or **Rhe**, *I.*, W. cst. Charente-Inférieure, France; opp. a. Rochelle; salt mftg.; ch. t. St. Martin.
Reading, *t.*, *co. bor.*, Berks, Eng.; at confluence of Rs. Thames and Kennet; univ.; biscuits, engin., brewing, seed-growing and mkt. gardening, tin-box mftg., printing; p. (1951) *114,176*.
Reading, *t.*, Mass., U.S.A.; nr. Boston; p. (1950) *14,006*.
Reading, *c.*, Penns., U.S.A.; on Schuylkill R.; ironwks.; p. (1950) *109,320*.
Recanati, *t.*, Macerata, Italy; industl.; p. *16,325*.
Recife, *spt.*, *cap.*, Pernambuco, Brazil; univ.;

cotton, machin., sugar, rubber, cocoa; p. (1950) *534,468*.
Recklinghausen, *t.*, N. Rhine-Westphalia, W. Germany; nr. Dortmund; collieries, iron, machin., textiles, chemicals; p. (estd. 1954) *117,800*.
Recôncavo, *dist.*, Bahia st., N.E. Brazil; surrounds bay at mouth of R. Paraguassu; intensive cultivation of sugar-cane, cotton, tobacco, rice, by Negro farmers; ch. ts. São Salvador, Cachoeira.
Red Basin, *see* Szechwan.
Red Bay, Antrim, N. Ireland.
Red Deer R., trib. of Saskatchewan, R., Alberta, Canada.
Red Lake, *t.*, Ontario, Canada; nr. L. Winnipeg; gold.
Red R. (China), *see* **Song Koi**.
Red R., U.S.A.; trib. Mississippi, flows from New Mexico through the Staked Plain; length, 1,600 m.
Red R. of the North, U.S.A.; rises in Minnesota and flows N., separating N. Dakota and Minnesota, U.S.A., and thence into Manitoba, Canada, to join Assiniboine R.; length 650 m.
Red Sea, *arm of the sea* separating Arabia from Africa; connects with the Indian Ocean by the Straits of Bab-el-Mandeb; length 1,400 m., greatest width 230 m.
Red Wing, *c.*, Minn., U.S.A.; on the Mississippi R., at head of L. Pepin; flour mills, grain tr.; p. (1950) *10,645*.
Redbank, *t.*, N.J., U.S.A.; summer resort, fishing, mkt. gardens, light mnfs.; p. (1950) *12,743*.
Redcar, *t.*, *mun. bor.*, N.R. Yorks, Eng.; on E. cst., nr. mouth of R. Tees; seaside resort; steel wks.; p. (1951) *27,512*.
Redcliffe, *t.*, Queensland, Australia; p. (1957) *16,200*.
Redding, *c.*, N. Cal., U.S.A.; lumber, mining, agr.; tourists; p. (1950) *10,256*.
Redditch, *t.*, *urb. dist.*, Worcester, Eng.; 12 m. S. of Birmingham; needles, fish tackle, cycles, springs, aluminium alloys, chromium and cadmium plating; p. (1951) *29,184*.
Rede, *R.*, Northumberland, Eng.; trib. of R. Tyne.
Redfern, *sub.*, Sydney, N.S.W., Australia; ironwks., engin.; p. (1947) *18,837*.
Redhill, *t.*, Surrey, Eng.; at foot of N. Downs, adjoining Reigate; residt.; refractory sands.
Redlands, *t.*, Cal., U.S.A.; p. (1950) *18,429*.
Redmond, *c.*, Ore., U.S.A.; agr., esp. potatoes; turkey rearing, dairying; p. *1,876*.
Redonda, *I.*, Leeward group, Caribbean Sea; between Montserrat and Nevis.
Redondela, *t.*, Pontevedra, Spain; on Vigo estuary; old feudal castles; p. *16,927*.
Redruth, *t.*, part of Camborne-Redruth urb. dist., Cornwall, Eng.; tin-mine dist., chemicals, engin., textiles; p. (1951) (with Camborne) *35,829*.
Redwood City, *c.*, W. Cal., U.S.A.; shipbldg., saltwks.; exp. sequoia; p. (1950) *25,544*.
Ree, Lough, *L.*, Ireland; between Roscommon, Longford and Westmeath, an extension of R. Shannon; 17 m. long.
Regalbuto, *industl. t.*, Catania, Italy; p. *10,200*.
Regello, *t.*, Val d'Arno, Italy; nr. Florence; p. *14,250*.
Regensburg (**Ratisbon**), *c.*, Bavaria, Germany; N.E. of Munich on R. Danube; cath.; brewing, machin., wood, chemicals; p. (estd. 1954) *123,900*.
Reggio di Calabria, *t.*, Calabria, Italy; on Strait of Messina; cath.; perfumes, silks, terracotta; train ferry to Messina (Sicily); has suffered from earthquakes; p. (1951) *140,855*.
Reggio nell' Emilia, *c.*, *cap.*, Emilia-Romagna, N. Italy; at N. foot of Apennines, 40 m. N.W. of Bologna; locomotives, aircraft; fine church of the Madonna della Ghiara; sericulture, cheese-mkg.; p. (1951) *106,182*.
Regina, *t.*, *cap.*, Saskatchewan, Canada; foundries, oil-wks., sawmills; p. (estd. 1957) *98,000*.
Region Oriental, Ecuador; a. 219,095 sq. m.; p. *295,200*; consisting of two provinces—Napo Pastaza and Santiago Zamora; only about 110,000 sq. m. of this region is inhabited.
Regla, *t.*, Cuba, W. Indies; nr. Havana; p. *23,037*.
Rehoboth, *t.*, S.W. Africa; salt. mining, cattle; p. *9,727*.
Rehovoth, Israel; agr. (citrus) and scientific ctr.; p. *c. 10,500*.
Reichenbach, *t.*, Saxony, Germany; paper, metals; p. (estd. 1954) *34,500*.
Reichenberg, *see* **Liberec**.
Reidsville, *t.*, N.C., U.S.A.; tobacco mkt., mnfs., textiles, turpentine; p. (1950) *11,708*.
Reigate, *mkt. t.*, *mun. bor.*, Surrey, Eng.; at foot of N. Downs, 5 m. E. of Dorking; residtl.; fuller's earth, freestone; p. (1951) *42,234*.
Reims, *t.*, Marne, France; on R. Vesle; famous Gothic cath.; champagne ctr., cloth factories, woollen inds. and tr., dye wks.; p. (1954) *121,145*.
Reindeer L., Saskatchewan, Canada.
Remscheid, *t.*, N. Rhine-Westphalia, Germany; nr. Düsseldorf; cutlery, machin., textiles; p. (estd. 1954) *112,900*.
Renaix (**Ronse**), *t.*, Belgium; nr. Ghent; linen, woollens; dyeing, bleaching; p. (estd. 1957) *25,246*.
Rendsburg, *t.*, Schleswig-Holstein, Germany; on N. Sea-Baltic Canal; metals, elec. goods, shipbldg.; p. (estd. 1954) *36,600*.
Renfrew, *maritime co.*, W. Scot.; S. of R. Clyde; agr., mftg., and comm., coal, iron, shipbldg., machin., printing; ch. industl. ctrs. Paisley and Greenock; a. 245 sq. m.; p. (1951) *324,652*.
Renfrew, *co. t.*, *burgh*, Renfrew, Scot.; nr. R. Clyde, 5 m. W. of Glasgow; p. (1951) *17,093*.
Renfrew, *t.*, Ontario, Canada; p. *5,511*.
Renmark, *t.*, S. Australia; on Murray R.; ctr. of irrigated fruit-growing dist.; p. *1,914*.
Rennes, *c.*, *cap.*, Ille-et-Vilaine, France; 40 m. S. of St. Malo; univ.; dairying and agr. dist.; farm implements, sail-cloth; p. (1954) *124,122*.
Reno, *lgst. c.*, Nevada, U.S.A.; seat of Univ. of Nevada; st. agr. college; famous for easy divorce procedure; p. (1950) *32,497*.
Renovo, *bor.*, Penns., U.S.A.; p. (1950) *3,751*.
Rensseaer, *t.*, N.Y., U.S.A.; on R. Hudson facing Albany; p. (1950) *10,856*.
Repton, *rural dist.*, Derbyshire, Eng.; agr., clay, coal-mining, sanitary ware; p. *29,780*.
Republican Fork or **Pawnee**, *R.*, trib. of Kansas R., Col., U.S.A.; length 550 m.
Repulse Bay, on S. side of Melville Peninsula, N. Canada.
Requeña, *t.*, Valencia, Spain; sulphur springs of Fuentepodida; p. *19,422*.
Resht, *t.*, *cap.*, Gilan, Persia; nr. Caspian Sea, sericulture, rice; p. (1956) *109,493*.
Resistencia, *t.*, *cap.*, Chaco, Argentina; p. (1947) *64,680*.
Resolution, *t.*, N.W. Terr., Canada; on S. shore of Gr. Slave L.
Resolution I., off S.W. cst. of S.I., New Zealand.
Resolution Is. (Brit.), N. of Labrador, at entrance Hudson Strait, Franklin, Canada.
Resolven, *t.*, N. Glamorgan, Wales, on R. Neath 6 m. N.E. of Neath; aluminium; p. (1951) *4,353*.
Retalhuleu, *t.*, *cap.*, R. dep., Guatemala, Central America; coffee; p. *6,542*.
Retford, E., *see* **East Retford**.
Rethymnon, *prefecture*, I. of Crete; cap. Rethymnon; p. (1951) *72,186*.
Rethymnon, *cap.*, Rethymnon, Crete; p. (1951) *13,587*.
Réunion, Ile de la (formerly Bourbon), *Fr. I.*, Indian Ocean; between Mauritius and Madagascar; sugar growing; cap. St. Denis; a. 970 sq. m.; p. (1954) *274,370*.
Reus, *t.*, Tarragona, Spain; textiles, leather, soap; p. *32,285*.
Reuss, R., Switzerland; flows N. from the St. Gotthard Pass through L. Lucerne, joining Aar R. near Brugg; length 98 m.
Reutlingen, *t.*, Baden-Württemberg, Germany; S. of Stuttgart; textiles, metals, machin., leather; p. (estd. 1954) *49,400*.
Reval, *see* **Tallin**.
Revel, *t.*, Haute-Garonne, France; nr. Toulouse; furniture; p. *5,133*.
Revere, *t.*, Mass., U.S.A.; sub. of Boston; resort; p. (1950) *36,763*.
Revilla Gigedo Is., *gr. of Is.*, belonging to Mexico, Pac. Oc.; ch. Is., Socorro, San Benito.
Rewah, *t.*, India; 131 m. S. of Allahabad; rice, coal; p. (1941) *36,008*.
Rewari, *t.*, India; S.W. of Delhi; turban and brassware mnfs.; p. *26,000*.
Reykjavik, *c.*, *cap.*, Iceland; on S.W. cst.; univ., cath.; exp. fish, skins, wool; p. (1950) *55,980*.
Rezé, *t.*, Loire Atlantique, France; p. (1954) *19,000*.
Rezekne, *t.*, Latvian S.S.R.; p. *13,139*
Rhayader, *rural dist.*, Radnorshire, N. Wales; stock and sheep raising; p. (estd. 1955) *4,700*.
Rheine, *t.*, N. Rhine-Westphalia, Germany; on R.

Ems; textiles, machin.; p. (estd. 1954) *40,500*.
Rheinhausen, *t.*, N. Rhine-Westphalia, Germany; on R. Rhine; S. of Duisburg; coal-mining, iron, textiles; p. (estd. 1954) *54,300*.
Rheinkamp (Repelen-Baerl before 1950), *t.*, N. Rhine-Westphalia, Germany; on R. Rhine, N.W. of Duisburg; coal-mining; p. (estd. 1954) *25,100*.
Rheydt, *t.*, N. Rhine-Westphalia, Germany; W. of Düsseldorf; textiles, machin., rly. junction; p. (estd. 1954) *80,700*.
Rhin (Bas), *dep.*, N.E. France; cap. Strasbourg; a. 1,848 sq. m.; p. (1954) *707,934*.
Rhin (Haut), *dep.*, N.E. France; cap. Colmar; a. 1,354 sq. m.; p. (1954) *509,647*.
Rhine, *R.*, rises in Switzerland, can. Grisons, passes through L. Constance, skirts Baden, traverses Hesse, Rhineland, and the Neth., flowing to N. Sea by two arms, Oude Rijn and the Waal (the latter discharging finally by the Maas); famous for its beauty, especially between Bonn and Bingen; ch. falls at Schaffhausen; once a natural barrier between E. and W. Europe, the Rhine is now spanned by 30 rly. bridges, and its navigation declared free in 1868; length 800 m.
Rhineland Palatinate (Rheinland-Pfalz), *Land*, Germany; a. 7,665 sq. m.; cap. Mainz; p. (1950) *3,004,752*.
Rhinns (Rins), *peninsula*, on W. cst. Islay I., Inner Hebrides, Scot.; lighthouse.
Rhio-Lingga Archipelago, *gr. of Is.*, Indonesia; mainly in Malacca Strait; a. 12,235 sq. m.; p. *298,225*.
Rhode Island, *st.*, New England, U.S.A.; washed by the Atlantic, and surrounded by Massachusetts and Connecticut; divided by Narragansett Bay, with many islands, lgst. being that from which the st. takes its name; mnfs., woollens, cottons, machin., jewellery; cap. Providence; a. 1,214 sq. m.; p. (1950) *791,896*.
Rhodes (Rhodos), *I.*, Dodecanese Is.; off S.W. cst., Anatolia, belonging to Greece; cap. R.; figs, oranges, grapes; p. (1940) *61,791*.
Rhodes, *t.*, *cap.*, I. of Rhodes, Greece; on N.E. cst.; p. (1951) *24,186*.
Rhodesia and Nyasaland, Federation of (formed 1953), comprising S. Rhodesia (a. 150,333 sq. m., p. (1956) *2,480,000*; N. Rhodesia (a. 288,130 sq. m., p. (1956) *2,180,000*); and Nyasaland (a. 49,177 sq. m., p. (1956) *2,600,000*).
Rhodope Mtns., *range*, S. Bulgaria; rise to 10,200 ft.
Rhodopi, *prefecture*, Thrace, Greece; cap. Komotini; p. (1951) *105,874*.
Rhöngebirge, *mtn. gr.*, Thuringia, Germany; highest peak 3,100 ft.
Rhondda, *t.*, *urb. dist.*, Glamorgan, Wales; in narrow Rhondda valley, 7 m. N.W. of Pontypridd; coal-mining; p. (1951) *111,357*.
Rhône, *R.*, Switzerland and France; rising in the Rhône glacier of the St. Gotthard mtn. gr., and flowing through the L. of Geneva and E. France to the G. of Lyons in the Mediterranean; length 640 m.
Rhône, *dep.*, S.E. France; drained by R. Rhône, and its trib. R. Saône, which unite at Lyons; agr., grain, potatoes, wine; vine-growing, many mnfs., silks, textiles; cap. Lyons; a. 1,104 sq. m.; p. (1954) *966,780*.
Rhyl, *t.*, *urb. dist.*, Flint, N. Wales; between Bangor and Chester, at entrance Vale of Clwyd; seaside resort; furniture mkg.; p. (1951) *18,745*.
Rhymney, *t.*, *urb. dist.*, Monmouth, Eng.; on R. Rhymney, 4 m. E. of Merthyr Tydfil; mining; p. (1951) *9,134*.
Rialto, *I.* and *dist.* on Grand Canal, Venice; ctr. of comm.
Ribadesella, *spt.*, Spain; W. of Santander; p. *8,228*.
Ribatejo, *prov.*, Portugal; a. 2,794 sq. m.; p. (1940) *424,063*.
Ribe, *t.*, Jutland, S. Denmark; on W. cst.; p. *6,770*.
Ribble, *R.*, Yorks and Lancs, Eng.; followed by main rly. route Leeds to Carlisle; length 75 m.
Ribeira, *t.*, Galicia, Spain; on peninsula of Arosa estuary; agr., cattle-rearing, fishing.
Ribeirão Preto, *c.*, S.E. Brazil; mkt. in rich agr. a. esp. coffee, cotton, sugar; p. (1947) *49,891*.
Riberalta, *R. pt.*, Colonia Terr., Bolivia, S. America; on R. Beni above rapids which limit navigation to upper course; collecting ctr. for wild rubber.
Riccia, *t.*, Campobasso, Italy; industl.; p. *8,575*.
Richelieu or Chambly, *R.*, Quebec, Canada; flows from L. Champlain to the St. Lawrence R. at L. St. Peter; length 80 m.
Richmond, *mun. bor.*, Surrey, Eng.; on R. Thames, S.W. of London; industl. and residtl.; beautiful park and riverside scenery; p. (1951) *41,945*.
Richmond, *t.*, *mun. bor.*, N.R. Yorks, Eng.; at E. foot of Pennines on R. Swale; p. (1951) *6,165*.
Richmond, *t.*, Nelson, N.Z.; p. *1,130*.
Richmond, *t.*, Cal., U.S.A.; oil refining; p. (1950) *99,545*.
Richmond, *c.*, Ind., U.S.A.; on R. Whitewater; mnfs.; p. (1950) *39,539*.
Richmond, *c.*, Ky., U.S.A.; in tobacco-growing and horse-rearing region; p. (1950) *10,268*.
Richmond, one of the five bors. of New York City, U.S.A.; p. (1957) *210,146*.
Richmond, *c.*, *cap.*, Va., U.S.A.; on falls on R. James; gr. tobacco mftg. ctr. and mart; p. (1950) *230,310*.
Richrath-Reusrath, *commune*, Rhine prov., Germany; ironwks., textile mills; p. *14,148*.
Rickmansworth, *mkt. t.*, *urb. dist.*, Herts, Eng.; at confluence of Rs. Colne and Chess, 3 m. S.W. of Watford; paper, brewing; residtl.; p. (1951) *24,518*.
Rideau Canal, Canada; from Ottawa R., to Kingston on L. Ontario; length 132 m.
Ridgefield, *t.*, N.J., U.S.A.; p. (1950) *8,312*.
Ridgewood, *t.*, N.J., U.S.A.; p. *17,481*.
Ridgway, *bor.*, Penns., U.S.A.; elec. equipment, engin., leather, lumber yards; p. (1950) *6,244*.
Riesa, *t.*, Saxony, Germany; on R. Elbe, nr. Meissen; steel wks., sawmills; p. (estd. 1954) *36,100*.
Riesengebirge, *mtns.*, Germany; (Czech **Krkonose**, Polish **Karkońesze**).
Riesi, *t.*, Sicily, Italy; industl.; p. *20,200*.
Rieti, *t.*, Perugia, Italy; an ancient Sabine t. in famous fertile dist.; mnfs.; p. (1951) *33,364*.
Riff (Er Rif), *mtns.*, Morocco, N.W. Africa; extend E. along N. African cst. for 200 m. from Straits of Gibraltar; inaccessible and economically unattractive, terr. of semi-nomadic tribes; rises to over 7,000 ft. in many places.
Riga, *cap.*, Latvian S.S.R.; at head of G. of Riga; gr. industl. activity; machin., glass, paper, cottons; rly. and shipbldg., exp. wheat, flax, hemp, dairy produce; p. (1959) *605,000*.
Rigi, *mtn.*, nr. L. Lucerne, Switzerland; alt. 5,905 ft.
Rijeka-Susak, *t.*, Jugoslavia; formerly known as Fiume; belonged to Austria-Hungary before First World War, then to Italy; ceded to Jugoslavia by Italy after Second World War; rival pt. to Trieste; petrol refining, tobacco, chemicals, hydro-elec.; p. (1953) *75,112*.
Rijssen, *t.*, Neth.; p. *10,645*.
Rimac, *R.*, Lima dep., Peru; S. America; rises in W. cordillera of Andes and flows W. to Pac. Oc.; provides water for irrigation and for c. of Lima; length 75 m.
Rimini, *t.*, Emilia, Italy; on the Adriatic cst.; mineral springs, sea-bathing, thriving inds.; p. *72,914*.
Rimnic, *t.*, Romania; on R. Rimnic, nr. Bucharest; industl.
Rimnic, *t.*, Romania; on R. Aluta, 100 m. N.W. Bucharest.
Rimouski, *t.*, Quebec, Canada; on S. bank St. Lawrence R.; lumber; tourists; p. *7,009*.
Ringköbing Fjord, *inlet*, W. cst. Jutland, Denmark.
Ringwood and Fordingbridge, *mkt. t.*, *rural dist.* Hants, Eng.; on R. Avon, nr. Christchurch; p. (rural dist. 1951) *23,908*.
Rio Branco, *R.*, Brazil; prov. Baia, trib. of Rio Grande; length 120 m.
Rio Branco, *R.*, N. Brazil; flowing to Rio Negro; length 370 m.
Rio Branco, *t.*, cap. of Acre st., Brazil.
Rio Branco, *terr.*, Brazil; cap. Boa Vista; a *82,749* sq. m.; p. (1947) *14,010*.
Rio Cuarto, *t.*, Cordoba prov., Argentina; p. *34,354*.
Rio das Mortes, *R.*, Brazil; trib. of the Araguay; length 500 m.
Rio de Janeiro, *maritime st.*, Brazil; a. 16,443 sq. m.; coffee plantations, sugar, cotton, tobacco; thorium; cap. Niterói; p. (est. 1950) *2,326,201*.
Rio de Janeiro, *c.*, Brazil; on Bay of same name; lgst. c. in Brazil, many fine bldgs., flourishing tr. and inds.; very lge. coffee exp., brewing, foundries, milling, sugar-refining; rly. wks.;

shipyards, exp. coffee, sugar, hides, meat, diamonds; p. (1950) *2,413,152*.
Rio de la Plata, *see* **Plate R.**
Rio de Oro, *prov.*, Spanish Sahara; a. 70,000 sq. m.
Rio de San Juan, *R.*, Utah, New Mexico and Colorado, U.S.A.; length 350 m.
Rio Dulce, *R.*, Santiago st., Argentina; length 400 m.
Rio Grande, *R.*, Senegambia, Africa; flows to the Atlantic; length 400 m.
Rio Grande, *headstream* of the R. Paraná, Brazil.
Rio Grande City, *t.*, S. Texas, U.S.A.; on Rio Grande R.; mkt., agr., oil, natural gas; p. (1950) *3,992*.
Rio Grande de Santiago, *R.*, Mexico; flows into the Pacific.
Rio Grande del Norte, *R.*, flows from st. of Colorado through New Mexico to the G. of Mexico; forms bdy. between Texas, U.S.A. and Mexico; length 1,800 m.
Rio Grande do Norte, *st.*, Brazil; sugar, cotton, cattle-rearing; cap. Natal; a. 20,482 sq. m.; p. (1950) *983,572*.
Rio Grande do Sul, *st.*, S. Brazil; cap. Porto Alegre; a. 109,067 sq. m.; p. (1950) *4,213,316*.
Rio Grande do Sul, *spt.*, Brazil; leather; p. *45,000*.
Rio Muni, *Span. col.*, Cent. Africa; with Fernando Po and other Is. forms col. of Span. Guinea; cacao, palm oil, coffee; a. 10,852 sq. m.; p. *135,000*.
Rio Negro, *R.*, Argentina; rises in the Andes, and flows through the terr. of Rio Negro to the Atlantic; length 650 m.
Rio Negro, *terr.*, Argentina; S. of Pampa; cap. Viedma; cattle-rearing region; a. 77,610 sq. m.; p. (estd. 1958) *193,400*.
Rio Negro, *R.*, S. America; rises in Colombia, and flows through N. Brazil to the Amazon; length 1,350 m.
Rio Negro, *dep.*, Uruguay; cap. Fray Bentos; a. 3,269 sq. m.; p. (1953) *51,954*.
Rio Piedras, *t.*, Puerto Rico, W. Indies; univ.; merged with San Juan 1951.
Rio Salada, *R.*, Argentina; rises in the Andes, and flows S.E. to R. Paraná, at Buenos Aires; length 1,000 m.
Rio Tinto, *t.*, Spain; at W. end of Sierra Morena, 40 m. N.E. of Huelva; lead- and copper-mines.
Riobamba, *c.*, Chimborazo, Ecuador; on R. St. Juan; woollens; Inca palace ruins; p. (1938) *26,782*.
Rioja, La, *prov.*, Argentina; gold- and copper-mines; cap. La Rioja; a. 33,394 sq. m.; p. (1947) *109,386*.
Riom, *t.*, Puy-de-Dôme, France; nr. Clermont Ferrand; p. (1954) *12,664*.
Rion *R.*, Georgian S.S.R.; flows from Caucasus to Black Sea; lower half navig.; hydro-elec. sta. at Kutais. (In Greek mythology the R. Phasis of the Argonauts.)
Rionero, *t.*, Potenza prov., S. Italy; nr. Melfi; industl.; p. *12,025*.
Ripatransone, *t.*, Italy; nr. Fermo; industl.; p. *7,700*.
Ripley, *mkt. t.*, *urb. dist.*, Derby, Eng.; 7 m. N.E. of Derby; coal, iron, heavy engin., bricks, agr. implements; p. (1951) *18,194*.
Ripley, *t.*, W. Tenn., U.S.A.; lumbering; veneer; cottonseed processing; p. (1950) *3,318*.
Ripon, *c.*, *mun. bor.*, W.R. Yorks, Eng.; on R. Ure; fine cath.; paint and varnish, pre-fabricated concrete structures; p. (1951) *9,464*.
Ripon, *t.*, Wis. U.S.A., on Green L., p. (1950) *5,619*.
Ripon Falls, *see* **Jinja**.
Riposto, *t.*, Sicily, Italy; on E. cst. nr. Taormina; wine export; p. *10,725*.
Ripponden, *urb. dist.*, W.R. Yorks, Eng.; nr. Halifax; p. (1951) *5,213*.
Risca, *t.*, *urb. dist.*, Monmouth, Eng.; on R. Ebbw, 5 m. N.W. of Newport; coal, iron and steel, bricks, tiles, plastics; p. (1951) *15,131*.
Rishton, *t.*, *urb. dist.*, Lancs, Eng.; at N. foot of Rossendale Fells, 4 m. N.E. of Blackburn; p. (1950) *5,794*.
Risley, nr. Warrington, Lancs., Eng.; Industrial Group and Atomic-Energy Authority Establishment.
Riva, *t.*, Trentino, Italy; battle zone in First World War, Nov.–Dec. 1915; p. *12,950*.
Rivas, *spt.*, Nicaragua, Central America; p. *7,443*.
Rive-de-Gier, *t.*, Loire, France; on R. Gier, nr. Lyons; mining ctr.; p. (1954) *15,118*.
Rivera, *dep.*, Uruguay; cap. Rivera; a. 3,793 sq. m.; p. (1953) *91,740*.
Riverina, *pastoral cty.*, N.S.W., Australia; between Lachlan-Murrumbidgee and Murray Rs.; sheep, agr. with irrigation; gold, coal; ch. ts., Wagga Wagga, Albury; a. 26,600 sq. m.; p. *71,000*.
River Rouge, *t.*, Mich., U.S.A.; p. (1950) *20,549*.
Riversdale, *dist.*, *W. prov.*, C. of Gd. Hope, S. Africa; a. 2,462 sq. m.
Riverside, *t.*, Cal., U.S.A.; p. (1950) *46,764*.
Riverside, *t.*, N.J., U.S.A.; p. (1950) *7,199*.
Riverton, *t.*, S.I., N.Z.,; p. (1951) *1,015*.
Riviera, the belt of cst. between the mtns. of the shore of the G. of Genoa, N. Italy, from Spezia to Nice; picturesque scenery, sheltered, mild climate; fashionable health resort.
Riyadh, *t.*, Nejd, Saudi Arabia; p. about *150,000*.
Rizal, *prov.*, central Luzon, Philippine Is.; chiefly agr. a.; a. 791 sq. m.; p. *444,805*.
Rize, *t.*, Turkey; nr. Trabzon, on Black Sea; in I. of same name; p. (1945) *14,174*.
Rjukan, *t.*, Telemark, S. Norway; 35 m. N.W. of Notodden, impt. nitrate factories; p. *8,460*.
Road Town, *spt. cap.*, Tortala and Virgin Is.; p. (1946) *681*.
Roanne, *t.*, Loire, France; nr. St. Etienne; textile ind., cottons, woollens, silk; p. (1954) *46,501*.
Roanoke, *I.*, off cst. N.C., U.S.A.; 13 m. long.
Roanoke, *R.*, Va., and N.C., U.S.A.; flows into Albemarle Sound; length 230 m.
Roanoke, *t.*, Ala., U.S.A.; cotton mnfs., clothes; p. (1950) *5,392*.
Roanoke, *t.*, S.W. Va., U.S A.; on R. R.; iron wks.; p. (1950) *91,921*.
Roatan Is., Honduras, in G. of H.
Robin Hood's Bay, *picturesque inlet with fishing vil. on cst.*, N.R. Yorks, Eng.; nr. Whitby.
Robson, Mt., Alberta, Canada, 12,972 ft.
Roca, C. da, most W. point of estuary of R. Tagus, Portugal.
Rocafuerte, *t.*, W. Ecuador; coffee, sugar, sisal, indigo; p. *14,125*.
Roch, *R.*, Lancs, Eng.; rises in E. of Rossendale Fells, central Pennines, flows S.W. into R. Irwell nr. Bury; with R. Calder provides relatively easy route across Pennines from Leeds to Manchester; used by rail, road, canal; length approx. 20 m.
Rocha, *dep.*, Uruguay; a. 4,280 sq. m.; cap. Rocha; p. (1953) *86,334*.
Rochdale, *t.*, *co. bor.*, Lancs, Eng.; at S. foot of Rossendale Fells, on R. Roch; textiles, textile engin., rayon spinning, elec. engin.; co-operative movement started here, 1844; p. (1951) *87,734*.
Rochefort, *t.*, S. Belgium; p. *3,550*.
Rochefort, *fortfd. pt.*, Charente-Maritime, France; with arsenal and sm. cst. tr.; famous cheese; p. (1954) *30,858*.
Rochelle, La, *fortfd. spt.*, *cap.*, Charente-Maritime, France; on Bay of Biscay; shipbldg., chemical wks., fisheries; p. (1954) *58,799*.
Roches Point, E. side of Cork harbour, Co. Cork, Ireland.
Rochester, *c.*, *mun. bor.*, Kent, Eng.; on R. Medway, adjoining Chatham; cath., cas.; aeronautical, elec. and mechanical engin., paint, varnish; p. (1951) *43,899*.
Rochester, *c.*, Minn., U.S.A.; in grain-growing dist.; p. (1950) *29,885*.
Rochester, *t.*, N.H., U.S.A.; on Salmon Falls and Cocheco Rs.; boot factories; p. (1950) *13,776*.
Rochester, *c.*, N.Y., U.S.A.; on Genesee R.; univ.; hydro-elec. power; cameras, films, etc., optical instruments, thermometers; p. (1950) *332,488*.
Roche-sur-Yon, La, *t.*, Vendée, France; on R. Yon; cas.; called formerly Bourbon Napoleonville; p. (1954) *19,576*.
Rochford, *t.*, *rural dist.*, Essex, Eng.; 3 m. N. of Southend; p. (rural dist. 1951) *19,612*.
Rockall, *sm. I.*, N. Atl. Oc.; lies 200 m. W. of Outer Hebrides; forms highest part of submarine bank which forms good fishing-ground; uninhabited. Annexed by Britain, 1955.
Rockall Deep, *submarine trench*, N. Atl. Oc.; between N.W. Ireland and Rockall I.; depth exceeds 1,600 fathoms.
Rockaway, *bor.*, N.J., U.S.A.; iron founding and products; textiles, leather; p. (1950) *3,812*.
Rockaway Beach, *summer resort*, on sandbar of

Long I.; now incorporated with Queens, one of the 5 bors. of New York City, U.S.A.
Rockford, *c.*, Ill., U.S.A.; machin. and furniture mftg.; p. (1950) *92,927*.
Rockhampton, *c.*, Queensland, Australia; on R. Fitzroy; comm. cap. of Central Queensland. Has lgst. meat-preserving wks. in Commonwealth; mining; p. (1957) *42,900*.
Rock Hill, *c.*, S.C., U.S.A.; industl.; p. (1950) *24,502*.
Rockingham, *t.*, N.C., U.S.A.; cotton mnfs., paper, lumbering, peaches; p. (1950) *3,356*.
Rock Island, *c.*, Ill., U.S.A.; on R. Mississippi; lumbering, flour mills, glass, farm implements; elec. equipment; p. (1950) *48,710*.
Rockland, *c.*, *spt.*, Ma., U.S.A.; on Penobscot Bay; shipbldg., granite, quarrying; p. (1950) *9,234*.
Rockland, *t.*, Mass., U.S.A.; shoemkg., engin.; p. (1950) *8,960*.
Rock River, Wis., U.S.A.; trib. of the Mississippi; length 375 m.
Rockville, *c.*, Conn., U.S.A.; on Hockanum R.; silks, woollens; p. (1950) *8,016*.
Rocky Mount, *t.*, N.C., U.S.A.; p. (1950) *27,697*.
Rocky Mountains, *extensive chain*, N. America; extending along the W. portions of Canada and the U.S.A. from Alaska to Mexico; the highest accurately measured point in the U.S.A. system is Mt. Massive (14,418 ft.); other high peaks are Mt. Elbert (14,431 ft.), Blanca Peak (14,390 ft.), Mt. Harvard (14,399 ft.), La Plata Peak (14,340 ft.), and Mt. Uncompahgre (14,306 ft.). Mt. St. Elias, in Alaska, is computed to be 18,008 ft. high, and was long held to be the highest peak in N. America, but is now known to be surpassed by the adjacent Mt. Logan (19,850 ft.) and by Mt. Orizaba (18,701 ft.) in Mexico.
Rodas, *mun.*, Cuba; sugar; p. *21,288*.
Rödby, *t.*, Denmark; on S. cst. of Lolland; p. (1956) *10,572*.
Rodewisch, *t.*, Saxony, Germany; engin., textiles; p. *10,572*.
Rodez, *t.*, *cap.*, Aveyron, France; on R. Aveyron; cath.; woollens; p. (1954) *20,383*.
Rodosto, *see* **Tekirdag**.
Rodriguez, *I.*, British dependency of Mauritius, Indian Ocean; 350 m. N.E. of Mauritius; principal exp., cattle, beans, salt, fish and goats; 42 sq. m.; p. (estd. 1957) *16,535*.
Roebling, *t.*, N.J., U.S.A.; established by steel-cable mkg. company; p. (1950) *3,500*.
Roermond, *t.*, Limburg, Neth.; on R. Maas; minster; paper, beer, cloth; p. (1951) *22,887*.
Roeselare, *t.*, W. Flanders, Belgium; on R. Lys, nr. Courtrai, cotton, linen, lace; p. (estd. 1957) *34,575*.
Roes Welcome, channel between Southampton I. and N.W. Terr., Canada.
Rogaland, *co.*, Norway; a. 3,546 sq. m.; p. (1950) *211,408*.
Rogers, *t.*, Ark., U.S.A.; fruit, vegs.; tourists; p. (1950) *4,962*.
Rogerstone, *t.*, S. Monmouth, Eng., on R. Ebbw and 3 m. W. of Newport; aluminium; p. (1951) *4,453*.
Rohtak, *t.*, W.N.W. Delhi, India; mkt., cotton textiles; fortifications; p. (1941) *35,235*.
Rokko, *C.*, Honshu, Japan; jutting into Sea of Japan.
Roma, *t.*, Queensland, Australia; in agr. dist. nr. Mt. Horrible; site of oil-boring operations; p. (1947) *3,880*.
Roman, *t.*, Romania; on R. Moldava; cath.; p. *25,857*.
Romania, *rep.*, E. Europe; bounded by U.S.S.R., Hungary, Jugoslavia and Bulgaria, consisting of provs. of Oltena, Muntenia (Wallachia), Dobrogea (Dobruja), Moldova (Moldavia), S. Bucovina, Transylvania, Banat, Crisana and Maramures; plain drained by Danube and tribs. Prut, Siret, Dambovita, Oit Jiu; except Transylvania, mountainous, Carpathians, Transylvanian Alps; very warm summers, severe winters, rainfall moderate, chiefly in summer; agr., maize, wheat, barley, oats; sheep, cattle, pigs, horses; forests, timber; minerals, petroleum, natural gas, lignite, copper, salt; flour-milling, brewing, distilling, oil-refining; cap. Bucharest; a. 91,671 sq. m.; p. (1956) *17,489,794*.
Romans, *t.*, Drôme, France; on R. Isère; formerly seat of ancient abbey; p. (1954) *22,559*.
Romblon Is., *prov.*, of Philippine Is.; low, fertile; ch. crops, abaca and copra; gold, marble; a. 512 sq. m.; p. *99,367*.
Rome, *c.*, *cap.*, Italy; on R. Tiber, 15 m. from the sea; one of the most famous cities in the world; ctr. of the Roman Catholic Church and former cap. of the greatest st. in the ancient world; situated on the original "seven hills" of the old Roman metropolis, and in the valleys between, along the R.; contains the celebrated cath. ch. of St. Peter, in the Vatican City, many churches and palaces, the cas. of St. Angelo, and numerous monuments, besides a univ. and several notable institutions devoted to art and learning; was created cap. of mod. United Italy in 1871; mnfs. and tr.; p. (1953) *1,760,000*.
Rome, *c.*, Ga., U.S.A.; on Coosa R.; in cotton region; p. (1950) *29,615*
Rome, *c.*, N.Y., U.S.A.; on the Mohawk R.; dairying ctr.; p. (1950) *41,682*.
Romford *mkt. t.*, *mun. bor.*, Essex, Eng.; 12 m. E. of London; brewing, light inds.; p. (1951) *87,991*.
Romilly-sur-Seine, *t.*, Aube, France; nr. Troyes; textile factories; p. (1954) *13,731*.
Romney, *see* **New Romney**.
Romney Marsh, *coastal marsh*, Kent, Eng.; formed by blocking of R. Rother by shingle spit of Dungeness which extends from Rye to Hythe; now largely drained; pastures for special Romney Marsh breed of sheep; a. 50 sq. m.
Romney, *t.*, Ukrainian S.S.R.; petroleum; p. *25,174*.
Romsdal, Möre Og, *dist.* Norway; cap. Molde; a. 5,812 sq. m.; p. *181,089*.
Romsey and Stockbridge, *mkt. t.*, *rural dist.*, Hants, Eng.; on R. Test, 7 m. N.W. of Southampton; paper mkg., brewing; p. (rural dist. 1951) *26,790*.
Ronaldshay, N. and S., Is. of the Orkneys.
Roncesvalles, *mtn. pass.*, in the Pyrenees, Spain; 20 m. N.E. of Pamplona, Navarra; Charlemagne's army under Roland, who was slain, defeated here, 778.
Ronda, *t.*, Malaga, Spain; ancient Moorish t. 42 m. N. of Gibraltar; mnfs. chocolate, leather, fruit, wines; p. *26,170*.
Ronse, *see* **Renaix**.
Roodepoort, *t.*, Transvaal, S. Africa; p. (1946) *22,950*.
Roorkee, *t.*, Uttar Pradesh, India; p. *17,476*.
Roosevelt, *R.*, trib. of Madeira R., Brazil.
Roosevelt Dam, Arizona, U.S.A.; on R. Salt 130 m. above Phoenix on edge of Colorado Plateau; supplies irrigation for cultivation of 360 sq. m. in lower valley of R. Salt and upper valley of R. Gila; hydro-elec. power-sta.
Roper R., N.E. Northern Terr., Australia; navigable for about 90 m. inland.
Roquefort-sur-Soulzon, *t.*, S.E. Aveyron, France; caves in limestone cliffs used for ripening cheese.
Roraima, *mtn.*, Brit. Guiana, Venezuela bdy.; alt. 9,000 ft.
Röros, *t.*, Norway; on R. Glomma; p. *2,575*.
Rorschach, *t.*, Switzerland; lace; p. (1941) *10,967*.
Rosa Monte, highest pk., Pennine Alps, Italy; alt. 15,217 ft.
Rosario, *t.*, Santa Fé, Argentina; on R. Paraná; rly. terminus; sugar-refining, milling, brewing; p. (estd. 1954) *551,276*.
Rosas, *t.*, Spain; on Franco-Spanish border, opp. Portbou on the Mediterranean cst.
Roscommon, *inland co.*, Connaught, Ireland; a. 949 sq. m.; p. (1956) *63,675*.
Roscommon, *t.*, Roscommon, Ireland; 96 m. W. of Dublin; p. (1951) *2,013*.
Roscrea, *mkt. t.*, Tipperary and Offaly, Ireland; on Little Bransa R.; p. (1951) *2,988*.
Roseau, *t.*, Dominica, Windward Is.; p. (1957) *13,500*.
Roseburg, *t.*, S.W. Ore., U.S.A.; roses, fruit, poultry; canning, sawmills; p. (1950) *8,390*.
Roselle, *t.*, N.J., U.S.A.; p. (1950) *17,681*.
Rosendaal, *t.*, S.W. Neth.; nr. Arnhem; p. (1951) *31,889*.
Rosendal-Nispen, *industl. t.*, N. Brabant, Neth.; nr. Breda.
Rosenheim, *t.*, Bavaria, Germany; on R. Inn, 35 m. S.E. of Munich; famous for sulphur springs, impt. brine wks., machin., wood, iron,

textiles, brewing; rly. junction; p. (estd. 1954) *30,300*.
Rosetta (Rashid), *t.*, Lower Egypt; on W. distributary of R. Nile, 43 m. N.E. Alexandria; p. (1947) *28,698*.
Roseville, *t.*, E. Cal., U.S.A.; exp. fruit, wines; p. (1950) *8,723*.
Roskilde, *mkt. t.*, Denmark; 20 m. W. of Copenhagen; fine cath. containing tombs of Kings and Queens of D.; royal palace; p. *23,497*.
Ross, *mkt. t.*, *urb. dist.*, Hereford, Eng.; on R. Wye, 12 m. S.E. of Hereford; cider; p. (1951) *5,394*.
Ross and Cromarty, *cst. and Highland co.*, Scot.; total a. 3,202 sq. m.; ch. t. Dingwall; p. (1951) *60,503*.
Ross Dependency, Antarctica, N.Z.
Ross I., Victoria Land, Antarctica.
Ross Sea, *sea* extending to 85° S. in the Antarctic.
Rossan Pt., *headland*, N. side of Donegal Bay, Ireland.
Rossano, *c.*, Cosenza, S. Italy; nr. G. of Taranto; old t. under the Byzantium Empire; alabaster and marble quarries; silk, olive oil; p. *17,425*.
Rossendale Fells (Rossendale Forest), *upland region*, S.E. Lancs, Eng.; forms W. extension of Pennines between Mersey and Ribble valleys; composed of hard, impervious millstone grit; covered by boggy moorland; many reservoirs store soft water for cotton-spinning ts. along S. edge (Bolton, Bury, Rochdale), cotton-weaving ts. along N. edge (Blackburn, Accrington, Burnley) and sm. industl. ts. in Irwell valley within Rossendale; alt. mainly above 1,200 ft.
Rossland, *t.*, B.C., Canada; gold; p. *2,848*.
Rosslare, *spt.*, Wexford, Ireland; on extreme S.E. of Ireland; steamer connections to Fishguard (Wales).
Rostock, *spt.*, Mecklenburg, Germany; nr. mouth of R. Warnow; univ.; fisheries, machin., chemicals, shipbldg., iron, foodstuffs; p. (estd. 1954) *140,000*.
Rostov, *t.*, *pt.*, R.S.F.S.R.; on R. Don, 10 m. up from Sea of Azov (Black Sea); a gr. grain mart and comm. and industl. ctr.; engin., elec. power, paper; p. (1959) *597,000*.
Roswell, *t.*, N.M., U.S.A.; p. (1950) *25,738*.
Rosyth, *t.*, Fife, Scot.; naval dockyard.
Rothamsted, *hamlet*, Herts, Eng.; in Chiltern Hills, 1 m. S. of Harpenden; lge. agr. experimental sta.
Rother, *R.*, Sussex and Kent, Eng.; rises in the Weald, flows S.E. into English Channel at Rye; length 31 m.
Rother, *R.*, Hants and Sussex, Eng.; trib. of R. Arun; length 24 m.
Rother, *R.*, Derby and Yorks, Eng.; flows to R. Don at Rotherham; length 21 m.
Rotherham, *t.*, *co. bor.*, W.R. Yorks; on R. Don, 4 m. N.E. of Sheffield; iron, steel, coal, glass; p. (1951) *82,334*.
Rotherhithe, *S.E. Thames-side-dist.*, London, Eng.
Rothes, *burgh*, Moray, Scot.; on R. Spey, 12 m. S.E. of Elgin; p. (1951) *1,211*.
Rothesay, *burgh*, Bute, Scot.; on E. cst. of I. of Bute in Firth of Clyde; tourism; p. (1951) *10,145*.
Rothwell, *t.*, *urb. dist.*, Northants, Eng.; 3 m. N.W. of Kettering; boots, shoes; p. (1951) *4,617*.
Rothwell, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Aire, 3 m. S.E. of Leeds; mining; chemicals, bricks, tiles, copper tubes, stone and sand quarrying; p. (1951) *24,283*.
Rotondo, *mtn.*, Corsica, France.
Rotorua, *t.*, N.I., N.Z.; health resort; hot springs; p. (1951) *10,635*.
Rotterdam, *spt.*, *wealthy comm. c.*, Neth.; on R. Maas; linked to N. Sea at Hook of Holland by "New Waterway" ship canal; Europe's lgst. pt. second in world; breweries, sugar-ref., shipbldg., chemicals, clocks; p. (estd. 1955) *713,000*.
Rotti, *I.* (50 m. by 20 m.) off cst. of Timor, Malay Archipelago, Indonesia; p. *59,221*.
Roubaix, *t.*, Nord, France; nr. Lille; on the Roubaix canal 1 m. from the Belgian frontier; woollen mnfs., grape and tomato forcing; gr. tr., many educational institutions and fine bldgs.; p. (1954) *110,067*.
Rouen, *c.*, Seine-Maritime, France; over 50 m. up R. Seine; extensive cotton and woollen factories, magnificent cath. and church; silks, machin., shipbldg.; badly damaged Second World War; p. (1954) *116,540*.
Roulers, *see* **Roeselare.**
Roumania, *see* **Romania.**
Rourkela, *t.*, Orissa, India; steel, tinplate, iron.
Rousay, Orkney Is., Scotland.
Roussillon, *old prov.*, S. France; lies in depression at E. end of Pyrenees, in dep. of Pyrénées Orientales; largely irrigated by many sm. streams; olive, vine, wheat.
Rouyn, *mining t.*, Quebec, Canada; at end of L. Abitibi; gold, copper, zinc; p. *8,808*.
Rovereto, *c.*, S. Tyrol, Italy; on R. Adige; silk, leather, paper, cottons; p. *20,575*.
Rovigo, *prov.*, Venetia, Italy; cap. Rovigo; a. 684 sq. m.; p. (1951) *355,056*.
Rovigo, *t.*, *cap.*, Rovigo prov., Italy; on R. Adige, 20 m. S. of Padua; agr. mkt.; p. *39,954*.
Rovinj, *t.*, Istria, Jugoslavia; sardine fisheries; p. *10,150*.
Rowley Regis, *industl. t.*, *mun. bor.*, Staffs, Eng.; adjoins Dudley; p. (1951) *49,409*.
Roxboro', *t.*, N.C., U.S.A.; cotton, tobacco, mnfs.; p. (1950) *4,321*.
Roxburgh, *inland co.*, S. Scot.; stretching halfway along the Eng. border; hilly; sheep-rearing; woollens, tweed; cap. Jedburgh; a. 670 sq. m.; p. (1951) *45,562*.
Royal Leamington Spa, *see* **Leamington.**
Royal Oak, *t.*, Mich., U.S.A.; p. (1950) *46,898*.
Royan, *t.*, Charente-Maritime, France; S. of Rochelle; fishery, tr., industl.; p. (1954) *12,289*.
Royersford, *bor.*, S.E. Penns., U.S.A.; light iron and steel mnfs.; glass; p. (1950) *3,862*.
Royston, *mkt. t.*, *urb. dist.*, Herts, Eng.; at N. foot of E. Anglian Heights, 7 m. N.E. of Baldock; p. (1951) *4,663*.
Royston, *urb. dist.*, W.R. Yorks, Eng.; coal-mining; p. (1951) *8,137*.
Royton, *t.*, *urb. dist.*, Lancs, Eng.; 4 m. N.E. of Manchester; cotton spinning; p. (1951) *14,772*.
Roznava, *t.*, S. Czechoslovakia; W. of Košice; antimony; p *6,835*
Ruabon, *par.*, Denbigh, N. Wales; on Salop border; coal, iron, tile wks.; p. *3,333*.
Ruandi-Urundi, *terr.*, formerly in German E. Africa, now Belgian Trust Terr., united administratively with Belg. Congo; rich in cattle; cap. Usumburu; a 19,536 sq m.; p (1956) (African) *4,484,591*, (European) *6,486*.
Ruapehu, *highest mtn.*, N.I., N.Z.; volcanic peak at S. extremity of central volcanic dist.; alt. 9,175 ft.
Rubicon, *R.* of Central Italy, flowing to the Adriatic, crossed by Julius Cæsar and his armies in 49 B.C. Has been identified with the Fiumicino or the Uso. There is a R. Rubicon (It. Rubico) a few m. N. of Rimini and S. of Cervia.
Rubtsovsk, *t.*, W. Siberia, R.S.F.S.R.; p. (1959) *111,000*.
Ruby Mines, *dist.*, Mandalay, Upper Burma; hilly region of the Shan plateau, rich in precious stones; H.Q. t. Mogôk, in ctr. of the mining dist.
Rudolf, *L.*, Kenya, Brit. E. Africa; N.E. of L. Victoria; a. 3,500 sq. m.
Rudolph I., N. of Franz Josef Land, Arctic Ocean; Russian naval base; met. sta.
Rudolstadt, *t.*, Thuringia, Germany; on R. Saale; cas.; porcelain, metals; p. (estd. 1954) *23,200*.
Rueil, *t.*, Seine-et-Oise, France; nr. Paris; p. (1954) *32,212*.
Rufiji, *R.*, Tanganyika; Brit. E. Africa; flows to the Indian Ocean; length 450 m.
Rugby, *mkt. t.*, *mun. bor.*, Warwick, Eng.; on R. Avon, 9 m. E. of Coventry; famous Public School; elec. and gen. engin., motor and aircraft patterns; p. (1951) *45,418*.
Rugeley, *mkt. t.*, *urb. dist.*, Staffs, Eng.; on R. Trent, 9 m. S.E. of Stafford; coal, iron, tanning; p. (est. 1958) *12,000*.
Ruhr, *industl. dist.*, W. Germany; lies to E. of R. Rhine, on either side of R. Ruhr; rich coalfield; impt. iron and steel, heavy engin. inds. based on local coal and iron ore from Luxembourg, Spain, Sweden; water communications to N. Sea along R. Rhine and Dortmund–Ems Canal; ch. ts. Essen, Duisburg, Düsseldorf, Dortmund, Bochum.
Ruislip-Northwood, *urb. dist.*, Middlesex, Eng.; residtl.; p. (1951) *68,274*.
Rukwa, *L.*, Brit. E. Africa; between L. Tanganyika and L. Nyasa in the rift valley; 30 m. by 12 m., a. increasing.
Rum, *I.*, Inner Hebrides, Argyll, Scot.; 8½ m. by 8 m.
Rumaila, Iraq; oilfield; pipe-line links to the Zubair–Fao system.
Rumania, *see* **Romania.**

Rumburk, *t.*, N. Bohemia, Czechoslovakia; pottery, textiles; p. *10,466*.
Rum Jungle, N. Terr., Australia; 70 m. S.E. of Darwin; impt. uranium mines.
Runcorn, *industl. t.*, *urb. dist.*, Cheshire, Eng.; on S. side of Mersey estuary; connected by the Ship Canal with Manchester; transporter bridge to Widnes; chemicals, tanning; p. (1951) *23,933*.
Rupert, *R.*, Canada; flows from L. Mistassini to James Bay; length 300 m.
Ruschuk, *see* **Ruse**.
Ruse, *t.*, Bulgaria; on R. Danube, opp. Giurgiu in Romania; univ., arsenal, barracks; beer, sugar, tobacco; p. (1956) *83,472*.
Rushden, *t.*, *urb. dist.*, Northants, Eng.; 3 m. E. of Wellingborough; shoes; p. (1951) *16,321*.
Rusholme, *t.*, E. of Manchester, S.E. Lancs, Eng.; industl. and residtl.
Rushville, *t.*, Ind., U.S.A.; p. (1950) *6,761*.
Russell, *t.*, Kan., U.S.A.; mkt. in agr. and cattle region, oil and gas fields; p. (1950) *6,483*.
Rüsselsheim, *t.*, Hessen, Germany; on R. Main, E. of Mainz; car mftg. (Opel); p. (estd. 1954) *22,900*.
Russian Soviet Federal Socialist Republic (R.S.F.S.R.) *ch. constituent rep.*, U.S.S.R.; ch. inds.: wheat, rye, oats, barley, potatoes, sugar-beet, fruits, sunflower, cotton, hemp, tobacco; sheep, cattle, dairying, pigs, horses; lumbering, timber, wood-pulp; coal, petroleum, iron, manganese, etc.; machin., textiles, oil-refining, cement, bricks; a. 6,310,594 sq. m.; cap. Moscow; p. (1959) *117,494,000*.
Rustavi, *t.*, Georgian S.S.R., New Town 20 m. S.E. Tbilisi; p. (1959) *62,000*.
Rustenburg, *t.*, Transvaal, Union of S. Africa; on N.W. edge of High Veld (alt. over 4,000 ft.) 60 m. W. of Pretoria; local mkt. for agr. produce, sorghum, maize, cotton.
Rutbah, *t.*, Iraq; on oil pipe-line from Iraq to Haifa.
Rute, *t.*, Cordova, Spain; nr. Lucerna; industl.; p. *18,903*.
Ruthenia, *dist.*, U.S.S.R.; formerly part of Romania, ceded to U.S.S.R. in 1945, now part of Ukrainian S.S.R.
Rutherford, *t.*, N.J., U.S.A.; p. (1950) *17,411*.
Rutherfordton, *t.*, N.C., U.S.A.; gold, lumber, textiles; agr.; p. (1950) *3,146*.
Rutherglen, *burgh*, Lanark, Scot.; on R. Clyde, S.E. of Glasgow; industl., chemicals, tubes, paper, wire ropes, bolts, chenilles, webbing; p. (1951) *24,225*.
Ruthin, *t.*, *mun. bor.*, Denbigh, Wales; in Vale of Clwyd, 8 m. S.E. of Denbigh; mkt.; p. (1951) *3,599*.
Rutigliano, *t.*, Bari, Italy; agr. interests; p. *10,650*.
Rutland, *midland co.*, Eng.; smallest in cty.; agr. farming, livestock; cheese, stone, iron; a. 152 sq. m., cap. Oakham; p. (1951) *20,510*.
Rutland, *c.*, Vt., U.S.A.; marble quarries, machin. and furniture; p. (1950) *17,659*.
Ruvo, *t.*, Bari, Italy; cath.; olive-oil presses; p. *25,225*.
Ruwenzori, **Mt.**, on bdy. between Uganda Prot. and Belgian Congo, Central Africa; overlooks W. arm of Gr. African Rift Valley midway between L. Albert and L. Edward; lower slopes covered in equatorial rain forest, coffee plantations on middle slopes above 5,000 ft.; alt. 16,790 ft.
Ryan Loch, *arm of sea*, on cst. Wigtown, Scot.; 8 m. by 2 m.
Ryazan, *t.*, R.S.F.S.R.; S.E. of Moscow; distilling, leather, engin.; p. (1959) *213,000*.
Rybinsk, *see* **Shcherbakov**.
Rybinsk Sea (Rybinsk Reservoir), R.S.F.S.R.; artificial L.; created behind dams on R. Volga and R. Sheksna at Rybinsk; part of scheme to regulate flow of R. Volga and to incorporate it in a vast inland waterway system; opened 1945; approx. a. 1,500 sq. m.
Rybnik, *t.*, S.W. Poland; engin., brewing, furniture-mkg.; p. *23,052*.
Rybnitz, *region*, Moldavian S.S.R.
Rydal Water, *L.*, nr. Ambleside, Westmorland, Eng.; vil. adjacent contains Rydal Mount, where Wordsworth lived.
Ryde, *t.*, *mun. bor.*, I. of Wight, Eng.; on N.E. cst.; yachting ctr. and seaside resort; boat and yacht bldg.; steamer connection across Spithead to Portsmouth; p. (1951) *20,084*.
Rye, *t.*, *mun. bor.*, *Cinque Pt.*, E. Sussex, Eng.; at mouth of R. Rother to W. of Dungeness; shipbldg. and fishing; p. (1951) *4,511*.
Ryton, *t.*, *urb. dist.*, Durham, Eng.; on R. Tyne W. of Newcastle; ironwks.; p. (1951) *13,779*.
Ryuku Archipelago, *gr.* of 89 Is., S. of Kyushu, Japan, under U.S.A. control; total a. 921 sq. m.; consisting of Okinawa, Amami, Tokara and others; ch. t. Naha on Okinawa; p. (1956) *807,400*.
Rzeszow, *prov.*, S.E. Poland; a. 7,110 sq. m.; agr.; p. (estd. 1950) *1,383,460*, cap. R.; p. *29,400*.
Rzeszow, *t.*, S.E. Poland; industl. development since 1950; p. (1957) *58,000*.
Rzhev, *t.*, R.S.F.S.R.; on R. Volga; industl. and comm. engin.; p. (1954) *60,000*.

S

Saale, *R.*, Thuringia and Saxony, Germany; trib. of R. Elbe; length 225 m.
Saalfeld, *t.*, Thuringia, Germany; on R. Saale; famous cas. and grottos; machin., chocolate mftg.; p. (estd. 1954) *27,100*.
Saane, *R.*, Switzerland; flows to R. Aar, nr. Berne; length 65 m.
Saar, *R.*, Lorraine, Saarland, Palatinate; rises in the Vosges and flows N.W. to R. Moselle, nr. Trier; length 153 m.
Saar, *st.*, W. Europe; in valley of Saar; administered by League of Nations 1919–35 and returned to Germany after plebiscite; economic attachment of Saar to France agreed upon by Allied powers after Second World War; reunited politically with German Federal Republic 1 Jan. 1957 as a Länd. Impt. coalfields, iron; ch. t. Saarbrucken; p. (1951) *955,413*.
Saarbrücken, *cap.*, Saarland, on R. Saar, opposite sister t. of Sanct, Johann; cas.; rich coalfield; iron and steel wks., textiles, leather, paper; p. (estd. 1954) *111,600*.
Saarebourg, *t.*, Moselle, France; on R. Saar, 30 m. N.W. of Strasbourg; mnfs. gloves, watch springs; p. (1954) *10,439*.
Saare Maa (Ösel), *I.*, Baltic Sea; at entrance to G. of Riga, Estonian S.S.R., U.S.S.R.; consists of low plateau, bleak and barren; ch. t., Kuresaare; a. approx. 900 sq. m.
Saarlouis, *t.*, Saarland, Germany; on R. Saar; coal-mng., wood, metals; p. (estd. 1954) *31,300*.
Saba, *I.*, Neth. Antilles, W. Indies; a. 4 sq. m.; p. (1948) *1,150*.
Sabac, *t.*, Jugoslavia; on R. Sava; old cas.; products; fruit, cattle, pigs, coal; p. *18,238*.
Sabadell, *t.*, Spain; N.W. of Barcelona; linen and cloth mills, flour, paper, distilling, iron founding; p. (1950) *59,494*.
Sabang, *spt.*, Sumatra, Indonesia; bunkering sta.; p. *6,855*.
Sabara, *t.*, Minas Gerais, Brazil; iron and steel; p. *7,684*.
Sabinas, *sm. t.*, Nuevo León st., Mexico; at foot of Sierra Madre Oriental, 15 m. N. of Monterrey; coal-mines.
Sabine, *R.*, Texas and La., U.S.A.; flows through S. Lake (an expansion of the R. 18 m. long) to Gulf of Mexico; length 500 m.
Sable Cape, *S. point*, Fla., U.S.A.
Sable I., off S.E. cst., Nova Scotia; 45 m. long.
Sackville, *t.*, N.B., Canada; agr. ctr.; mnfs., harness mkg., stoves, furnaces; p. *2,489*.
Saco, *c.*, Me., U.S.A.; cotton mnfs.; p. (1950) *10,324*.
Saco, *R.*, U.S.A.; flows from White Mtns. in New Hampshire to Saco B., Mne.; 160 m. long.
Sacramento, *c.*, *cap.*, Cal., U.S.A.; on the R. Sacramento; Capitol and R.C. cath.; rail wkshps., furniture, pottery, smelting, meat and fruit packing, flour; p. (1950) *137,572*.
Sacramento, *R.*, Cal., U.S.A.; flows to San Francisco Bay; length 500 m.
Sacz, *see* **Nowy Sacz**.
Sadani, *spt.*, Tanganyika, Brit. E. Africa; at mouth of R. Wami; p. *2,000*.
Saddleback (Blencathara), *mtn.*, Cumberland, Eng.; nr. Keswick; alt. 2,847 ft.
Saddleworth, *t.*, *urb. dist.*, W.R. Yorks, Eng.; in Pennines, 5 m. N.E. of Oldham; woollen, paper mkg., engin.; p. (1951) *16,762*.
Sado, *I.*, off cst. of Honshu, Japan; gold and silver mines; rice, fishing; a. 331 sq. m.
Sadon, *t.*, R.S.F.S.R.; zinc, lead, lead smelting.

Safad, *t.*, N. of Sea of Galilee, Israel; p. *11,300*
Saffron Walden, *mkt. t., mun. bor.*, Essex, Eng.; on E. Anglian Heights, 12 m. N. of Bishops Stortford; agr., horticulture and engin.; p. (1951) *6,825*.
Safi, *spt.*, W. cst. Morocco; summer health resort; poor harbour, gr. grain and wool tr.; phosphates; fishing; p. (1946) *50,845*.
Saga, *t.*, Kyushu, Japan; coal-mining, fishing; p. *8,455*.
Sagaing, *div.*, Upper Burma; mtn. ridges, fertile plains; rice, wheat, peas, cotton; a. 50,086 sq. m.; p. *2,322,675*.
Sagaing, *t.*, Upper Burma; on R. Irrawaddy; pagodas; groundnuts, cotton, millets, tobacco, cattle; p. *14,127*.
Sagan, *see* **Zagan.**
Saganoseki, *sm. t.*, N.E. Kyushu, Japan; on Bungo Strait, 15 m. E. of Oita; impt. gold-, copper-, silver-mines.
Sagastyr, *I.*, at mouth of R. Lena, R.S.F.S.R.
Saginaw, *c.*, Mich., U.S.A.; on R. Saginaw; in agr. and timber region; machin., railwks., beet-sugar; p. (1950) *92,918*.
Sagua la Grande, *t.*, Cuba; on R. of same name; p. *15,539*.
Saguenay, *R.*, Quebec, Canada; length from L. St. John to St. Lawrence R. about 100 m.; of gr. depth, beautiful scenery; hydro-elec. power developed.
Sagunto, *t.*, Spain; nr. Valencia; p. *20,253*.
Sahara, the gr. N. African desert between the Sudan and the Barbary sts., extending from the Atlantic to the Nile, inc. Tripoli and Fezzan; a. 3,500,000 sq. m.; the E. portion is known as the Libyan desert, that part E. of the R. Nile, being often called the Nubian Desert; numerous oases with ts. and tr. ctrs.; p. (estd. *2,500,000*), nomadic Arab and Berber tribes.
Saharan Atlas, S. range of Atlas mtns. in Algieria; ch. pks., J. Aures, 7,644 ft., J. Aissa, 7,350 ft., J. Ksel, 6,594 ft.
Saharan Oases, *terr.*, S. Algeria; p. *39,575*.
Saharanpur, *c.*, Uttar Pradesh, India; rly. wks., wood carving; furniture, paper, tobacco, mnfs.; p. (1951) *148,435*.
Sahibganj, *t.*, Bihar, India; on R. Ganges.
Saida, *see* **Sidon.**
Saidabad or **Sirdjan,** *t.*, Laristan, Persia; S.W. of Kerman, nr. Kuh-i-Lalehzar mtn.; p. *10,000*.
Saigon, *c., spt.*, S. Viet-Nam; on R. Saigon, to E. of Mekong delta, 60 m. from sea; lge. comm. ctr.; cath., citadel, arsenal and naval yd.; spices, rice; p. (1958) *1,799,175* (with Cholon).
Saimaa, *L.*, Finland; N. of Viborg; a. 150 sq. m.; outlet into L. Ladoga.
St. Abb's Head, *rocky promontory*, Berwick, Scot.
St. Agnes Head, Cornwall, Eng.
St. Albans, *c., mun. bor.*, Herts, Eng.; on N. margin of Vale of St. Albans, 20 m. N.W. of London; faces remains of Roman Verulamium across R. Ver; light inds., electronics, instrument mkg.; cath.; residtl.; p. (1951) *44,106*.
St. Albans, *t.*, Vt., U.S.A.; dairy farming; p. (1950) *8,552*.
St. Amand, *t.*, Cher., France; on R. Cher; industl.; p. (1954) *10,765*.
St. Andrews, *burgh*, Fife, Scot.; on N.E. cst. of Fife; seaside resort; univ.; famous golf course; p. (1951) *9,459*.
St. Anne, *t.*, Alderney, Channel Is.; church designed by Sir George Gilbert Scott.
St. Anthony, *waterfalls*, on R. Mississippi; U.S.A. predominant factor in site of Minneapolis (Minn.).
St. Arnaud, *t.*, Victoria, Australia; p. *2,900*.
St. Asaph, *c., rural dist.*, Flint, N. Wales; on R. Clwyd, 4 m. N. of Denbigh; cath.; optical glass mkg.; p. (rural dist. 1951) *9,858*.
St. Augustine, *t.*, Fla., U.S.A.; resort; p. (1950) *13,555*.
St. Austell, *mkt. t., urb. dist.*, Cornwall, Eng.; on S. flank of Hensbarrow, 14 m. N.E. of Truro; holiday resort; china clay, stone quarrying, engin., wood and cork; p. (1951) *23,634*.
St. Barthélemy, *French I.*, W. Indies; dependency of Guadeloupe; p. (1946) *2,231*.
St. Bees Head, *promontory*, 2½ m. N.W. of St. Bees, Cumberland, Eng.; freestone quarries, tin.
St. Benoît, *t.*, Ile de la Réunion, Indian Ocean; connected by rail with ch. port, Pointe-des-Galets.
St. Bernard Pass, Great, on Italian–Swiss bdy., W. Alps; carries main road from W. Switzerland to Plain of Lombardy; approached from N. by trib. of upper Rhône, from S. by Val d'Aosta; alt. over 7,000 ft.
St. Bernard Pass, Little, on French–Italian bdy., W. Alps.; links Isère valley with Val d'Aosta; alt. approx. 5,000 ft.
St. Boniface, *t.*, Manitoba, Canada; sub. of Winnipeg; p. (1956) *28,851*.
St. Boswells, *par.*, Roxburgh, Scot.; p. *3,466*.
St. Bride's Bay, at W. extremity, Pembroke, Wales.
St. Brieuc, *t.*, Côtes-du-Nord, France; college, cath.; ironwks., textiles, timber and cst. tr.; p. (1954) *37,670*.
St. Buryan, *par.*, Cornwall, Eng.; lobster and crab fishing; p. *1,132*.
St. Catherine's, *c.*, Ont., Canada; on Welland Canal; mkt. for Niagara fruit-growing reg.; agr. implement wks., timber mills, flour mills, tanneries and varied inds.; p. (1946) *30,275*.
St. Chamond, *t.*, Loire, France; nr. St. Etienne; silk, ribbons, rayon; rly. wks.; coal-mining; p. (1954) *15,580*.
St. Charles, *c.*, Mo., U.S.A.; nr. St. Louis; tobacco and flour; p. (1950) *14,314*.
St. Clair, *t.*, Penns., U.S.A.; industl.; p. (1950) *5,856*.
St. Clair, *L.*, Canada–U.S.A.; part of link between L. Huron and L. Erie.
St. Clair, *R.*, N. America; flows from L. Huron through L. of St. Clair into L. Erie; forms bdy. between Michigan (U.S.A.) and Ontario (Canada); impt. link in Gr. Lakes waterway; length 85 m., depth dredged to 20 ft.
St. Claude, *t.*, Jura, France; at confluence of Rs. Tacon and Bienne; cath.; fancy shell, horn and ivory mnfs.; p. (1954) *11,301*.
St. Cloud, *t.*, Seine-et-Oise, France; 6 m. from ctr. of Paris; fine park, château; residtl.; porcelain; p. (1954) *20,671*.
St. Cloud, *t.*, Minn., U.S.A.; on R. Mississippi; timber yards, dairying, farming; p. (1950) *28,410*.
St. Croix, *I.*, Virgin Is., gr., U.S.A.; ch. inds. sugar cultivation, stock raising, vegetable growing, rum mnf.; a. 82 sq. m.; p. (1950) *12,096*.
St. Croix, *R.*, Wis., U.S.A.; trib. of the Mississippi; length 200 m.
St. Davids, *c.*, Pembroke, Wales; 15 m. S.W. of Fishguard; cath., ruins of Bishop's Palace; p. *1,595*.
St. Davids Head, *promontory*, on cst. of Pembroke, Wales.
St. Denis, *t., N. sub.*, Paris, France; industl. and residtl.; abbey, burial pl. of Kings of France; chemicals, machin., spirits, soap; p. (1954) *80,705*.
St. Denis, *spt., cap.*, Ile de la Réunion (French), Indian Ocean; p. (1946) *36,096*.
St. Dié, *t.*, Vosges, France; on R. Meurthe; cath.; iron, copper, machin., hosiery; p. (1954) *20,952*.
St. Dizier, *t.*, Haute-Marne, France; on R. Marne; iron, steel, copper, boats; p. (1954) *25,515*.
St. Elias, *mtn.*, Alaska, U.S.A.; alt. 18,024 ft.
St. Etienne, *t., cap.*, Loire, France; nr. Lyons; ribbon-weaving, boot-lace, silk, velvet, engin., armaments, motor-cycles, cycles, chemicals, and iron mftg. ctr., in coal-field dist.; p. (1954) *181,730*.
St. Eustatius, one of the Neth. Antilles, W. Indies; a. 31 sq. m.; p. (1948) *945*.
St. Francis R., Quebec, Canada; hydro-elec. power.
St. Francis, *R.*, Mo., U.S.A.; trib. of R. Mississippi; forms bdy. of Ark.; length 450 m.
St. Gall (St. Gallen), *can.*, Switzerland; mountainous; forest; vineyards; cattle raising; cotton spinning, lace; cap. St. G.; a. 777 sq. m.; p. (1950) *309,106*.
St. Gall, *t.*, Switzerland; on R. Steinach; cath.; cottons and embroidery; p. (1950) *68,011*.
St. George, *bay*, W. cst. Newfoundland, Canada.
St. George, *I.*, Grenada Is., Brit. W. Indies; wireless sta.
St. George, *spt.*, N.B., Canada; various granites quarried; p. *1,169*.
St. George's Channel, Brit. Isles; part of Irish Sea separating Wales from Ireland.
St. George's I., Fla., U.S.A.
St. Germain, *t.*, Seine-et-Oise, France; on R.

Seine; former royal château; cottons, woollens; p. (1954) *29,429*.
St. Germans, *mkt. t., rural dist.*, Cornwall, Eng.; 4 m. W. of Saltash; p. (rural dist. 1951) *16,845*.
St. Gheorghe, *t.*, Romania; on Black Sea cst., S. of Sulina.
St. Gotthard, *Pass* (alt. 6,867 ft.), Switzerland; between Ticino vall. and L. of Lucerne.
St. Gowan's Head, *promontory*, Pembroke, Wales.
St. Helena, *I.*, *Brit. col.*, Atl. Oc.; 1,200 m. from W. cst. of Africa; Seaport and only *t.* Jamestown; Napoleon imprisoned here 1815–21, and Boer captives 1900; coaling sta.; flax; a. 47 sq. m.; p. (1957) *4,682*.
St. Helens, *t.*, *co. bor.*, Lancs, Eng.; 12 m. E. of Liverpool; connected by canal with R. Mersey; coal, iron, alkali; copper smelting, glass, plastics; p. (1951) *110,276*.
St. Helier, *spt.*, Jersey, Channel Is.; p. *28,000*.
St. Hyacinthe, *c.*, *spt.*, Quebec, Canada; on Yamaska R.; cath.; farm machin., woollens, leather; p. (1946) *17,798*.
St. Ives, *t.*, *mun. bor.*, Cornwall, Eng.; at entrance to St. Ives Bay; fishing, holiday resort; p. (1951) *9,037*.
St. Ives, *mkt. t., mun. bor.*, Huntingdon, Eng.; on R. Ouse, 4 m. E. of Huntingdon; timber, gravel, concrete prod., engin., canning, agr. machin.; p. (1951) *3,077*.
St. Jean, *t.*, Quebec, Canada; rly. junction; porcelain, pottery, tiles; p. *13,646*.
St. Jérôme, *t.*, Quebec, Canada; pulp, paper, knitted goods, woollens, rubber goods, cement bricks; p. *11,329*.
St. John, *c.*, *spt.*, N.B., Canada; cottons, woollens, machin., paper, lumbering, sugar refinery; fisheries; corn tr.; p. (1956) *52,491*.
St. John, *I.*, U.S Virgin Is. gr.; a. 19 sq. m.; ch. inds. charcoal, stock-raising, tourists; was noted for bay leaf oil, but ind. now dormant.
St. John, *L.*, Quebec, Canada; on Saguenay R.
St. John, *R.*, N.B., Canada; flows to Bay of Fundy; length 450 m.
St. John, *t.*, *cap.*, Antigua, W. Indies; p. (1957) *12,000*.
St. John's Point, *C.*, Down, Northern Ireland; forming N. side of Dundrum Bay.
St. Johns R., Fla., U.S.A.; flows to Atlantic; length 350 m.
St. John's, *spt.*, *c.*, *cap.*, Newfoundland, Canada; on E. cst.; first Eng. settlement in America; gr. tr. in fish, cod, oil, etc.; p. (1956) *77,991*.
St. John's Wood, *residtl. dist.*, N.W. London, Eng.; contains Lord's Cricket Ground.
St. Johnsbury, *t.*, Vt., U.S.A.; mnfs.; p. (1950) *7,370*.
St. Joseph, *t.*, Mich., U.S.A.; on L. Mich.; resort; industl.; p. (1950) *10,223*.
St. Joseph, *c.*, Mo., U.S.A., on M. R.; rly. ctr.; meat packing, clothing, farm implements; p. (1950) *78,588*.
St. Joseph d'Alma, *t.*, Quebec, Canada; pulp, paper; p. *6,449*.
St. Joseph Lake, Ontario, Canada.
St. Junien, *t.*, Haute Vienne, France; on R. Vienne; fine churches, shrine; gloves, leather; porcelain wks.; p. (1954) *10,618*.
St. Just, *t.*, *urb. dist.*, Cornwall, Eng.; nr. Lands End, 6 m. W. of Penzance; dairying; tin-mining; p. (1951) *4,122*.
St. Kilda, *rocky I.*, most W. of the Hebrides, Scot.; 3 m. long. In 1930 the 36 inhabitants were removed to mainland; now bird sanctuary, famous for its wren, a distinct sub-species.
St. Kilda, *wat. pl.*, Victoria, Australia; nr. Melbourne; p. *26,000*.
St. Kitts-Nevis, *I.*, Leeward gr., T.W.I.; sugar, cotton, molasses; a. (inc. Anguilla) 153 sq. m.; cap. Basse-Terre; p. (1957) *56,433*.
St. Lambert, *t.*, Quebec, Canada; p. *6,417*.
St. Laurent du Maroni, *t.*, Fr. Guiana; penal admin. ctr.; p. *1,000*.
St. Lawrence, **G. of**, Canada; arm of Atlantic, partly enclosed by Newfoundland and Nova Scotia; impt. fisheries.
St. Lawrence I., Alaska, U.S.A.; in Bering Sea; 100 m. long.
St. Lawrence, *gr. R.*, of N. America; length from the source of its headstream, the St. Louis, 2,100 m.; forms the outlet of the great lakes (Superior, Michigan, Huron, Erie and Ontario) and the bdy. between the st. of N.Y., U.S.A., and Ontario, Canada; ch. tribs.: Ottawa, Richelieu, St. Maurice, Saguenay.
St. Lawrence Seaway, N. America; links head of the Gr. Lakes with Atl. Oc., provides a channel 27 ft. minimum depth enabling lge. ocean-going vessels to reach American Continent, and provides major source of hydro-electric power to ind. areas; opened 1959.
St. Leonards, *t.* Sussex, Eng.; W. of Hastings; seaside resort.
St. Lô, *t.*, Manche, France; on R. Vire; cath.; cloth mnfs.; p. (1954) *11,778*.
St. Louis, *t.*, Senegal, W. Africa; at mouth of R. Senegal; cath., pal.; rly. and road ctr.; airport; exp. oilseeds and skins; p. (1948) *51,000*.
St. Louis, *t.*, Ile de la Réunion, Indian Ocean; p. (1941) *23,936*.
St. Louis, *c.*, Mo., U.S.A.; on R. Mississippi 10 m. below confluence of Rs. Miss. and Mo.; two univs., impt. rly. and river junction; lgst. fur mkt.; grain and cotton mkt.; very varied mnfs.; engin., boots and shoes; motors, flour, chemicals, printing; p. (1950) *856,796*.
St. Lucia Bay, *inlet* of the Indian Ocean at mouth of R. Umvolozi, S. of St. Lucia Lake, Natal, S. Africa.
St. Lucia I., *Brit. col.*, Windward Is., T.W.I.; exp. sugar, cocoa, lime juice, etc.; coaling sta.; a. 238 sq. m.; cap. Castries; p. (1957) *91,102*.
St. Malo, *fortfd. spt.*, Ille-et-Vilaine, France; cas. and church (formerly a cath.); agr. prod., shipping, fishing, and tourist inds. Dinard lies opposite across the Rance est.; p. (1954) *14,339*.
St. Maria di Leuca, *C.*, S. Italy.
St. Marie, *C.*, S. point of Madagascar.
St. Martin, *French I.*, W. Indies; dependency of Guadeloupe; p. (1946) *6,786*.
St. Martin, *I.*, Neth. Antilles, W. Indies; a. 13 sq. m.; p. (1948) *1,697*.
St. Marylebone, *metropolitan bor.*, N.W. London, Eng.; industl. and residtl.; p. (1951) *75,764*.
St. Mary's I., Scilly Is., Brit. Isles.
St. Mary's, *t.*, Ontario, Canada; p. *3,635*.
St. Matthew I., Alaska; U.S.A.; in Bering Sea.
St. Maur-des-Fosses, *sub.*, Paris, Seine, France; garden city; p. (1954) *64,387*.
St. Maurice, *vil.*, Valais, Switzerland; nr. Martigny; 6th-century abbey; once a leading Burgundian t.; p. *2,699*.
St. Maurice, *R.*, Quebec, Canada; trib. of St Lawrence R.; hydro-elec. power developed; length 400 m.
St. Mawes, *vil.*, Cornwall, Eng.; on E. cst. of estuary of R. Fal; holiday resort, fishing.
St. Michael, *see* **San Miguel**, Azores.
St. Michael's Mt., *castled rock*, Cornwall, Eng.; the ancient Ictis; alt. 230 ft.
St. Mihiel, *t.*, Meuse, France; on R. Meuse, nr. Bar-le-Duc; industl.; Benedictine abbey; lace; p. (1946) *4,581*.
St. Monance, *burgh*, Fife, Scot.; p. (1951) *1,517*.
St. Moritz, *picturesque t., health resort*, Switzerland; in the Upper Engadine; winter sports; alt. 6,090 ft.; spa; p. *4,000*.
St. Nazaire, *t.*, Loire-Atlantique, France; at mouth of R. Loire, nr. Nantes; docks and shipping; steelwks., aircraft; exp. wine, sardines, silk, etc.; p. (1954) *39,350*.
St. Neots, *mkt. t., urb. dist.*, Hunts, Eng.; on R. Ouse, 10 m. N.E. of Bedford; shoes, brewing, milling, paper mkg., sports equipment, plastics; p. (1951) *4,697*.
St. Niklaas, *mftg. t.*, E. Flanders, Belgium; nr. Antwerp; cap. of the ancient Waesland; cottons, woollens, lace, rayon; p. (estd. 1957) *46,739*.
St. Ninians, *par.*, Stirling, Scot.; woollens, nails; p. *14,662*.
St. Omer, *t.*, Pas-de-Calais, France; cath., abbey ruins; brewing, distilleries, soap, linen; p. (1954) *19,280*.
St. Ouen, *t.*, *sub.*, Paris, France; on R. Seine; light inds., copper, aluminium goods, furniture, gloves; power sta.; p. (1954) *48,112*.
St. Pancras, *metropolitan bor.*, N. London, Eng.; industl. and residtl.; 3 main-line rly. termini within bor.; p. (1951) *138,634*.
St. Paul, *c.*, *cap.*, Minn., U.S.A.; faces Minneapolis across the R. Mississippi; cath.; univ.; meat-packing, milling; furs, lumber products, clothes; p. (1950) *311,349*.
St. Paul, *spt.*, Ile de la Réunion (French), Indian Ocean; p. *25,959*.
St. Paul I., *sm. French I.*, dependency of Madagascar, Indian Ocean.

St. Paul, *R.*, Liberia; flows to the Atlantic nr. Monrovia; length 300 m.
St. Paul de Loanda, *t.*, Angola; exp. rubber, ivory, palm oil, coffee, coconuts, rum.
St. Peter, *L.*, Canada; expansion of St. Lawrence R. above Three Rivers; 20 m. by 9 m.
St. Peter Port, *seaport, cap.*, Guernsey, Channel Is.; wat. pl.; fruit, flowers, vegetables; p. *18,250*.
St. Petersburg, *t.*, Fla., U.S.A.; resort; p. (1957) *145,000*.
St. Pierre, *t.*, Martinique I., Fr. W. Indies; ch. t. in Fr. W. Indies; completely destroyed by eruption of Mt. Pelée, 1902.
St. Pierre and Miquelon, *French terr.*, consisting of 8 sm. Is. off S. cst. of Newfoundland; a. of St. Pierre gr., 10 sq. m.; a. of Miquelon gr., 83 sq. m.; ch. t. St. Pierre, fisheries; p. of St. P. and M. (1958) *4,904*.
St. Pierre-des-Corps, *t.*, Indre-et-Loire, France; p. (1954) *10,656*.
St. Pierre, *t.*, Réunion, Indian Ocean; p. (1941) *22,379*.
St. Pölten, *t.*, Lower Austria; nr. Vienna; cotton spinning and hardware mftg.; p. (1951) *40,338*.
St. Quentin, *t.*, Aisne, France; on R. Somme; lace, tulle, woollens, chemicals, ironwks.; p. (1954) *53,866*.
St Raphaël, *t.*, Var. France; p. (1954) *10,177*.
St. Rémy, *t.*, Bouches-du-Rhône, France; Roman antiquities.
St. Savine, *t.*, Aube, France; p. (1954) *10,947*.
St. Servan, *spt.*, Ille-et-Vilaine, France; opp. St. Malo; p. (1954) *13,763*.
St. Sulpice, *t.*, Haute Vienne, France; N.E. of Limoges.
St. Thomas I., *see* São Tomé.
St. Thomas, *I.*, Virgin Is. gr., Atl. Oc.; belongs to U.S.A.; rum and bay rum, sugar, truck-farming, cattle, deep-sea fishing; bunkering of ships, handicrafts, tourism; a. 32 sq. m.; p. (1950) *14,559* (with St. John).
St. Thomas, *t.*, Ontario, Canada; rly. wkshps., flour, flax; p. *17,132*.
St. Trond, *t.*, Limbourg, Belgium; brewing, distilling.
St. Valéry-sur-Somme, *spt.*, Somme, France; resort of pilgrims; here William the Conqueror embarked for Eng. 1066; fishing; p. *3,071*.
St. Vincent, *C.*, S.W. Portugal; Spanish fleet defeated by British 1797.
St. Vincent, Gulf of, *lge. inlet*, S. Australia; penetrates 100 m. inland, max. width 35 m.; Pt. Adelaide located on E. side.
St. Vincent, *I.*, Brit. col., T.W.I.; one of Windward gr.; sugar, arrowroot, cotton, peanuts; cap. Kingstown; a. 150 sq. m.; p. (1956) *78,594*.
Sainte Agathe des Monts, *t.*, Quebec, Canada; tourist resort; p. *3,308*.
Sainte Croix, Virgin Is., W. Indies; former possession of Denmark, now U.S.A.
Saintes, *t.*, Charente-Maritime, France; cath.; Roman antiquities; suffered in Huguenot wars; agr. implements; earthenware; p. (1954) *23,768*.
Saipan I., Marianas, Pac. Oc., U.S.A. trusteeship; sugar, coffee, fruit; a. 71 sq. m.; p. (1958) *7,250*.
Sakai, *spt.*, Japan; local import ctr.; p. (1950) *213,688*.
Sakania, *t.*, Belgian Congo; frontier sta. on rly. between Elizabethville and N. Rhodesia; customs house; p. *25,095*.
Sakata, *t.*, Honshu, Japan; p. *46,447*.
Sakhalin, *I.*, off E. cst. Asia; S. half ceded by Japan to U.S.S.R., 1945; a. about 13,930 sq. m.; herring fisheries, coal, naphtha, alluvial gold, oil, timber; p. *420,000*.
Sakishima, *Is.*, E. of Formosa.
Sakmara, *R.*, R.S.F.S.R.; rises in Ural Mtns., trib. of R. Ural; length 350 m.
Sala, *t.*, Västmanland, Sweden; nr. Salberg; silver-mine worked for over 400 years; p. *8,250*.
Saladillo, *R.*, N. Argentina; upper course of R. Dulce.
Salado Rio, *R.*, Argentina; trib. of the R. Paranà; length 1,000 m.
Salado, Rio, *R.*, Mexico; trib. of Rio Grande del Norte.
Salaga, *t.*, Ghana, W. Africa; impt. tr.; p. *1,000*.
Salamanca, *t.*, Guanajuato st., Mexico; p. *11,985*.
Salamanca, *prov.*, Leon, W. Spain; cap. Salamanca; a. 4,756 sq. m.; p. (1950) *411,963*.
Salamanca, *t.*, *cap.*, Salamanca prov., Spain; on R. Tormes; oldest Spanish univ., 2 caths., many convents; p. (1950) *80,239*.
Salamaua, *t.*, *pt.*, New Guinea, Australian Trust. Terr.; gold.
Salamis, *I.*, Greece; opposite harbour of Athens; famous naval battle, 480 B.C.
Salamis, *spt.*, Greece; naval base; p. *17,312*.
Salar de Uyumi, windswept, dry, salt flat, S.W. Bolivia.
Salaverry, *spt.*, Peru; exp. sugar; p. *3,403*.
Salayer Is., *gr.*, S. of Celebes, Indonesia; a. of lgst., 180 sq. m.
Salcombe, *t.*, *urb. dist.*, S. Devon, Eng.; 4 m. S. of Kingsbridge; resort; fishing; p. (1951) *2,576*.
Saldanha B., *inlet* on W. cst. C. of Good Hope, S. Africa; whaling, fishing; granite, quarrying; length 17 m.
Sale, *t.*, *mun. bor.*, Cheshire, Eng.; on R. Mersey, 2 m. S. of Stretford; p. (1951) *43,167*.
Sale, *t.*, Victoria, Australia; 128 m. from Melbourne; ctr. of lge. agr. and pastoral dist.; p. (1957) *7,170*.
Salé or Salch, *spt.*, Fez, Morocco; formerly pirate headquarters; p. (1946) *57,188*.
Salekhard, *t.*, *R. pt.*, N.W. Siberia, R.S.F.S.R.; on R. Ob; fisheries, collecting ctr. for furs; exp. timber; p. *10,000*.
Salem, *t.*, Madras, India; carpets, weaving, farming ctr.; p. (1951) *202,335*.
Salem, *c.*, Mass., U.S.A.; 15 m. from Boston; cottons, lumber products, leather goods, machin. wireless valves; p. (1950) *41,880*.
Salem, *t.*, N.J., U.S.A.; in fruit-growing dist.; p. (1950) *9,050*.
Salem, *c.*, Ohio, U.S.A.; steel; p. (1950) *12,754*.
Salem, *c.*, *cap.*, Ore., U.S.A.; on Williamette R.; univ.; fruit-packing, flour milling and canning; p. (1950) *43,140*.
Salemi, *t.*, Sicily, Italy; the ancient Halicyæ; p. *19,100*.
Salerno, *spt.*, Campania, Italy; on G. of Salerno, 30 m. S.E. of Naples; cottons, silks, printing, leather; vine-growing dist.; p. (1951) *90,317*.
Salford, *c.*, *co. bor.*, Lancs, Eng.; on R. Irwell, adjoining Manchester; engin., clothing mftg.; p. (1951) *178,036*.
Salima, *t.*, Nyasaland, S. Africa; alt. 1,672 ft.; term. of rly. from Beira on L. Nyasa.
Salina, *c.*, Kan., U.S.A.; on Smoky Hill R.; univ.; flour milling, cattle mkt., farm implements; p. (1950) *26,176*.
Salina, *I.*, Lipari Is., Italy; in the Mediterranean, 6 m. long; 2 volcanic cones.
Salina Cruz, *t.*, *spt.*, Oaxaca, Mexico; terminal pt. of Tehuantepec rly.; shallow harbour; dyewoods, coffee, hemp, hides and skins; p. *5,393*.
Salinas, *t.*, Ecuador; cable sta.; holiday resort; 118 m. from Guayaquil.
Salinas, *R.*, Cal., U.S.A.; rises in U.S. Coast Range, flows N.W. into Bay of Monterey, Pac. Oc.; fertile valley floor irrigated to produce hard and stone fruits, mkt.-garden produce (especially lettuce), alfalfa; length, 140 m.
Salinas-Grandes, *gr. marsh a.*, Argentina; N. of Córdoba.
Salisbury, *c.*, *mun. bor.*, Wilts, Eng.; at S. foot of Salisbury Plain at confluence of Rs. Avon and Wylye; splendid cath.; military ctr.; agr. and mkt. t.; p. (1951) *32,910*.
Salisbury, *c.*, *cap.* S. Rhodesia and *Federal cap.*; airways ctr.; univ. coll.; ctr. tobacco indus.; main distr. ctr. for Mashonaland; p. *105,000* (incl. *34,400* Europeans).
Salisbury, *t.*, Md., U.S.A.; iron and steel goods, woodwork, canning; p. (1950) *15,141*.
Salisbury, *t.*, N.C., U.S.A.; cotton, grain, timber, textiles, refrigerators; p. (1950) *20,102*.
Salisbury Plain, Wilts, Eng.; undulating upland N. of Salisbury; prehistoric monumental remains of Stonehenge; impt. Army training-ground.
Sallaumines, *t.*, Pas-de-Calais, France; p. (1954) *14,541*.
Salmon, *R.*, Idaho, U.S.A.; trib. of Snake R.; length 450 m.
Salon, *t.*, Bouches-du-Rhône, France; on Canal de Craponne; soap and oil wks.; p. (1954) *17,597*.
Salonika, *see* Thessaloniki.
Salpau Selka, Finland; most southerly gravel ridge; forested; winter sports.
Salsette I., N. of Bombay, India; a. 241 sq. m.; connected by bridge and causeway with Bombay; cave antiquities and temples.

Salt, *R.*, Arizona, U.S.A.; rises in Colorado Plateau, flows W. into Gila R. 20 m. below Phoenix; length 240 m. *See also* **Roosevelt Dam.**
Saltcoats, *sm. burgh*, Ayr, Scot.; chemicals, ship-yards and rly. sheds; p. (estd. 1956) *12,000.*
Salt Fork, *R.*, Okla., U.S.A.; trib. of Arkansas R.
Salt Lake City, *c., cap.*, Utah, U.S.A.; nr. Gr. Salt Lake, H.Q. of Mormonism; temple and univ.; lge. collection of genealogy in the Church Library; tr. ctr.; meat packing, printing, publishing, metal-wk., lumber products, automobiles, wireless sets; p. (1950) *182,121.*
Salta, *N. prov.*, Argentina; sugar, vines, oranges, oil; cap. Salta; a. 62,511 sq. m.; p. (estd. 1958) *410,400.*
Salta, *c.*, Argentina; on R. Salta; sugar, vines, oranges, tobacco, oil, minerals; cath., college; p. (1947) *66,785.*
Saltash, *mkt. t., mun. bor.*, Cornwall, Eng.; on W. side of Tamar estuary; lowest bridge (rly.) across Tamar; farming, fishing, malting; p. (1951) *7,924.*
Saltburn, *t., urb. dist.* (with **Marske**), N.R. Yorks, Eng.; on E. cst. 3 m. S.E. of Redcar; seaside resort; p. (1951) *8,428.*
Saltcoats, *burgh*, Ayr, Scot.; on Firth of Clyde, 2 m. S. of Ardrossan; coal; p. (1951) *13,108.*
Saltillo, *cap.*, Coahuila st., Mexico; cottons, flour, woollens, cereals, gold, silver, lead, copper, iron, zinc, coal; p. (1940) *75,721.*
Saltney, *t.*, Flint, Wales; on R. Dee and 2 m. S.W. of Chester; oil and fat refining; p. (1951) *2,642.*
Salto, *dept.*, Uruguay; cap. Salto; a. 4,865 sq. m.; (1953) *108,030.*
Salto, *cap.*, S. dep., Uruguay; leather, salted meats; p. (estd. 1956) *60,000.*
Salton Sea, *L.*, S. Cal., U.S.A.; 263 ft. below sea-level in depression which extends N.W. from head of G. of Cal.; ctr. of inland drainage; a. 270 sq. m. *See also* **Imperial Valley.**
Salton Sink, Cal., U.S.A.; inland depression 287 ft. below sea-level.
Saluggia, *t.*, Piedmont; N. Italy; nuclear reactor.
Saluzzo, *t.*, Italy; nr. Cunei; cath., cas.; leather, silks, hats; p. *17,000.*
Salvador, El, *rep.*, Central America; on Pacific cst.; very hot, abundant summer rain but dry winter; coffee, sugar, rubber, tobacco, gold, silver, iron, mercury; smallest and most densely populated of Central American States; cap. San Salvador; a. 13,173 sq. m.; p. (1957) *2,391,942.*
Salvador, *spt.*, Baia, Brazil; coffee, cocoa, tobacco, hides; p. (1950) *424,142.*
Salween, *R.*, Burma; rises in Tibet, flows S. to G. of Martaban; many rapids; length 1,800 m.
Sal-y-Gomez I., Pac. Oc.; Chilean; uninhabited.
Salzach, *R.*, Austria; trib. of R. Inn; length 130 m.
Salzburg, *prov.*, Austria, adjoining Bavaria and the Tyrol; on N. slope of E. Alps; many L., thermal springs; much mineral wealth; cap. Salzburg; a. 2,762 sq. m.; p. (1951) *327,232.*
Salzburg, *c.*, Austria; on R. Salzach; cath., cas.; birthplace of Mozart; tourist resort; salt, dairying, musical instruments; annual musical festival; p. (1951) *102,927.*
Salzgitter, *t.*, Lower Saxony, Germany; S.W. of Brunswick; iron ore, salt extraction, metallurgy; p. (estd. 1954) *98,800.*
Salzkammergut, *lake dist.*, Upper Austria; salt-mines.
Salzwedel, *t.*, Saxony-Anhalt, Germany; on R. Jeetze; chemicals, sugar, metals; p. (estd. 1954) *25,100.*
Samakh, *t.*, Israel; on Sea of Galilee; rly junction.
Samar, *I.*, Philippines; S. of Luzon; 147 m. long, 50 m. wide; a. 5,050 sq. m.; p. *550,000.*
Samara, *see* **Kuibyshev.**
Samaria, *ancient c.*, Jordan, now **Sabastye.**
Samarinda, *t.*, Borneo, Indonesia; on E. cst.; p. *11,046.*
Samarkand, *c.*, Uzbek S.S.R.; E. of Bukhara; mosques and ancient ruins; textiles, engin.; p. (1959) *195,000.*
Samarra, *t.*, Iraq; on R. Tigris; Moslem holy c.; p. *8,000.*
Samawa, *t.*, Iraq; on R. Euphrates; cereals, carpets; p. *10,000.*
Sambalpur, *t.*, Orissa, India; on R. Mahanadi; ruined fort, old temples; cottons, silks; p. *10,000.*
Sambar, *C.*, S.W. Borneo, Indonesia.
Sambhal, *t.*, Uttar Pradesh, India; p. *25,000.*
Sambhar, *t.*, Rajasthan, India; p. *50,000.*
Sambor, *t.*, W. Ukrainian S.S.R., U.S.S.R.; S.W. of Lvov (Galicia); brine-wells, brewing, silk mnfs.; p. *10,000.*
Sambre, *R.*, Belgium and N.E. France; trib. R. Meuse at Namur; length 110 m.
Samburu, *t.*, Kenya; rly. sta.
Samnan, *t.*, Persia; iron, sulphur ores, petroleum.
Samoa Is., Terr. of W., *gr.* of 9 Pacific Is. in Pac. Oc.; formerly German, now N.Z. Trust Terr.; lgst., Savaii (a. 700 sq. m.); exp. copra, cacao beans, bananas; p. (1958) *102,195.*
Samoa Is., Samoan gr. Pac. Oc.; E. of 171° long., W. of Greenwich; belong to U.S.A.; a. 76 sq. m.; lgst. I. Tutuila; ch. pt. Pago Pago; American naval sta.; p. (1956) *20,154.*
Samokov, *t.*, Bulgaria; S. of Sofia; industl.; p. *12,784.*
Samos, *I.*, Ægean Sea; Greek terr.; off W. cst. Anatolia; fine wine, silk, tobacco, cotton; cap. Vathéos; a. 180 sq. m.; p. (1951) *59,595.*
Samothrake, *rugged I.*, Ægean Sea; alt. 5,248 ft.; the "Thracian Samos"; sulphur springs, sponges; a. 71 sq. m.; p. mainly Greeks.
Samshui, *t., former treaty pt.*, Kwangtung, China; good tr. with Hong Kong; p. (1931) *9,160.*
Samsö, *I.*, Kattegat, Denmark; a. 42 sq. m.
Samsun, *spt.*, Trabzon, Turkey; on Black Sea cst.; exp. tobacco, grain, timber, wax, wool, skins, copper goods, antimony; p. (1945) *38,417.*
San, *R.*, S.E. Poland; trib. of R. Vistula, bdy. between Poland and Ukraine.
San Ambrosia, *I.*, off cst. Chile.
San Angelo, *t.*, Texas, U.S.A.; on R. Concho; cattle, wool, mohair mkt.; dairy produce, petroleum, machine-shop prod.; p. (1950) *52,093.*
San Antonio, *sm. coastal t.*, Angola, Africa; at mouth of R. Congo; serves as occasional pt. of embarkation for travellers from lower regions of Belgian Congo.
San Antonio, *spt.*, Chile; nearest pt. for Santiago; holiday resort; wine; p. (1940) *27,314.*
San Antonio, *c., winter resort*, Texas, U.S.A.; at mouth of San Pedro R.; cath., fort, arsenal; iron and steel wk., textiles, cigars, soap, cattle, hides, wool, cotton; p. (1950) *408,442.*
San Antonio, *C.*, most westerly point of Cuba.
San Benito, *spt.*, G. of Tehuantepec, Mexico.
San Bernardino, *t.*, Paraguay; holiday resort.
San Bernardino, *c.*, Cal., U.S.A.; railroad ctr.; citrus-fruit packing and shipping ctr.; p. (1950) *63,058.*
San Carlos, *t.*, Luzon, Philippines; p. *47,334.*
San Carlos de Bariloche, *t.*, Argentina; on S. shore of L. Nahuel Huapi; tourist ctr.; p. *3,500.*
San Casciano, *t.*, Italy; nr. Florence; industl.; p. *14,325.*
San Cataldo, *t.*, Sicily; Italy; good tr.; p. *22,700.*
San Cristóbal, (formerly **Cuidal Real**), *t.*, Chiapas, Mexico; cath.; textiles; p. (1940) *11,768.*
San Cristóbal, *t., cap.*, Táchira st., Venezuela; cement; wireless sta.; p. (1950) *56,073.*
San Diego, *t.*, Cal., U.S.A.; on Pacific cst., 10 m. N. of Mexican border; fine harbour, winter health resort; nr. popular resorts of Coronado Beach and La Jolla; furniture, fish-canning, aircraft; p. (1950) *334,387.*
San Felipe, *cap.*, Yaracuy St., Venezuela; p. *12,190.*
San Felipe de Aconcagua, *t.*, Chile; nr. Valparaiso; agr. ctr., coffee, cocoa, sugar, cotton, maize, fruits, rice, hides; p. *19,660.*
San Felix, *t.*, Venezuela; river pt. on R. Orinoco; p. *1,324.*
San Fernando, *spt.*, E. Argentina; on R. Plate, N. of Buenos Aires.
San Fernando, *t.*, Chile; agr. ctr.; p. *28,723.*
San Fernando, *t.*, Cadiz, Spain; fine town-hall, fish mkt.; vineyards; p. (1948) *38,581.*
San Fernando, *t.*, Venezuela; R. pt. on Apure R.; tr. ctr.; alligator hides, egret feathers, cattle; p. *9,489.*
San Fernando, *spt.*, Trinidad I., T.W.I.; on W. cst. of Trinidad, 25 m. S. of Port of Spain; exp. sugar, asphalt, petrol; p. (estd. 1957) *38,850.*
San Francisco, *t.*, Argentina; on rly. between Córdoba and Santa Fé.
San Francisco, *c., spt.*, Cal., U.S.A.; on the San F. bay; entrance spanned by Golden Gate Bridge, longest single-span bridge in the world; univ.; engin., canning, lumber mills, printing,

publishing, chemicals, machin.; p. (1950) *775,357*.
San Francisco Pass, Argentina–Chile; across Andes at alt. 15,505 ft.
San Francisco de Macoris, *t.*, Dominican rep., W. Indies; p. *18,108*.
San Geronimo, *t.*, Oaxaca st., Mexico; rly. junction.
San Giovanni a Teduccio, *t.*, S. Italy; at foot of Vesuvius; iron mines, rly. wkshps.; p. *27,475*.
San Giovanni in Persiceto, *t.*, N. Italy; nr. Bologna; p. *20,450*.
San Isidro, *t.*, E. Argentina; N. sub. Buenos Aires; p. *25,070*.
San Jerônimo, *t.*, Rio Grande do Sul, Brazil; low-grade coal.
San João, *t.*, Brazil; on junction of Araguara and Tocatins Rs.
San Joaquin, *R.*, Cal., U.S.A.; trib. of Sacramento R.; length 400 m.
San José, *prov.*, Costa Rica, Central America; cap. San J.; p. (1950) *281,822*.
San José, *t.*, *cap.*, Costa Rica; cath., univ., observ.; coffee tr.; p. (1946) *97,557*.
San José, *c.*, Cal., U.S.A.; in Santa Clara valley; nr. is Lick Observatory; resort; fruit and vegetable canning; lumber prod., woollens, leather; p. (1950) *95,280*.
San José, *dep.*, Uruguay; a. 2,688 sq. m.; cap. San J.; p. (1953) *96,848*.
San José, *t.*, *cap.*, San José, Uruguay; grain, flour milling; p. *13,000*.
San Juan, *prov.*, Argentina; at foot of the Andes; a. 34,432 sq. m.; cap. San Juan; gold, copper; p. (estd. 1958) *353,900*.
San Juan, *t.*, cap. San Juan, Argentina; nr. Mendoza on R. San Juan; cattle, dried fruit; p. *18,000*.
San Juan, *c.*, *cap.*, Puerto Rico, Central America; cath.; univ.; naval sta., airport; distilleries, sugar; p. (1950) *357,205* (inc. Rio Piedras).
San Juan R., Central America; divides Nicaragua and Costa Rica; plans made for its canalisation, which would give both countries a clear waterway from Caribbean to Pacific; length 90 m.
San Juan, *R.*, Mexico; trib. of Rio Grande; length 160 m.
San Juan del Norte (Greytown), *spt.*, S.E. pt. of Nicaragua on Caribbean Sea.
San Juan del Río, *t.*, Durango, Mexico; p. *6,694*.
San Juan del Sur, *spt.*, Nicaragua, Central America; on Pacific cst.
San Juanito, *spt.*, Lower Cal., Mexico; on W. cst.
San Lorenzo, *mtn.*, S. Argentina; alt. 12,000 ft.
San Lucas, *C.*, point of Lower Cal., Mexico.
San Luis, *prov.*, Argentina; oranges, grapes; a. 29,700 sq. m.; cap. S.L.; p. (estd. 1958) *187,100*.
San Luis, *t.*, *cap.*, St. Luis, Argentina; cattle, grain, wines; onyx quarrying; p. (1947) *25,788*.
San Luis Obispo, *t.*, Cal., U.S.A.; p. (1950) *14,180*.
San Luis Potosi, *st.*, Mexico; agr. and mining; cap. San Luis Potosi; a. 24,415 sq. m.; p. (1950) *855,125*.
San Luis Potosi, *t.*, *cap.*, San Luis Potosi st., Mexico; clothing, cottons, rly. wks., lead, silver- and gold-refining; wool hides, cattle; p. (1950) *156,324*.
San Marco in Lanis, *t.*, Foggia, Italy; p. *19,275*.
San Marino, smallest st. in Europe and world's smallest rep.; on spurs of Apennines, Italy; ch. exp.: wine, woollen goods, hides, building stone; farming, cattle-raising; wine; a. 38 sq. m.; cap. San Marino; p. (estd. 1955) *14,000*.
San Marino, *t.*, *cap.*, San Marino; on hill-top, alt. over 1,200 ft., 12 m. S.W. of Rimini; tourists; wine, curios for sale to tourists; p. *2,200*.
San Martin, *dep.*, Peru; ch. t. Moyobamba; a. 17,448 sq. m.; p. (1947) *135,155*.
San Mateo, *t.*, Cal., U.S.A.; residtl. sub. San Francisco; p. (1950) *41,782*.
San Miguel, *c.*, El Salvador, Central America; on Rio Grande; nr. malarial swamps; famous fair; rubber, grain, indigo; p. (1946) *49,556*.
San Miguel, *principal I.*, Azores, Portugal; hot sulphur springs, oranges, etc.; 41 m. by 9 m.; cap. Ponta Delgada.
San Nicolas, *R. pt.*, Argentina; on Paraná R., 148 m. from Buenos Aires; cattle, flour, agr. produce; p. *24,829*.
San Pedro, *t.*, Paraguay; p. (1945) *14,790*.
San Pedro, *spt.*, Cal., U.S.A.; sub. Los Angeles; naval base; p. (1950) *36,527*.
San Pedro de Macoris, *t.*, Dominican Rep., W. Indies; p. (1948) *24,200*.
San Pedro Sula, *t.*, Honduras, Central America; p. (1945) *22,116*.
San Quintin Bay, *spt.*, Lower Cal., Mexico.
San Rafael, *t.*, W. Argentina; agr., cattle, fruit; p. *32,663*.
San Remo, *sm. pt.*, Italy; famous winter seaside resort on Italian riviera; flower mkt., olive oil, lemons, wine; 12th cent. church; p. *31,625*.
San Roque, *C.*, E. Brazil.
San Roque, *t.*, Andalusia, Spain; nr. Gibraltar; p. *12,371*.
San Salvador or Watling's I., Bahama Is., W. Indies; discovered by Christopher Columbus, 1492; p. (1953) *694*.
San Salvador, *cap.*, El Salvador; univ., observatory; silks, cottons, cigars; p. *157,356*.
San Sebastian, *c.*, *spt.*, *cap.*, Guipuzcoa, Spain; captured by Wellington 1813; gd. tr. and fisheries; sailcloth, cottons, paper, glass; p. (1950) *113,776*.
San Severo, *mkt. t.*, S. Italy; hill-top site, 15 m. N.W. of Foggia, Apulia; cath.; wine ctr., cream of tartar, bricks; p. *36,275*.
San'a, *cap.*, Yemen, Arabia; walled c. 7,270 ft. above sea-level; tr. in silk, cottons and china; jewellery, arms, fruit; p. *60,000*.
Sanchez, *spt.*, Dominican Rep., W. Indies; situated on the Bahia de Sumana, at E. end of Cibao lowland dist.; linked to Santiago by rail; exp. cacao, tobacco.
Sancti Spiritus, *c.*, Santa Clara, Cuba; in grazing dist.; p. (1943) *104,578*.
Sandakan, *impt. tr. c.*, N. Borneo, E. Indies; N.E. cst.; fine natural harbour; exp. timber, rubber, copra, hemp, salt fish; p. (estd. 1957) *14,499*.
Sandalwood (Sumba), *I.*, in Malay Archipelago, S. of Flores, Indonesia; very fertile; rice, maize, tobacco, timber, cinnamon; *cap.* Waingapu; a. 4,385 sq. m.; p. *182,326*.
Sanday, *I.*, Barra Is., Orkney, Scot.
Sandbach, *t.*, *urb. dist.*, Cheshire, Eng.; 5 m. S.E. of Middlewich; salt, chemicals, motor vehicles; p. (1951) *9,250*.
Sandbank, *par.*, Argyll, Scot.; 3 m. N.W. Dunoon; p. *1,366*.
Sandiacre, *vil.*, Derby, Eng.; on W. bank of R. Erewash, 4 m. S. of Ilkeston; lace-mkg.; p. *6,071*.
Sandoa, *t.*, Belgian Congo; on upper Lulua R.; admin. ctr.; p. *5,000*.
Sandown-Shanklin, *t.*, *urb. dist.*, I. of Wight, Eng.; on Sandown Bay; holiday resort; p. (1951) *12,693*.
Sandringham, *par.*, Norfolk, Eng.; Royal residence; farming.
Sandur, *t.*, Madras st., India; manganese, iron; p. *5,529*.
Sandusky, *c.*, Ohio, U.S.A.; on S. cst., L. Erie; tr. in coal, fruit, and foodstuffs; paper, farm implements, chemicals; p. (1950) *29,375*.
Sandwich, *t.*, *mun. bor.*, *Cinque pt.*, Kent, Eng.; at mouth of Stour R.; mkt., light inds.; p. (1951) *4,142*.
Sandwich Is., *dependency* of Falkland Is., Brit. Crown Col. S. Atlantic.
Sandy, *t.*, *urb. dist.*, Beds, Eng.; 3 m. N.W. of Biggleswade; mkt. gardening; p. (1951) *3,667*.
Sandy Hook, *peninsula*, N.J., U.S.A.; projecting into lower bay of N.Y.; yachting ctr.
Sanford, *t.*, Fla., U.S.A.; p. (1950) *11,935*.
Sanga, *R.*, trib. of Congo R., Fr. Equatorial Africa.
Sangir (Sangihe), *Is.*, Indonesia; between Philippines and Celebes; eruption of volcano on ch. I. killed 12,000 inhabitants, 1856.
Sankt Ingbert, *t.*, Saarland, N.E. of Saarbrücken; coal-mining, iron, glass, machin., textiles, leather; p. (estd. 1954) *26,100*.
Sankuru, *R.*, trib. of Kasai R., Belg. Congo, Central Africa.
Sanlucar, *t.*, Cadiz, Spain; nr. mouth R. Guadalquivir; wines and agr. produce; ruined cas.; p. *32,848*.
Sanniya Hor, *L.*, Iraq; linked to R. Tigris; shallow, acts as flood control reservoir.
Sannois, *t.*, Seine-et-Oise, France; p. (1954) *13,644*.
Sanok, *t.*, Poland; nr. Rzeszów; metallurgy; p. *11,176*.
Sanquhar, *burgh*, Dumfries, Scot.; in upper Nithsdale; carpets, coal, bricks; p. (1951) *2,381*.

Sansanding, *t.*, Fr. W. Africa; site of lge. barrage across R. Niger.
Santa Ana, *c.*, El Salvador, Central America; municipal palace, barracks; coffee, sugar; p. (1946) *98,942*.
Santa Ana, *t.*, Cal., U.S.A.; fruit farming, oilfields, mnfs. farm implements, preserved fruits; p. (1950) *45,553*.
Santa Bárbara, *dist.*, Honduras; Panama hats.
Santa Barbara, *t.*, *winter resort*, Cal., U.S.A.; at foot of Santa Inez mtns.; fruit, oil; p. (1950) *44,913*.
Santa Catarina, *st.*, Brazil; inc. Santa Catarina I.; a. 36,435 sq. m.; mineral wealth; cap. Florianopolis; p. (1950) *1,578,159*.
Santa Clara, *t.*, Cuba; at alt. over 1,200 ft.; sugar, cattle; p. (1943) *122,241*.
Santa Clara Valley, Cal., U.S.A.; extends S. from San Francisco Bay; very intensive fruit-growing under irrigation, specialises in prunes; ch. t. San José.
Santa Cruz, *spt.*, Patagonia, Argentina; sheep.
Santa Cruz, *terr.*, S. Argentina; sheep, horses; cap. Gallegos; a. 93,952 sq. m.; p. (estd. 1958) *59,500*.
Santa Cruz, *t.*, Bolivia; alt. 1,500 ft.; sugar, coffee, rice, cattle; Japanese settlement nearby; p. (1957) *58,272*.
Santa Cruz, *dep.*, Bolivia; cap. S. C.; p. (1950) *286,145*.
Santa Cruz, *c.*, Cal., U.S.A.; on Monterey Bay; popular seaside resort, fruit, and vegetable canning; fishing; p. (1950) *21,970*.
Santa Cruz, *t.*, cap. Tenerife I., Canary Is.; p. (1950) *103,446*.
Santa Cruz Is., Pac. Oc.; Brit. Solomon Is.; prot.
Santa Cruz de la Sierra, *t.*, Bolivia; on R. Piray; sugar, flour; distilling; p. *33,000*.
Santa Cruz de Tenerife, *prov.* (Spanish), Canary Is., Atl. Oc.; inc. Is. of Tenerife, Palma, Gomera, Hierro; a. 1,329 sq. m.; p. (1950) *418,101*.
Santa Fé, *prov.*, Argentina; agr. and stock farming; cap. Santa Fé; a. 52,056 sq. m.; p. (estd. 1958) *2,051,500*.
Santa Fé, *t.*, Argentina; on I. in R. Salado; cath., univ.; shipbldg.; p. (estd. 1954) *219,620*.
Santa Fé, *t.*, N.M., U.S.A.; at base of Sangre de Cristo range; oldest capital in U.S. founded by Spaniards 1610; p. (1950) *27,998*.
Santa Isabel, *cap.*, Fernando Po, Continental Guinea, Spanish W. Africa; residence of Governor; p. (1946) *15,064*.
Santa Maria, *t.*, Rio Grande do Sul, Brazil; rly. ctr.; tanning, hats, brewing, maté, wine, timber, rice; p. *39,492*.
Santa Maria, *t.*, Campania, Italy; on site of ancient Capua; cath.; glass, leather; p. *36,637*.
Santa Marta, *spt.*, *cap.*, Magdalena dep., Colombia, S. America; cath.; p. (1947) *25,113*.
Santa Maura, *see* **Levkàs**.
Santa Monica, *c.*, Cal., U.S.A.; sub. Los Angeles; residtl.; p. (1950) *71,595*.
Santa Rosa, *t.*, *cap.*, La Pampa terr., Argentina; p. *14,000*.
Santa Rosa, *t.*, Cal., U.S.A.; fruit, grain, dairying; p. (1950) *17,902*.
Santa Rosalia, *t.*, peninsula of Lower Cal., Mexico; located E. cst. on G. of Cal.; impt. copper-mines.
Santander, *dep.*, Columbia, S. America; E. of the Magdalena R.; cap. Bucaramanga; a. 12,379 sq. m.; p. (1947) *718,480*.
Santander, *prov.*, Spain; agr., grape growing, fisheries; cap. Santander; a. 2,108 sq. m.; p. (1950) *404,921*.
Santander, *spt.*, *cap.*, Santander prov., Spain; former summer resort of the Court; cath.; exp. iron and zinc ore; p. (1950) *102,462*.
Santarém, *t.*, Para, Brazil; rubber, cacao, Brazil nuts, sugar; p. *3,000*.
Santarém, *dist.*, Portugal; in fertile valley of R. Tagus; cap. S.; p. (1950) *458,658*.
Santarém, *t.*, Portugal; on height above Tagus; fine bridge; p. (1940) *14,409*.
Santiago, *prov.*, Chile; cap. Santiago; a. 5,557 sq. m.; p. (1957) *2,106,249*.
Santiago de Chile, *c.*, *cap.*, Chile; on R. Mapocho; most populous t. on Pacific side of S. America; cath., univ.; national library; leather, soap, beer, foundries; p. (1952) *1,350,409*.
Santiago de Compostella, *c.*, Corunna, Spain; on R. Sar; cath. (with tomb of St. James); univ.; beer, spirits, paper, linen; p. (1950) *55,553*.
Santiago de Cuba, *c.*, *spt.*, Cuba, W. Indies; on S. cst.; former cap. of I.; cath.; iron foundries, tanneries, ctr. of mineral dist.; exp. sugar, coffee, tobacco; Spanish fleet destroyed by U.S.A. warships here 1898; p. (1943) *120,577*.
Santiago de las Vegas, *t.*, Cuba; nr. Havana; p. (1943) *21,265*.
Santiago de los Caballeros, *t.*, Dominican Rep., W. Indies; p. (1948) *62,527*.
Santiago del Estero, *t.*, Argentina; on R. Dulce; p. (1947) *63,491*.
Santiago del Estero, *prov.*, Argentina; cap. S. del E.; a. 52,511 sq. m.; p. (estd. 1958) *600,400*.
Santiago-Zamora, *prov.*, Ecuador; p. (1950) *21,046*.
Säntis, *mtn.*, on bdr. Swiss cans. St. Gallen and Appenzell, alt. 8,216 ft., Europe's highest television transmitter on summit.
Santo Domingo (**Dominican Republic**), E. Hispaniola, W. Indies; mountainous, fertile valleys; sugar, coffee, cacao, timber; rich in minerals (unworked); cap. Ciudad Trujillo; a. 19,332 sq. m.; p. (1948) *2,182,109*.
Santo Domingo, *see* **Cuidad Trujillo**.
Santoña, *spt.*, Spain; on N. cst., E. of Santander; p. *11,136*.
Santorene, *see* **Thera**.
Santos, *c.*, *spt.*, São Paulo, Brazil; world's ch. coffee pt.; also exp. sugar, rum, tobacco; p. (1950) *201,739*.
São Carlos, *t.*, São Paulo st., Brazil; 120 m. N.W. of São Paulo; ctr. of ch. coffee-growing dist.
São Francisco, *R.*, Brazil; flows from Minas Gerais prov., to Atlantic; navigable for 150 m. below cataract of Paulo Afonso; length 1,600 m.
São Francisco, *spt.*, Santa Catarina, Brazil; p. *15,000*.
São Jeronymo, *t.*, Rio Grande do Sul st., S. Brazil; 40 m. W. of Porto Alegre; coal-mines.
São João, *t.*, Minas Gerais, Brazil; coffee, rice, cattle, cotton, sugar; p. (1947) *38,500*.
São Leopoldo, *t.*, Rio Grande do Sul st., S. Brazil; 20 m. N. of Porto Alegre, lgst. of gr. of German colonies in S. Brazil; mkt. t.
São Luiz, *cap.*, Maranhao st., Brazil; episcopal palace; p. (1947) *97,713*.
São Paulo, *st.*, Brazil, on Atlantic cst.; coffee, sugar-cane, cereals, cotton, tobacco, fruit, wine, some coal deposits; cap. S. Paulo; a. 95,454 sq. m.; p. (1950) *9,242,610*.
São Paulo, *c.*, *cap.* São Paulo st., Brazil; cath., monasteries; cottons, woollens, jute, furniture; p. (1950) *2,227,512*.
São Roque, *c.*, Rio Grande do Norte st., N.E. Brazil; most N.E. point of S. America.
São Tomé with Principe Is. in the G. of Guinea; p. (1950) *60,159*.
Saône, *R.*, France; rises in Vosges, and flows to R. Rhône at Lyons; length 282 m.
Saône-et-Loire, *dep.*, France; mountainous; wines, coal, cereals, iron, steel, porcelain, oil, chemicals; cap. Mâcon; a. 3,331 sq. m. p. (1954) *511,182*.
Saône-Haute, *dep.*, France; cereals; fruit, iron, steel, cottons, coal; cap. Vesoul; a. 2,074 sq. m.; p. (1954) *209,303*.
Sapporo, *t.*, *administrative cap.*, Hokkaido, Japan; garrison; flour mills, flax, hemp, brewing; p. (1950) *313,850*.
Saqqara, *t.*, Egypt; tombs and pyramids; nr. site of Memphis.
Saragossa, *see* **Zaragoza**.
Sarajevo, *t.*, *cap.*, Bosnia and Herzegovina, Jugoslavia; the assassination here, on 28 June 1914, of the Archduke Francis Ferdinand precipitated the First World War; weaving carpets, pottery, flour, silks, sugar; p. (1953) *136,283*.
Saranac, L., *t.*, *popular lakeside resort*, N.Y., U.S.A.; p. (1950) *6,913*.
Saransk, *t.*, R.S.F.S.R.; engin.; p. (1959) *90,000*.
Sarapul, *R. pt.*, R.S.F.S..; Ron R. Kama; boots, shoes, gloves, rope, flax; p. (1959) *68,000*.
Saratoga Springs, N.Y., U.S.A.; summer resort at foot of Adirondack mtns., mineral springs; p. (1950) *15,473*.
Saratov, *t.*, *pt.*, R.S.F.S.R.; on R. Volga; univ.; engin., ball-bearings, textiles, oil-refining, saw-milling; p. (1959) *581,000*.
Sarawak, *Brit. col.*, N.W. Borneo; exp. sago, rubber, oil, pepper; cap. Kuching; a. 47,071 sq. m.; p. (1956) *626,223*.
Sardinia, *I.*, *region*, Italy; in Mediterranean and former kingdom, constructed out of Duchy of Savoy; mountainous; sheep, cattle, fishing,

wheat, barley, fruit, wine; cap. Cagliari; a. 9,302 sq. m.; p. (1951) *1,273,850*.
Sargasso Sea, *zone*, situated in S.W. of North Atlantic; relatively still sea within swirl of warm ocean currents. Noted for abundance of gulf-weed on its surface, rich in marine life. Named by Columbus.
Sariwon, *t.*, Korea; p. *30,389*.
Sark, *I.*, Channel Is.; 6 m. E. of Guernsey; picturesque scenery; farming; tourist ctr.; a. 1,274 acres; p. *448*.
Sark, *R.*, forms extreme W. bdy. between Scot. and Eng.
Sarnen, *cap.* half-can. Obwalden, Switzerland.
Sarnia, *t.*, Ontario, Canada; on St. Clair R.; woollens, machin., oil refineries, petro-chemical inds.; p. *18,734*.
Sarpsborg, *t.*, Norway; on R. Glommen; chemicals, wood-pulp, aluminium; p. (1946) *12,767*.
Sarreguemines, *t.*, Moselle, France; 7 m. S.E. of Saarbrücken; porcelain, plush leather, matches; p. (1954) *14,947*.
Sarria, *t.*, Lugo, Spain; p. *15,167*.
Sarthe, *dep.*, N.W. France; undulating surface; farming, apples, livestock; coal, linen, potteries; cap. Le Mans; a. 2,412 sq. m.; p. (1954) *420,393*.
Sarthe, *R.*, France; trib. of R. Loire; l. 165 m.
Sarzana, *t.*, Liguria, Italy; nr. Spezia; cath.; silks; p. *13,650*.
Sasebo, *spt.*, Kyushu, Japan; p. (1950) *194,453*.
Saseno I., *see* Sazan.
Saskatchewan, *prov.*, Canada; coniferous forests and plains; Rs. Saskatchewan and Churchill; many lge. Ls.; extreme climate; good rail communications; hydro-elec. power; gr. wheat prov.; livestock, dairying; coal, copper, furs, fisheries; cap. Regina; a. 251,700 sq. m.; p. (1956) *880,665*.
Saskatchewan, *R.*, Canada; flows from Rocky mtns. through L. Winnipeg and thence by R. Nelson to Hudson Bay; length 1,450 m.
Saskatoon, *c.*, Saskatchewan, Canada; univ.; flour, cement; p. (1956) *72,858*.
Sasovo, *t.*, R.S.F.S.R.; wood inds.; p. *10,000*.
Sassari, *t.*, Sardinia, Italy; nr. G. of Asinara; cath., univ., palaces; tobacco and macaroni wks.; oil, grain; p. (1951) *70,243*.
Satara, *t.*, Bombay, India; p. (1941) *36,405*.
Satu-Mare, *t.*, N.W. Romania; pottery, textiles; p. *56,313*.
Saudi Arabia, *lgst. kingdom*, peninsula of Arabia; formerly kingdom of Hejaz (cap. Mecca) and Nejd (cap. Riyadh); mainly desert; nomadic pop.; Mohammedanism; dates, wheat, barley; impt. oil concessions; p. (approx.) *2,000,000*.
Sauerland, *dist.*, *Land*, N. Rhine–Westphalia, W. Germany; plateau, alt. from 500 to 1,500 ft., E. of Rhine and between valleys of Sieg and Ruhr; agriculturally poor, largely forested; crossed by R. Wupper, with which are associated industl. ts. Wuppertal (textiles), Solingen and Remscheid (cutlery and special steel).
Saugor, *t.*, Madhya Pradesh, India; univ.; p. (1941) *63,933*.
Sault Ste. Marie, *c.*, Mich., U.S.A.; on L. Superior at rapids; flour, woollens, locomotives; p. (1950) *17,912*.
Sault Ste. Marie, *c.*, Ontario, Canada; on L. Superior at rapids; pulp, paper, iron, steel; p. (1941) *25,794*.
Saulte Ste. Marie Canals ("Soo"), Canada and U.S.A.; twin canals on Canadian and American side of shallow channel linking L. Superior and L. Huron; traversed by all wheat and iron-ore traffic from L. Superior pts.; length (Canadian) 1 m.; depth 18 ft.
Saumur, *t.*, Maine-et-Loire, France; on R. Loire, 30 m. S.W. of Tours; wines, enamels, tinware; p. (1954) *18,169*.
Saurashtra, *former st.*, India; now absorbed into Bombay st.; total a. 21,062 sq. m.; p. (1951) *4,136,005*.
Sava or Save, *R.*, N. Jugoslavia; trib. of Danube; [length 550 m.
Savage or Niue, Cook Is., Pac. Oc.; under N.Z.; ch. exp. native plaited ware, bananas, copra, and sweet potatoes; ch. pt. Alofi; a. 100 sq. m.; p. (1948) *4,318*.
Savaii I., *lgst. of Samoan gr.*, Pac. Oc.; a. 703 sq. m.
Savannah, *c.*, *spt.*, Ga., U.S.A.; turpentine, manure, soap, timber; p. (1950) *119,638*.
Savannah, *R.*, U.S.A.; flows between Ga. and S.C., to Atl. Oc.; length 450 m.
Save, *R.*, France; trib. of R. Garonne; length 65 m.
Saverne, Col de, *low pass*, N.E. France; carries trunk rly. from Paris to Strasbourg and the Orient between Vosges and Hardt Mtns.; gradual approach from W., steep descent to E. into Rhine valley.
Savigliano, *t.*, Piedmont, Italy; silk; p. *18,725*.
Savoie or Savoy, *dep.*, S.E. France; on Italian border; mountainous; mineral springs, pastoral, dairying; cap. Chambéry; a. 2,389 sq. m.; p. (1954) *252,192*.
Savoie (Haute), *dep.*, France; mountainous; farming, wine, cheese; cap. Annecy; a. 1,774 sq. m.; p. (1954) *293,852*.
Savona, *spt.*, Genoa, Italy; cath.; iron, shipbldg., glass and tinplate wks.; exp. preserved fruits and tomatoes; p. (1951) *68,698*.
Sawbridgeworth, *t.*, *urb. dist.*, Herts, Eng.; on R. Stort, 4 m. S. of Bishops Stortford; malting, fruit preserving; p. (1951) *3,692*.
Saxmundham, *mkt. t.*, *urb. dist.*, Suffolk, Eng.; 18 m. N.E. of Ipswich; p. (1951) *1,438*.
Saxony, *Land*, Germany, Soviet Zone; farming, printing, type-founding, toys, textiles, lace, spirits, beer, coal, iron, mineral springs; ch. ts. Dresden, Leipzig, Chemnitz; a. 6,640 sq. m.; p. *5,543,400*.
Saxony-Anhalt, *Land*, Germany, Soviet zone; a. 9,480 sq. m.; p. *4,162,100*.
Sayan Mtns., *range of mtns.*, between Rs. Yenisei and Angra, R.S.F.S.R.
Sayre, *t.*, Penns., U.S.A.; on R. Susquehanna; p. (1950) *7,735*.
Sazan, *I.*, Adriatic Sea; off cst. of Albania; restored to Albania by Italy.
Scafell Pike, *mtn.*, Cumberland, Eng.; in N. Pennines; highest in Eng.; alt. 3,210 ft.
Scalby, *t.*, *urb. dist.*, N.R. Yorks, Eng.; 3 m. N.W. of Scarborough; p. (1951) *6,225*.
Scalpay, *I.*, Skye, Scot.
Scandinavia, *region*, N. Europe, comprising Sweden, Norway and Denmark.
Scania, *see* Skåne.
Scapa Flow, *strait*, N. Scot.; between Pomona and Hoy, Orkney Is., surrendered German fleet scuttled, 1919.
Scarba, *I.*, Argyll, Scot.; off N. end of Jura.
Scarborough, *t.*, *mun. bor.*, N.R. Yorks, Eng.; on E. cst. 18 m. N.W. of Flamborough Head; seaside resort; p. (1951) *43,983*.
Scarpanto, *Greek I.*, E. Mediterranean; between Rhodes and Crete, one of the Dodecanese; p. *8,747*.
Schaan-Vaduz, *t.*, Liechtenstein; point where Arlberg Express (Paris–Vienna) passes through the principality.
Schaffhausen, *most N. can.*, Switzerland; on R. Rhine; pastoral and afforested; cap. Schaffhausen; p. (1951) *57,515*.
Schaffhausen, *t.*, cap. Schaffhausen can., Switzerland; on the Rhine; cath., cas.; famous falls, iron, steel, aluminium, cottons, brewing, distilling; p. (1941) *22,498*.
Schaumburg-Lippe, *former st.*, between provs. of Hanover and Westphalia, Germany, now part of Lower Saxony; farming; coal-mining; cap. Bückeburg.
Schelde (Scheldt), *R.*, France, Neth. and Belgium; rises in Aisne, France, flows to N. Sea; length 248 m.
Schenectady, *c.*, N.Y. U.S.A.; foundries, wireless-transmitting apparatus, locomotive; synthetic diamonds; p. (1950) *91,785*.
Scheveningen, *seaside resort*, Neth.; 2 m. N.W. of the Hague; fishing.
Schiedam, *t.*, Neth.; N.W. of Rotterdam; liquors, candles, yeast; p. (estd. 1955) *76,000*.
Schiehallion, *mtn.*, Perth, Scot.; alt. 3,547 ft.
Schiltigheim, *t.*, Bas-Rhin, France; machin., factory equipment; p. (1954) *22,798*.
Schlei, *narrow inlet* of Baltic, Schleswig-Holstein, Germany; 25 m. long.
Schleswig, *c.*, *pt.*, Schleswig-Holstein, Germany; cath., cas.; rope wks., tanning, freighting; p. (estd. 1954) *37,800*.
Schleswig-Holstein, *Land*, N. Germany; retroceded from Denmark 1920; cap. Kiel; moors and plain farming, livestock; textiles, tobacco; a. 6,048 sq. m.; p. (1950) *2,594,648*.
Schlettstadt, *see* Sélestat.
Schneidemühl, *see* Pila.
Schönebeck, *t.*, Saxony–Anhalt, Germany; on

R. Elbe; metals, chemicals, brewing; p. (estd. 1954) *46,700*.
Schouten I., New Guinea, Indonesia; in Greelvink Bay; p. *25,487*.
Schouwen I., Zeeland, Neth.; in N. Sea.
Schuylkill R., Penns., U.S.A.; flows into Delaware R.; length 130 m.
Schuylkill Haven, *t.*, Penns., U.S.A.; on Schuylkill R.; p. (1950) *6,597*.
Schwabach, *t.*, Bavaria, Germany; S. of Nürnberg; metal inds.; p. (estd. 1954) *20,100*.
Schwäbisch-Gmünd, *c.*, Baden–Württemberg, Germany; E. of Stuttgart; cath.; clocks, metal, glass and optical inds.; p. (estd. 1954) *34,100*.
Schwarzwald (Black Forest), *forest belt, Land* Baden-Württemberg, W. Germany; a. 1,844 sq. m.; highest peak Feldberg, alt. 4,900 ft.
Schweidnitz, *see* **Swidnica.**
Schweinfurt, *t.*, Bavaria, Germany; on R. Main, N.E. of Würzburg; metals, machin., dyes, brewing; p. (estd. 1954) *48,200*.
Schweizer Reneke, *t.*, Transvaal, S. Africa; irrigation; p. *2,252*.
Schwelm, *t.*, N. Rhine–Westphalia, Germany; E. of Wuppertal; metals, machin., textiles paper; p. (estd. 1954) *29,700*
Schwenningen, *t.*, Baden–Württemberg, Germany; clocks, metals, footwear; p. (estd. 1954) *25,100*.
Schwerin, *cap.*, *Land* Mecklenberg, Germany; industl. and educational; cath., palace; pianos, furniture, soap, bricks; p. *55,692*.
Schwerte, *t.*, N. Rhine–Westphalia, Germany; nr. Hagen; nickel wks.
Schwyz, *forest can.*, Switzerland; cap. Schwyz; a. 350 sq. m.; p. (1950) *71,082*.
Schwyz, *t.*, Switzerland; nr. L. of Lucerne; p. (1941) *9,530*.
Sciacca, *spt.*, Sicily, Italy; nr. Agrigento; cath.; H.Q. of Mediterranean coral fishery; sardines, olives; mineral springs; p. approx. *25,000*.
Scilla, *promontory*, Strait of Messina, Calabria, Italy.
Scilly Is., *gr.*, 30 m. S.W. of Land's End, Cornwall, Eng.; total a. 10 sq. m.; lgst. I., St. Marys; cap. Hugh Town; flowers, vegetables; p. *1,828*.
Scioto, *R.*, Ohio, U.S.A.; joins Ohio at Portsmouth; length 250 m.
Scone, *par.*, Perth, Scot.; place of residence and coronation of early Scottish kings; from here Edward I. removed the Stone of Destiny to Westminster Abbey in 1297; tourist ctr.; civil aerodrome.
Scotland, Brit. Is.; N. part of Gr. Britain; contains 33 cos.; home affairs administered by Dep. of Secretary of State for Scot.; physically divided into Highlands (many islands on W.), Middle Lowlands and S. Uplands; highest peaks, Ben Nevis 4,406 ft. and Ben Macdhui 4,296 ft.; ch. Ls., L. Lomond, L. Ness; ch. Rs., Clyde, Tweed, Tay, Spey, Dee, Forth; climate, maritime; agr. in E., grazing in W.; oats, barley, wheat, potatoes, fruit; coal, iron, oil-shale, granite; fisheries; mnfs., textiles, shipbldg.; machin., distilling, sugar-refining, printing; cap. Edinburgh; Glasgow, ch. comm. and industl. t.; a. 29,796 sq. m.; p. (1951) *5,095,969*.
Scranton, *c.*, Penns., U.S.A.; on R. Susquehanna; anthracite, iron foundries, steel wks., locomotives, and silk mnfs.; p. (1950) *125,536*.
Scunthorpe, *t.*, *mun. bor.*, Lindsey, Lincs, Eng., on Lincoln Edge, 6 m. S. of the Humber; iron-mng. and smelting, steel girders, engin., chemicals, tar distillation; p. (1951) *54,245*.
Scutari (Albania), *see* **Shkodra.**
Scutari (Turkey), *see* **Usküdar.**
Scutari L., *see* **Shkodra L.**
Seaford, *t.*, *urb. dist.*, E. Sussex, Eng.; 3 m. E. of Newhaven; seaside resort; p. (1951) *9,023*.
Seaforth Loch, Lewis, Outer Hebrides, Scot.; 14 m. long.
Seaham, *spt.*, *urb. dist.*, Durham, Eng.; Seaham Harbour, on E. cst. 4 m. S. of Sunderland; modern colly. workings, extending under sea; p. (1951) *26,138*.
Seathwaite, *vil.*, N. Lancs, Eng.; on R. Duddon on S. fringe of English Lake Dist.; highest average annual rainfall recorded in Brit. Is., 130 in.
Seaton, *t.*, *urb. dist.*, S. Devon, Eng.; on Lyme Bay at mouth of R. Axe; seaside resort; freestone quarries; p. (1951) *2,903*.
Seaton Valley, *t.*, *urb. dist.*, Northumberland, Eng.; nr. Blyth; coal-mining; p. (1951) *26,435*.
Seattle, *spt.*, Wash., U.S.A.; univ., cath.; shipbldg., aeroplanes, glass, fish-canning, fishing and whaling, packing, lumbering, coal; p.(1950) *467,591*.
Sebenico, *see* **Sibenik.**
Sebnitz, *t.*, Germany; E. of Dresden; p. *12,614*.
Secunderabad, Hyderabad, India; military sta.; p. *100,000*.
Sedalia, *c.*, Mo., U.S.A.; farming, meat-packing; machin., textiles, coal; rly. ctr. and wks.; p. (1950) *20,354*.
Sedan, *t.*, Ardennes, France; on R. Meuse; formerly a strong fortress; battle 1870, resulting in complete defeat of France; weaving; machin., metal ware, woollens, flour; p. (1954) *17,637*.
Sedgefield, *t.*, Durham, Eng.; farming; p. *3,111*.
Sedgley, *industl. t.*, *urb. dist.*, Staffs, Eng.; nr. Wolverhampton; coal-mng., metal wks., bricks, engin., fireclay goods; p. (1951) *23,104*.
Segezha, *t.*, R.S.F.S.R.; on L. Vyg; cellulose, paper, sawmilling.
Sego, *L.*, R.S.F.S.R.; 20 by 20 m.; N.W. of L. Onega; outlet into White Sea.
Ségou, *t.*, *R. pt.*, Sudanese Rep., W. Africa; on R. Niger; ctr. of irrigation scheme; cotton, hides, cattle, wax, salt; p. (1946) *22,150*.
Ségou Canal, Fr. W. Africa; leaves R. Niger 4 m. below Bamako, extends 130 m. N.E. to Segou; irrigates 3,000 sq. m. on right bank of Niger and assists navigation.
Segovia, *prov.*, Old Castile, Spain; agr., stock-keeping, and mftg.; cap. Segovia; a. 2,682 sq. m.; p. (1950) *201,433*.
Segovia, *c.*, Spain; nr. R. Eresma; cath.; iron-ware, cloth, earthenware, paper, flour; p. (1949) *34,838*.
Segre, *R.*, Lérida, N.E. Spain; rises in E. Pyrenees, flows S.W. into R. Ebro; water irrigates the a. around Lerida, the lgst. block of irrigated land in Spain; length approx. 170 m.
Segura, *R.*, Spain, flows to Mediterranean at Guardamar; 180 m.
Seim, *R.*, Ukrainian S.S.R.; trib. of R. Desna; length 300 m.
Seine, *dep.*, France; mkt. gardens; gypsum, freestone; a. 185 sq. m.; cap. Paris; p. (1954) *5,154,834*.
Seine, *R.*, France; rising in Côte d'Or dep., and flowing past Paris and Rouen to English Channel at Havre; length 473 m.
Seine-et-Marne, *dep.*, N. France; agr., stock-raising, dairying; "Brie" cheese; porcelain, gypsum, flagstone; cap. Melun; a. 2,275 sq. m.; p. (1954) *453,438*.
Seine-et-Oise, *dep.*, N. France; mkt. gardening, vineyards, wheat; machin., chemicals, porcelain, gunpowder, stone; cap. Versailles; a. 2,185 sq. m.; p. (1954) *1,708,791*.
Seine-Maritime, *dep.*, N. France; undulating and fertile; grain, dairying, textiles, iron, shipbldg., flax, chemicals; fisheries; cap. Rouen; a. 2,448 sq. m.; p. (1954) *941,684*.
Sekia el Hamra, *prov.*, Spanish Sahara; N.W. Africa; a. 32,047 sq. m.; ch. t. Smara.
Sekondi, *spt.*, Ghana, W. Africa; connected with and largely superseded as a pt. by Takoradi harbour; p. (1948) *44,130* (inc. Takoradi).
Selangor, *st.*, Malaya; on W. side of Peninsula; a. 3,160 sq. m.; cap. Kuala Lumpur; p. (1957) *1,012,047*.
Selby, *mkt. and industl. t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Ouse, 13 m. S. of York; ancient abbey church; flour-milling, flax, oil-cake; p. (1951) *10,217*.
Sele, *R.*, S. Italy; rises in S. Apennines, flows W. into G. of Salerno; headwaters now carried E. through gr. Apennine tunnel (7 m.) to irrigate plateau of Apulia in S.E. Italy.
Selenga, *R.*, Mongolia and Siberia; flows into L. Baikal; length 750 m.
Sélestat, *t.*, Bas-Rhin, France; on R. Ill; two caths.; p. (1954) *11,705*.
Selkirk, *co.*, Scot.; mountainous (Broad Law 2,723 ft.); sheep, oats, woollens; cap. Selkirk; a. 267 sq. m.; p. (1951) *21,724*.
Selkirk, *bor.*, *co. t.*, Selkirk, Scot.; on Ettrick Water; 4 m. S. of Galashiels; tartans, tweeds; p. (1951) *5,853*.
Selkirk, *t.*, Yukon, Canada; on junction of Macmillan and Lewes Rs.
Selkirk Mtns., B.C., Canada; run N.W. to S.E. parallel with Rocky Mtns. and occupy inside of

the great bend of R. Columbia; ancient rocks; highly mineralised; pierced by Connaught Tunnel on Canadian Pacific Rly. route through Kicking Horse Pass to Vancouver; rise to over 9,000 ft.
Selma, *c.*, Ala., U.S.A.; on Alabama R.; in cotton-growing dist.; also dairying, lumbering, ironwks., fertilisers; p. (1950) *22,840* (more than half coloured).
Selsey, *t.*, Sussex, Eng.; on Selsey Bill, 7 m. S. of Chichester; coastal resort; fishing.
Selsey Bill, *peninsula*, between Bognor Regis and Portsmouth, Sussex, Eng.
Selukwe, *t.*, S. Rhodesia; alt. 4,734 ft.; gold-mining, chrome ore; ranching and agr.
Selwyn Range, *mtns.*, Queensland, Australia; extends 350 m. W. from Gr. Dividing Range; forms divide between Rs. flowing N. to G. of Carpentaria and Rs. flowing S. to Darling; gold, copper; alt. mainly below 1,500 ft.
Semarang, *spt.*, Java, Indonesia; exp. sugar, tobacco, tapioca, kapok; shipbldg., rly. repairs, cement, sawmills; p. *217,800*.
Seminole, *t.*, Okla., U.S.A.; p. (1950) *11,863*.
Semipalatinsk, *t.*, Kazakh. S.S.R.; on R. Irtysh; textiles, sawmilling, engin.; p. (1959) *155,000*.
Semlin, *see* **Zemun.**
Semmering Pass, *low pass*, Austria; provides route across E. Alps for rly. from Vienna to Venice; alt. below 3,000 ft.
Sena, *t.*, Mozambique, Port. E. Africa; on R. Zambesi.
Sendai, *t.*, Honshu, Japan; salt, fish; p. (1950) *341,685*.
Seneca Falls, *t.*, N.Y., U.S.A.; on R. Seneca; mnfs.; p. (1950) *6,634*.
Senegal, *R.*, W. Africa; flowing from Kong mtns. W. and N.W. to Atlantic at St. Louis, above Cape Verde; length 1,000 m.
Senegal, *aut. rep.* within Fr. Community, member of Mali Fed.; N. of R. Gambia; groundnuts; cap. Dakar; a. 77,730 sq. m.; p. (1957) *2,269,000*.
Senekal, *t.*, O.F.S., S. Africa; tr. ctr.; wool, wheat; p. *4,415*.
Senigallia, *t.*, Italy, N.W. of Ancona; p. *26,345*.
Sennar, *t.*, Sudan; on Blue Nile, on rly. route to Khartoum, Suakin, Pt. Sudan; dam for irrigation and control of Nile floods; hydro elec. power sta.; p. *1,000*.
Sennin, *see* **Kamaishi.**
Sens, *t.*, Yonne, France; on R. Yonne; cath., the ancient Agedincum; farm implements, boots, chemicals, cutlery; p. (1954) *18,612*.
Senta, *t.*, Jugoslavia; on R. Tisa; flour, leather, sugar, wine, agr., machin., chemicals, paper; p. (1953) *25,524*.
Seoul, *cap.*, S. Korea; brassware, pottery, silk; p. (1949) *1,446,019*.
Septimer, *mtn. pass*, Swiss Alps, can. Grisons; alt. 7,611 ft.
Seraing, *t.*, Liége, Belgium; extensive ironwks.; engin.; p. (estd. 1957) *42,534*.
Serampore, *t.*, W. Bengal, India; former Danish settlement; cotton and silk weaving, pottery, jute- and paper-mills; p. (1941) *55,339*.
Serang, *I.*, Malaya Archipelago, Indonesia, N. of Amboyna; a. 6,612 sq. m.; tobacco; p. (estd.) *105,000*
Serbia, *fed. unit*, Jugoslavia; former independent kingdom; a. 33,930 sq. m.; cap. Belgrade; p. (1948) *6,523,224*.
Serdovsk, *t.*, R.S.F.S.R., S.W. of Penza; grain tr.; p. *10,000*.
Seremban, *t.*, cap., Negri Sembilan, Malaya; p. *25,000*.
Seres, *see* **Sérrai.**
Sereth, *R.*, Romania; trib. of R. Danube; length 290 m.
Sergipe, *cst. st.*, Brazil; forested; tobacco, maize, sugar, cotton; cap. Aracaju; a. 8,129 sq. m.; p. (1950) *650,132*.
Sergo, *see* **Kadiyevka.**
Sériphos, *I.*, Cyclades gr., Grecian Archipelago, Ægean Sea.
Serowe, *cap. c.*, Bamangwato tribe, Bechuanaland prot., S.W. Africa; p. *15,935*.
Serpukhov, *t.*, *R. pt.*, R.S.F.S.R.; on R. Oka, S. of Moscow; engin., textiles; p. (1959) *105,000*.
Serra da Bandeira, *cap.*, Hulia prov., Angola; tourists.
Serra da Mantiqueira, *mtn. range*, highest in Brazil;
Serra do Espinhaco, *mtns.*, Brazil; highest peak, Itambe, 6,705 ft.; iron-ore deposits.
Serra do Mar, *mtns.*, Brazil; form steep E. edge of Brazilian Plateau S. from Rio de Janeiro.
Sérrai (Seres), *prefecture* Macedonia, Greece; cap. Sérrai; p. (1951) *221,015*.
Sérrai (Seres), *t.*, Macedonia, Greece; on Struma R.; woollens, cottons, carpets; p. (1951) *36,279*.
Sestri Levante, *spt.*, Italy; nr. Genoa; p. *15,341*.
Sète (formerly **Cette**), *spt.*, Hérault, France; on Mediterranean cst.; chemicals, fisheries; exp. oysters, brandy, wine; p. (1954) *33,454*.
Setif, *mkt. t.*, E. Algeria; alt. 3,596 ft.; cereals, horses; p. (1948) *51,674*.
Setouchi, *coastal region*, S.W. Honshu, N. Shikoku, Japan; flanks shores of Inland Sea; sm. plains backed by terraced hillsides; intensive agr., rice, mulberry, tea, citrus fruits; many sm. ts. engaged in fishing, local tr. and varied inds. inc. textiles, salt-extraction from brine.
Setté Cama, *spt.*, Gabun, Equat. Africa; open roadstead, landing difficult owing to swell; exp. timber.
Settle, *mkt. t.*, *rural dist.*, W.R. Yorks, Eng.; on R. Ribble in heart of Craven dist.; caves with remains of extinct fauna; thread, cotton; p. (1951) *14,279*.
Settsu Plain, S. Honshu, Japan; located at head of Osaka Bay at E. end of Inland Sea; intensively cultivated alluvial lowlands, ch. crops, rice, vegetables, oranges; gr. industl. belt extends along cst. through Kobe, Osaka, Kishiwada; engin., chemicals, textiles; a. 500 sq. m.
Setubal, *c.*, *spt.*, Lisbon, Portugal; on R. Sado; boatbldg., fishing, sardine-curing, lace, salt, fertilizers, etc.; p. (1940) *268,272*.
Seul Lac, *L.*, S. of St. Joseph L., Ontario, Canada.
Sevan (Gokcha), *lge. L.*, Armenian S.S.R.; alt. 6,340 ft.; never freezes; surrounded by high barren mtns.
Sevan, *t.*, Armenian S.S.R.; underground hydro-elec. power sta.
Sevastopol, *spt.*, Ukrainian S.S.R.; built on ruins left after famous siege 1855; report on Black Sea; naval arsenals; leather, tiles, machin.; exp. grain; p. (1959) *148,000*.
Seven Islands, *pt.*, on St. Lawrence, Quebec, Canada; exp. iron brought by rail from Ungava peninsula.
Sevenoaks, *mkt. t.*, *urb. dist.*, Kent, Eng.; in Vale of Holmesdale, 5 m. N.W. of Tonbridge; residtl.; agt. fruit and hops, light inds.; p. (1951) *14,834*.
Severn, *R.*, W. of Eng. and N. Wales; rises in Montgomery and flows to Bristol Channel; length 200 m.
Severn, *R.*, Ontario, Canada; flows to Hudson Bay; length 350 m.
Severn Tunnel, Eng.; under estuary of R. Severn between Pilning (Glos.) and Severn Tunnel Junction (Mon.); carries main rly. from London to S. Wales; longest main-line rly tunnel in Brit. Is.; length nearly 4½ m.
Seville, *prov.*, Spain; agr., mining; cap. Seville; a. 5,430 sq. m.; p. (1950) *1,099,374*.
Seville, *pt.*, *cap.*, Seville, Spain; on R. Guadalquivir; Gothic cath.; palace, univ.; ironware, machin., cigars, silks, porcelain, aircraft; exp. lead, iron, mercury, cork, oranges, lemons, wine; birthplace of Velasquez and Murillo; p. (1950) *376,627*.
Sevran, *t.*, Seine-et-Oise, France; p. (1954) *12,956*.
Sèvres, *t.*, Seine-et-Oise, France; on R. Seine; celebrated porcelain mnfs.; p. (1954) *17,109*.
Sevres (Deux), *dep.*, N. France; p. (1954) *312,842*.
Seychelles Is., *Brit. col.*, Indian Ocean; consisting of 92 Is., lgst. I. Mahé; cap. Victoria; exports prods. of coconut palm, phosphate, essential oils and spices; total a. 156 sq. m.; p. (estd. 1958) *41,901*.
Seyne or **La Seyne-sur-Mer,** *t.*, Var, France; nr. Toulon; shipbldg.; p. (1954) *26,672*.
Sfax, *spt.*, Tunisia; admin. ctr.; exp. phosphate, olive oil, salt, esparto grass, cereals, dates, hides; imports food, coal, textiles, soap; sponges; fishing; p. (1946) *54,637*.
Sgurr Mor, *mtn.*, Ross and Cromarty, Scot.; alt. 3,483 ft.
Shabani, *t.*, S. Rhodesia; asbestos; p. *8,000* (incl. *1,700* Europeans).
Shaftesbury, *mkt. t.*, *mun. bor.*, Dorset, Eng.; 10 m. N. of Blandford; agr. implements, chemicals, glove mftg.; p. (1951) *3,297*.
Shahabad, *t.*, Bihar, India; cement; p. (1941) *53,122*.

Shahjahanpur, *c.*, Uttar Pradesh, India; on Deoha R.; sugar; p. (1951) *104,835*.
Shahpur, *t.*, W. Punjab, Pakistan; cotton; p. *8,545*.
Shaker Heights, *t.*, Ohio, U.S.A.; p. (1950) *28,222*.
Shakhty (Alexandrovsk Grushevski), *t.*, R.S.F.S.R.; coal, engin., elec. power; p. (1959) *196,000*.
Shamokin, *bor.*, Penns., U.S.A.; iron mftg., anthracite; p. (1950) *16,879*.
Shan States, former Federated Shan States and Wa States, Burma; p. *1,617,071*.
Shandakan Tunnel, N.Y. st., U.S.A.; carries water under Catskill Mtns. to augment water supply of c. of N.Y.; length 18 m.
Shanghai, *c., pt.*, Kiangsu, China; on Whangpoo trib. of Yangtze-Kiang; most impt. of the former Chinese treaty pts., considerable exp. silk and tea; mnfs. paper, cigarettes, cotton; shipbldg., engin.; p. (estd. 1957) *7,100,000*.
Shanhaikwan, *t., pt.*, Hopei, China; on rly. from Peking to Manchuria and the Liaotung G.
Shanklin, *see* **Sandown-Shanklin.**
Shannon Airport, Clare, Ireland, *see* **Foynes.**
Shannon, *R.*, Ireland; separating Connaught from provs. of Leinster and Munster, and flowing to Atlantic at Loop Head; length 224 m.
Shansi, *inland and hilly prov.*, N. China, bounded W. and S. by the Hwang-Ho; coal, iron ore, petroleum, salt; cap. Taiyuan; a. 60,394 sq. m.; p. (1953) *14,314,485*.
Shantou, *see* **Swatow.**
Shantung, *maritime prov.*, China, on the G. of Chihli and the Yellow Sea; pts.: Cheefu, Weihaiwai and Kiaochow; fertile plain; grain, silk, fruit; coal, iron, lead, copper; cap. Tsinan; a. 56,447 sq. m.; p. (1953) *48,876,548*.
Shap, *par.*, Westmorland, Eng.; near by is Shap Summit 914 ft., an impt. pass traversed by rly. and by a main road; granite.
Shapinsay, Orkney Is., Scot.
Shari, *R.*, Sudanese Rep., W. Africa; flows from the S. to L. Chad; navigable for greater part of course; length 700 m.
Sharikhan, *t.*, Uzbek, S.S.R.; nr. Namagan; cotton.
Sharon, *plain*, Israel; citrus fruits, vineyards, poultry.
Sharon, *t.*, Penns., U.S.A.; ironwks., bricks, elec. goods; p. (1950) *26,454*.
Sharpness, *vil.*, Glos., Eng.; on S. shore, Severn estuary 18 m. N.E. of Avonmouth; entrance to Berkeley Canal.
Shasi, *c., R. pt.*, Hupeh, China; on Yangtze-Kiang; cotton cloth; p. (estd. 1931) *113,526*.
Shasta, *mtn.*, Cal., U.S.A.; 14,380 ft.
Shatt-al-Arab, *R.*, Iraq; formed by union of Tigris and Euphrates, flows thence to head of Persian G.; length 120 m.
Shatura, *t.*, R.S.F.S.R.; E. of Moscow; elec. power-plant; p. (1954) *50,000*.
Shawinigan Falls, *c.*, Quebec, Canada; pulp and paper; p. (1941) *20,325*.
Shawnee, *c.*, Okla., U.S.A.; cottons, meat-preserving; p. (1950) *22,948*.
Shcherbakov (Rybinsk), *t., R. pt.*, R.S.F.S.R.; on R. Volga; engin., textiles, hydro-elec.; p. (1959) *181,000*.
Sheaf, *R.*, W.R., Yorks, Eng.; rises in S.E. Pennines, flows N.E. to join R. Don at Sheffield; for last 2 m. narrow valley crowded with smaller factories of Sheffield; valley provides main route to S. (Chesterfield) and S.W. (Manchester via Totley); length 11 m.
Sheboygan, *c.*, Wis., U.S.A.; on L. Michigan; furniture mftg., pianos, gloves, enamelled ware; p. (1950) *3,599*.
Shechem, *see* **Nablus.**
Sheerness, *spt., urb. dist.*, Kent, Eng.; on I. of Sheppey at entrance to estuary of R. Medway; Government dockyard and garrison; p. (1951) *15,727*.
Sheffield, *c., co. bor.*, W.R. Yorks, Eng.; on cramped site at confluence of Rs. Sheaf and Don; gr. cutlery, steel, iron, brass mftg. ctr., machin., instruments, electro-plate; p. (1951) *512,834*.
Shelbyville, *t.*, Ind., U.S.A.; on Big. Blue R.; mftg. ctr. in colly. and agr. region; p. (1950) *11,734*.
Shellal (Esh Shellal), *t., R. pt.*, Upper Egypt, N.E. Africa; on right bank of R. Nile, 2 m. above Aswan Dam; S. terminus of Egyptian rly. system; river-steamer service connects with Wadi Halfa, 160 m. upstream, N. terminus of Sudan rly. system.
Shellhaven, *oil refineries*, Essex, Eng.; on N. side of Thames estuary, nr. Stanford-le-Hope.
Shelton, *t.*, Conn., U.S.A.; old vil. of Huntingdon, has 18th-century houses; p. (1950) *12,694*.
Shenandoah, *t.*, Penns., U.S.A.; anthracite; p. (1950) *15,704*.
Shenandoah, *R.*, Va., U.S.A.; trib. of Potomac R.
Shendi, *t.*, Sudan; on R. Nile; p. *14,300*.
Shensi, *prov.*, China; W. of Hwang-Ho; wheat, cotton; coal, petroleum; cap. Sian; a. 72,919 sq. m.; p. (1953) *15,881,281*.
Shenyang (Mukden), *c.*, Liaoning, Manchuria, N. China; on Hun-Ho in narrowest part of lowland linking N. China plain with plain of Manchuria; impt. rly. junction with main routes N. to Harbin and Trans-Siberian Rly., S. to Pekin, Lushun (Pt. Arthur) and into Korea; gr. comm. and political ctr.; p. (1956) *2,290,000*.
Shepherd's Bush, *residtl. sub.*, W. London, Eng.
Shepparton, *t.*, Victoria, Australia; 118 m. N.N.E. of Melbourne; p. (1957) *12,090*.
Sheppey, I. of, Kent, Eng.; in Thames estuary E. of mouth of R. Medway; 9 m. long, 5 m. wide; cereals, sheep-raising.
Shepshed, *t., urb. dist.*, Leicester, Eng.; 3 m. W. of Loughborough; gloves, boots, shoes, needles; p. (1951) *6,235*.
Shepton Mallet, *mkt. t., urb. dist.*, Somerset, Eng.; at foot of Mendip Hills, 5 m. S.E. of Wells; shoes, cider; p. (1951) *5,131*.
Sherborne, *mkt. t., urb. dist.*, Dorset, Eng.; 4 m. E. of Yeovil; famous abbey and school; gloves, silk, creameries, lt. engin.; timber yards; p. (1951) *5,987*.
Sherbrooke, *c.*, Quebec, Canada; at confluence of Rs. St. Francis and Magog; woollens, cottons, carpets, machin., sawmills; p. (1956) *58,668*.
Sherchell, *sm. spt.*, Algeria; mkt.; p. *12,650*.
Sheridan, *t.*, Wyo., U.S.A.; p. (1950) *11,500*.
Sheringham, *t., urb. dist.*, Norfolk, Eng.; on N. cst. 4 m. W. of Cromer; seaside resort; fishing; p. (1951) *4,803*.
Sherman, *t.*, Texas, U.S.A.; tr. in locally produced cotton and corn; p. (1950) *20,150*.
Sherwood Forest, *ancient royal woodland*, Notts, Eng.
Shetland Is., Scot.; in Zetland co., 50 m. N.E. of the Orkneys; about 100 in gr., ch. I., Mainland; textiles, fishing; also cattle, sheep, ponies; potatoes; ch. t. Lerwick; a. 551 sq. m.; p. (1951) *19,343*.
Sheyenne, *R.*, Dakota, U.S.A.; trib. of Red R.; length 325 m.
Shields, North, *see* **Tynemouth.**
Shields, South, *see* **South Shields.**
Shifnal, *mkt. t., rural dist.*, Shropshire, Eng.; 5 m. S.E. of Wellington; malting, coal, iron; p. (rural dist., 1951) *13,534*.
Shigatze, *t.*, Tibet; on R. Tsangpo; tr. ctr. on main caravan routes; p. *9,000*.
Shikarpur, *t.*, Bombay, India; tr. ctr., gems and silk; p. over *62,000*.
Shikoku, *one of the lge. Is.* Japan; S. of Honshu; rice, fruit, sugar-cane; copper; a. 7,248 sq. m.
Shildon, *t., urb. dist.*, Durham, Eng.; 3 m. S. of Bishop Auckland; rly. wks.; p. (1951) *14,513*.
Shilka, *R.*, E. Siberia; R.S.F.S.R.; trib. of R. Amur; length 760 m.
Shillong, *cap.*, Assam, India; at alt. 4,500 ft. in Khasi Hills; ctr. of impt. tea-growing dist.; p. *25,000*.
Shimbara, *t.*, Japan; holiday resort; p. (1947) *38,510*.
Shimisu, *spt.*, Japan; tea ctr.; oranges, paper, tinned fruit and fish; p. (1947) *68,892*.
Shimoda, *spt.*, Honshu, Japan; between Nagoya and Yokohama; p. *10,000*.
Shimonoseki, *spt.*, Honshu I., Japan; at extreme S.W. of I.; steamer connections to Moji (Kyushu I.); p. (1950) *193,572*.
Shin, *Loch*, Sutherland, Scot.; 16½ m. long; drained by R. Shin to the R. Oykell.
Shipka Pass, Bulgaria; over the Balkan Mtns. 47 m. N.E. of Plovdiv.
Shipley, *t., urb. dist.*, W.R. Yorks, Eng.; on R. Aire, 8 m. N.W. of Leeds; worsted mnfs.; p. (1951) *32,585*.
Shipston-on-Stour, *mkt. t.*, Warwick, Eng.; in Cotswold Hills, 4 m. E. of Chipping Camden; rope, farming; p. *1,365*.
Shiraz, *c., cap.*, Fars, Persia; beautifully sited in

vine-growing dist.; mosaics, carpets, silk; p. (1956) *169,088*.
Shire, *R.*, flows from L. Nyasa to R. Zambesi; on it are the famous Murchison Falls, up to which the R. is navigable; length 380 m.
Shirwa or Chilwah, *shallow L.*, nr. Nyasa, Africa; 40 m. long, 14 m. wide; has 4 Is.
Shiuchow (Kukang), *t.*, Kwangtung, China; tobacco, groundnuts; head of navigation of R. Pei; p. (estd. 1935) *207,610*.
Shiuhing, *t.*, Kwangtung, China; W. of Canton; marble; oranges.
Shizuoka, *spt.*, Honshu, Japan; tea refining, blending, packing; oranges, fruit tinning; woodwork; textiles; p. (1950) *238,629*.
Shkodra (Scutari), *L.*, 29 m. long; on borders of Montenegro and Albania; outlet via R. Bojana into Adriatic.
Shkodra (Scutari), *t.*, Albania; stands at foot of S. L. (ancient cap. Illyria); cas. cath.; tobacco ind.; p. (estd. 1950) *29,500*.
Shoa, *st.*, Ethiopia; S.E. Amhara.
Shoalhaven, *R.*, N.S.W., Australia; length 260 m.
Shoeburyness, *t.*, Essex, Eng.; on N. side of Thames estuary, 3 m. E. of Southend; barracks, gunnery school, bricks.
Sholapur, *c.*, Bombay, India; between Hyderabad and Poona; lge. bazaar, temples, etc., silk, cotton cloth; p. (1951) *266,050*.
Shoreditch, *metropolitan bor.*, E. London, Eng.; industl., mainly cabinet mkg.; p. (1951) *44,885*.
Shoreham-by-Sea, *t.*, *urb. dist.*, W. Sussex, Eng.; at mouth of R. Adur, 4 m. E. of Worthing; old spt. and mkt. t.; boat bldg., chemicals, soap, preserves; p. (1951) *13,052*.
Shoshone Falls, on Snake R., Idaho, U.S.A.; height 200 ft.
Shott esh Shergui, lgst. saline L., Algeria.
Shotts, *plateau*, N. Africa; upland region with salt Ls., within Atlas mtns.
Shreveport, *c.*, La., U.S.A.; industl. ctr. in cotton-growing dist.; petroleum; p. (1950) *127,206*.
Shrewsbury, *co. t.*, *mun. bor.*, Salop, Eng.; on R. Severn 12 m. above Ironbridge gorge between The Wrekin and Wenlock Edge; agr. and dairy equipment, machin., elec. goods; impt. cattle and sheep mkt.; famous public school; fine churches, Shire Hall, Guildhall, etc.; p. (1951) *44,926*.
Shropshire (Salop), *N.W. midland co.*, Eng.; bordering on Wales; fine pastoral country with hills and woodland, agr. and dairying; iron; mnfs.; cap. Shrewsbury; a. 1,347 sq. m.; p. (1951) *289,844*.
Shufu, *see* **Kashgar**.
Shumen (Kolarovgrad) *t.* Bulgaria; S.E. of Ruse; cloth; occupied by Russians, 1878; p. (1956) *41,670*.
Shumerlya, *t.*, Chuvash, R.S.F.S.R.; cellulose, paper, woodworking; p. *10,000*.
Shurma, *t.*, Hejaz, Saudi Arabia; S. of Medina.
Shusha, *t.*, Azerbaydzhan S.S.R.; silk-weaving, leather; p. massacred by Moslems 1926.
Shustar, *t.*, Persia; carpets, woollens, pottery, etc.; shallow-draught boats can reach Shallili, nr. S. by R. Karun; p. *20,000*.
Shuya, *t.*, R.S.F.S.R.; engin., textiles; p. (1959) *64,000*.
Shwebo, *t.*, Central Burma; on R. Irrawaddy; p. *11,286*.
Si Kiang, *ch. R.*, S. China; headstreams rise in Yunnan plateau, form main R. nr. Sunchow; R. then flows E., enters S. China Sea through lge. delta nr. Hong Kong; lower valley intensively cultivated, rice, sugar-cane, tea; tropical climate permits continuous cultivation of most crops throughout year; valley very densely populated.
Sialkot, *t.*, Lahore, W. Punjab, Pakistan; N.E. of Lahore; sports goods, musical and surgical instruments, paper; p. (1951) *167,543*.
Siam (Thailand), *kingdom*, S.E. Asia; much jungle; hot, abundant summer rainfall; ch. prod. rice, also rubber, teak-wood, tin, cotton, tobacco, iron ore, chemicals; cap. Bangkok; a. 200,148 sq. m.; p. (1956) *22,811,701*.
Siam, G. of, *lge. inlet*, S. China Sea; 385 m. from N.W. to S.E.
Sian (Changan), *c.*, *cap.*, Shensi, China; mkt.; oil and sawmills; p. (estd. 1957) *1,500,000*.
Šibenik, *t.*, Jugoslavia; naval base; fishing, weaving, woollens, chemicals; bauxite; p. *37,271*.
Siberia, *terr.*, U.S.S.R.; from the Ural Mtns. to Sea of Okhotsk and Bering Strait, bounded by the Arctic on the N., and on the S. by Mongolia and Turkestan; climate mostly severe; ch. ts. Novosibirsk (cap. W.S.) and Irkutsk (cap. E.S.); rich in coal, iron, minerals; resources not yet fully known; a. 4,210,420 sq. m.; p. (1939) *21,891,469*.
Siberut, *I.*, S. of Sumatra, Indonesia.
Sibi, *t.*, Baluchistan, Pakistan; lignite; p. *9,532*.
Sibiu, *t.*, Central Romania; linen, leather, brewing; p. (1945) *63,738*.
Sibu, *t.*, Sarawak; Brit. Borneo, E. Indies; 80 m. up R. Rejang; p. *5,000*.
Sicily, *the lgst. I.*, Mediterranean Sea; former kingdom and now a region of Italy; produces corn, oranges, olives, silk, almonds, sardines, sulphur and salt; oil in dist. of Ragusa, Gela Fontanarossa; pleasant climate; mountainous, highest point the volcano Mt. Etna; ch. ts. Palermo, Catania, Messina; a. 9,926 sq. m.; p. (1951) *4,462,220*.
Sicuani, *t.*, S. Peru, S. America; alt. 11,650 ft.; agr. and pastoral dist. ctr.; p. *15,000*.
Sidamo, *see* **Galla and Sidamo**.
Sidcup, *see* **Chislehurst and Sidcup**.
Sidi-bel-Abbès, *t.*, W. Algeria; wheat, barley, tobacco, olives, vines; cattle, wool; footwear, bricks, furniture, cheese, macaroni; p. (1948) *61,355*.
Sidlaw Hills, *low mtn. range*, Angus, Perth, Scot.
Sidmouth, *mkt. t.*, *urb. dist.*, Devon, Eng.; on S. cst., 15 m. S.E. of Exeter; seaside resort; Honiton lace, gloves; p. (1951) *10,403*.
Sidon, *cst. t.*, Lebanon; on Mediterranean, N. of Beirut; terminal of oil pipe-line from Saudi Arabia; refinery; p. *17,695*.
Siedlce, *t.*, Poland; E. of Warsaw; p. *25,562*.
Siegburg, *t.*, N. Rhine-Westphalia, Germany; on R. Sieg; Benedictine abbey; dyes, iron, ceramics; p. (estd. 1954) *27,600*.
Siegen, *t.*, N. Rhine-Westphalia, Germany; on R. Sieg; 2 cas.; iron-mining and smelting, machin., leather; p. (estd. 1954) *40,900*.
Siemianowice Siaskie, *t.*, Poland; nr. Katowice; p. *18,438*.
Siena, *hill-town*, Tuscany, Italy; 32 m. S. of Florence; spreads over three hilltops with Piazza del Campo in between where celebrated Palio festival (horse-races) are held; 13th- and 14th-cent. arch., cath.; agr. mkt., tanning, glass, textiles, bricks; *panforte* confectionery; tourist ctr.; p. (1951) *52,226*.
Sieradz, *t.*, Poland; on R. Warta; p. *32,449*.
Siero, *t.*, Oviedo, Spain; on R. Nora; agr., livestock-raising, coal-mining; p. *30,931*.
Sierra da Estrella, *see* **Estrella, Sierra da**.
Sierra de Baudo, *mtn. range*, Columbia, S. America.
Sierra de Gata, *mtn. range*, Portugal-Spain.
Sierra de Gredos, *mtn. range*, Central Spain.
Sierra de Guadarrama, *mtn. range*, Central Spain.
Sierra Leone, *Brit. col. and prot.*, W. Africa, situated between Guinea and Liberia; covered with ranges of hills; ch. prod., palm kernels, ginger, piassava, kolas; iron ore, diamonds, chromite, gold; cap. Freetown; a. 27,925 sq. m.; p. (1956) *2,100,000*.
Sierra Madre, *mtn. range*, W. cst., Mexico and Guatemala.
Sierra Mojada, *mtn. range*, Central Mexico.
Sierra Morena, *mtn. range*, Spain; between Guadalquivir and Guadiana basins, highest point 5,500 ft.
Sierra Nevada, *mtn. range*, Granada, Spain; highest summit, Mulhacen.
Sierra Nevada, *mtn. chain*, Cal., U.S.A.; highest peak Mt. Whitney, alt. 14,898 ft.
Sierra Nevada de Mérida, *mtn. range*, W. Venezuela; S. America; extends N.E. from San Cristóbal to Barquisimeto; extension of E. range of Andes, alt. over 16,000 ft.; impt. coffee plantations from 3,000 to 6,000 ft. on slopes.
Sierra Nevada de Santa Marta, *mtns.*, Colombia, S. America; summits over 19,000 ft.
Sighet, *t.*, N. Romania on U.S.S.R. frontier; p. (1945) *18,329*.
Siglufjörd, *spt.* N. Iceland; herrings; p. (1947) *2,972*.
Siguiri, *t.*, Guinea, W. Africa; on R. Niger; gold; p. *11,000*.
Siirt, *t.*, Turkey; S. of Bitlis; p. *16.,210*
Sikang, *former prov.*, China; included in Szechwan prov. 1955.
Sikasso, *t.*, Sudan, W. Africa; mkt., route ctr.; p. *13,000*.
Sikkim, *st.*, E. Himalayas, adjoining Tibet, Nepal

and Bhutan; dense forests, with rich flora and orchidaceæ, but grows rice and Indian corn in the clearings; ch. tr. routes from Bengal to Tibet pass through the st.; cap. Gangtok; a. 2,745 sq. m.; p. (1951) *137,725*.

Sila, La, *mtn. massif*, Calabria, S. Italy; granite mass occupying full width of peninsula; alt. over 3,500 ft., max. 6,327 ft.

Silchester, *par.*, Hants, Eng.; between Basingstoke and Reading; impt. ctr. of the Roman road system; many Roman remains.

Silesia (Polish **Śląsk**, Czech **Slezsko**), *geographical region*, Europe; extends on both sides of Oder R.; rich in coal, zinc, iron, arsenic; farming, sugar-beet, cereals, fruit, general ind.; has frequently changed hands, in 1919 was divided between Germany (70%), Poland (25%), and Czechoslovakia (5%); in 1945 the former German part became Polish, now forms 2 provs., caps. Katowice and Wroclaw; p. *4,764,500*; the Czechoslovakian part is united with Moravia; p. *200,000*.

Silistra, *t.*, Bulgaria; on N.E. Romanian border, on Danube R.; cloth, distilleries, sawmills, grapes; p. *16,180*.

Silkeborg, *t.*, Jutland, Denmark; W. of Aarhus; p. *20,955*.

Silloth, *resort*, on Solway Firth, Cumberland, Eng.; coal, grain.

Silsden, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Aire, 4 m. N.W. of Bingley; p. (1951) *5,820*.

Silva Porta, *t.*, Angola, Africa; admin. t.; cattle, agr. ctr.; p. *4,671*.

Silver City, *t.*, N.M., U.S.A.; gold, iron, silver; cattle; health resort; p. (1950) *7,022*.

Silver Spring, *t.*, Md., U.S.A.; sub. to Wash.; p. *43,294*.

Simalur, *I.*, S. of Sumatra, Indonesia.

Simcoe, *L.*, N. of L. Ontario, Canada; 30 m. by 18 m.

Simeto, *R.*, Sicily, Italy; rises in central Sicily, flows E. across plain of Catania into Mediterranean; lower course bordered by malarial marshes; length 54 m.

Simferopol, *t.*, Ukrainian S.S.R.; on R. Salghir nr. Sevastopol; soap, candles, fruits, engin.; p. (1959) *189,000*.

Simla, *cap.*, E. Punjab, Indian Union; alt. 7,075 ft. above sea, with sanatorium; p. (1941) *18,348*.

Simonstown, C. of Gd. Hope, S. Africa; naval sta., docks; p. *7,310*.

Simplon, *mtn.*, Switzerland; alt. 11,695 ft.; the pass over the Simplon (alt. 6,594 ft.) from Domodossola, Italy, to Brig in the Rhône valley, Switzerland, was originally made by Napoleon I. The Simplon rly. tunnel leads from Brig on the Swiss side to Iselle in the Val di Vedro on the Italian and is the longest in the world, 12¼ m.

Sinai, *peninsula*, between Gs. of Aqaba and Suez, at head of Red Sea; a. 11,055 sq. m., mainly desert; Mt. Sinai (the Arab Jebel Musa, or "Mt. of Moses") called also Horeb, is one of numerous mtns. on the peninsula; alt. 7,363 ft.

Sinaloa, *st.*, Mexico; on G. of Cal.; agr. and mining, rich in gold, silver, copper, iron and lead; cap. Culiacán; a. 22,580 sq. m.; p. (1950) *621,940*.

Sind, *st.*, Pakistan; formerly part of the Mogul Empire; admin. H.Q. at Karachi, spt. for the Indus valley; mostly desert, only one-tenth irrigated; prod., cereals, hemp, cotton, indigo; a. 50,443 sq. m.; p. (1951) *4,619,000*.

Sindara, *t.*, Fr. Equat. Africa; admin. ctr.

Sines, *spt.*, S. Portugal; birthplace of Vasco da Gama; p. *6,094*.

Singapore, *I.*, *Brit. Crown col.*, intern. self-governing st. (1959); at S. extremity of Malay Peninsula; includes Christmas I. and Cocos Is.; naval, military and air-force base; rubber, fruits, coffee; a 291 sq. m.; p. (1959) *1,550,000*.

Singareni, *t.*, Hyderabad, India; coal.

Singen, *t.*, Baden–Württemberg, Germany; N.W. of L. Constance; foodstuffs, metals; p. (estd. 1954) *23,400*.

Singhbhum, *dist.*, Bihar, India; iron- and steel-wks.

Singora, *see* **Songkhala**.

Sinkiang-Uighur, *aut. region*, China, bordering on Soviet Union and Kashmir; cereals, cotton, wool, silk; cap. Tihwa; a. 705,962 sq. m.; p. (1953) *4,873,608*.

Sinneh, *t.*, Persia; carpets; p. *32,000*.

Sinop, *Turkish t.*, on Black Sea in *I.* of same name; timber, silk; p. *4,896*.

Sintra (**Cintra**), *t.*, Portugal; summer resort, 18 m. from Lisbon; convention of S., 1808.

Sion, *cap.*, Valais, Switzerland; on R. Rhône; built on two castled hills; cath.; p. *9,363*.

Sioux City, Iowa, U.S.A.; on R. Missouri; meat-packing, foundries, elec. goods, cement; p. (1950) *83,991*.

Sioux Falls, *t.*, S.D., U.S.A.; on Big. Sioux R.; in rich wheat region; machin., cars, farming implements; p. (1950) *52,696*.

Sirajganj, *t.*, Bengal, Pakistan; gr. jute-mart; p. *5,000*.

Sir Edward Pellew, *gr. of Is.*, N. Australia; in G. of Carpentaria.

Siret R., *see* **Sereth R.**

Sirmur, *former Punjab St.*, India; merged into the Indian Union; ch. t. S. (or Nahan).

Sitapur, *t.*, Uttar Pradesh, India; p. *30,381*.

Sitka (formerly **Novo Archangelsk**), *t.*, S.E. Alaska, U.S.A.; on Baranof I., in Sitka Sound; was ch. pt. of former Russian America; gold-mines; lumbering, canning; naval and coaling sta.; p. (1950) *2,080*.

Sitra, *I.*, Persia G.; forming part of st. of Bahrain, Arabia, 3 m. long and 1 m. wide; from here an oil pipeline and a causeway carrying a road extends out to sea for 3 m. to a deep-water anchorage.

Sittang, *R.*, Burma; rises in Pegu Yoma, flows S., enters G. of Martaban, Andaman Sea through delta; valley intensively cultivated, rice; delta forested; length 610 m.

Sittingbourne and Milton, *mkt. t.*, *urb. dist.*, Kent, Eng.; on Milton Creek, 9 m. E. of Chatham; paper-mills, brick-wks.; cement; ctr. of fruit-growing dist.; p. (1951) *21,904*.

Sivas, *Turkish I.*, rich in minerals, has mineral springs with fertile grain-growing soil, fine orchards and vineyards, besides timber forests; cap. Sivas; p. (1945) *494,373*.

Sivas, *t.*, Turkey; in the Kizil Irmak valley; mnfs. woollens; p. (1945) *45,419*, three fourths Moslems.

Sivash or **Putrid Sea**, lagoon on E. side of Crimea, U.S.S.R.

Siwa, *oasis*, Egypt; in Libyan Desert, 300 m. S.W. of Alexandria; dates, olives, remains of temple of Ammon and the fountain of the Sun; 20 m. long, 1 m. wide; p. *1,000*.

Sjæiland I., Denmark; lgst. I.; agr., fishing, mnfs.; ch. t. Copenhagen; a. 2,840 sq. m.

Skagen, *t.*, N. Denmark; on cst. of the Skagerrak; fishing; p. *6,446*.

Skagerrak, arm of N. Sea, giving access to the Kattegat, between Norway and Denmark, 70–90 m. wide.

Skågway, *sm. spt.*, Alaska, U.S.A.; at head of Lynn Canal inlet, 400 m. N.W. of Prince Rupert; linked by rly. to Whitehorse on Upper R. Yukon; boomed in gold rush (in 1898, p. *15,000*), subsequently declined; p. (1940) *634*.

Skanderborg, *t.*, Jutland, Denmark; S.W. of Aarhus; p. *4,171*.

Skåne (**Scania**), *peninsula*, extreme S. of Sweden; corresponds approx. to cos. Malmöhus, Kristianstad; most favoured part of Sweden in relief, soil, climate; intensive farming, wheat, barley, sugar-beet, fodder crops, dairy cattle; ch. ts. Malmo, Lund, Trelleborg; a. approx. 4,000 sq. m.

Skaraborg, *co.*, Sweden; a. 3,269 sq. m.; p. (1950) *248,397*.

Skaw, The (**Grenen**), *C.*, at extreme N. of Denmark.

Skeena, *R.*, B.C., Canada; rises in N. Rocky Mtns., flows S.W. to Pac. Oc. at Prince Rupert; lower valley used by Canadian National Rly. from Edmonton (Alberta) to Prince Rupert via Yellowhead Pass; length approx. 400 m.

Skegness, *t.*, *urb. dist.*, Lindsey, Lincoln, Eng.; on E. cst. at entrance to The Wash; farming, vegetables; resort; p. (1951) *12,554*.

Skelmersdale, *t.*, *urb. dist.*, Lancs, Eng.; coal, bricks, drainpipes; p. (1951) *6,211*.

Skelton and Brotton, *t.*, *urb. dist.*, N.R. Yorks, Eng.; at N. foot of Cleveland Hills, 10 m. E. of Middlesbrough (1951) *12,999*.

Skerries, *spt.*, Dublin, Ireland; fishing; muslin, stones; p. (1951) *2,457*.

Skibbereen, *mkt.*, *spt.*, *urb. dist.*, Cork, Ireland; farming; p. (1951) *2,341*.

Skiddaw, *mtn.*, Cumberland, Eng.; E. of Bassenthwaite L.; alt. 3,054 ft.
Skien, *spt.*, Bratsberg, Norway; on R. Skien; saw-mills, ice, and timber tr.; p. (1946) *14,474*.
Skierniewice, *t.*, Poland; S.W. of Warsaw; p. *17,666*.
Skipton, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Aire, 6 m. N.W. of Keighley; cotton and rayon; p. (1951) *13,210*.
Skive, *t.*, N. Jutland, Denmark; fishing; rly. ctr.; p. *12,360*.
Skopin, *t.*, R.S.F.S.R.; S.E. of Moscow; lignite, engin.; p. *16,740*.
Skopje, *t.*, *cap.*, Macedonia, Jugoslavia; chrome-mines in neighbourhood; the ancient Scopi; asbestos, chemicals; p. (1953) *121,551*.
Skowhegan, *t.*, Me., U.S.A.; p. (1950) *6,183*.
Skye, *I.*, lgst. of the Inner Hebrides, Inverness, Scot.; mountainous; sheep-farming and fisheries; only town, Portree; a. 547 sq. m.
Skyros, *I.*, Grecian Archipelago, E. of Evvoia (Euboea).
Slagelse, *old t.*, Sjaelland (Zealand), Denmark; p. *18,073*.
Slaithwaite, *mkt. t.*, W.R. Yorks, Eng.; S.W. of Huddersfield.
Slamannan, *par.*, Stirling, Scot.; coal, iron; p. *3,001*.
Slanic, *t.*, Wallachia, Romania; on S. flank of Carpathian Mtns., 22 m. N. of Ploesti; impt. salt deposits.
Śląsk, *see* **Silesia**.
Slatina, *t.*, Romania; on R. Olt, 87 m. W. of Bucharest; ancient churches; p. *13,136*.
Slave, *R.*, N.W. Terr., Canada; flows into Gr. Slave L.
Slave Coast, portions of Guinea cst., W. Africa, embracing Dahomey and Nigeria.
Slavonia, former Crown land (with Croatia) of Hungary; now Jugoslavia; a. 8,987 sq. m.; cap. Osijek; p. *2,625,000*.
Slavyansk, *t.*, Ukrainian S.S.R.; coal, chemicals, salt, engin.; p. (1959) *83,000*.
Sleaford, *mkt. t.*, *urb. dist.*, Kesteven, Lincoln, Eng.; 12 m. N.E. of Grantham; agr. and agr. implements, malting, seeds; p. (1951) *7,282*.
Sleepers, The, *gr. of Is.*, Hudson Bay, Canada.
Slezsko, *see* **Silesia**.
Slieve Bloom, *hill range*, Offaly and Laoghis cos., Ireland; highest point 1,733 ft.
Slieve Donard, *mtn.*, N. Ireland; highest of the Mourne Mtns., co. Down; alt. 2,796 ft.
Sligo, *cst. co.*, Connacht, Ireland; pasture, tillage, barren mtn., and turf; livestock, fishing; a. 737 sq. m.; p. (1956) *56,828*.
Sligo, *t.*, Sligo, Ireland; on Sligo Bay; distilling, flour, fisheries; p. (1946) *12,906*.
Slioch, *mtn.*, Ross and Cromarty, Scot.; 3,217 ft.
Sliven, *t.*, E. Roumelia, Bulgaria; famous for black wine; p. (1956) *46,383*.
Slough, *t.*, *mun. bor.*, Bucks, Eng.; on river terrace N. of R. Thames, 23 m. W. of London; many light inds.; p. (1951) *66,439*.
Slovakia, *old prov.*, Czechoslovakia; consists largely of Carpathian Mtns.; ch. t. Košice; a. 18,902 sq. m.; p. (1947) *3,402,300*.
Slovenia, *fed. unit*, Jugoslavia; cap. Ljubljana (Laibach); a. 6,266 sq. m.; p. (1947) *1,389,064*.
Slupsk (Stolp), *t.*, Pomerania, Poland; German before 1945; cas.; machin., agr. implements; p. (1946) *33,948*.
Småland, *dist.*, S. Sweden; barren upland area S. of L. Vättern; moorland, deciduous forest; contrasts greatly with remainder of S. Sweden.
Smederevo, *t.*, Jugoslavia; nr. Belgrade; p. *15,455*.
Smethwick, *co. bor.*, Staffs, Eng.; N.W. sub. of Birmingham; machin., engin., iron, glass; p. (1951) *76,397*.
Smichov, *t.*, Czechoslovakia; on R. Vltava; connected by bridge with Prague; mnfs.; p. *54,370*.
Smith Sound, Arctic Canada; connects Kane Bay with Baffin Bay.
Smith's Falls, *t.*, Ont., Canada; rly. ctr.; p. *7,159*.
Smoky Hill, *R.*, Col., Kan., U.S.A.; trib. of Kansas R.; length 400 m.
Smolensk, *c.*, R.S.F.S.R.; on both banks of the R. Dnieper; tallow, linen, iron and copper smelting, engin.; p. (1959) *146,000*.
Smyrna, *see* **Izmir**.
Snaefell, *highest mtn.*, I. of Man; alt. 2,034 ft.
Snake R. or **Lewis Fork**, trib. of Columbia R., flows from Wyo. to Wash., U.S.A.; length 1,050 m.
Sneek, *t.*, Friesland, Neth.; nr. Leeuwarden; mnfs.; p. *16,820*.
Sneeuwbergen, *mtn. range*, C. of Gd. Hope S. Africa.
Sniatyn, *t.*, Ukrainian S.S.R.; on R. Prut; tanning, horses and cattle fairs; p. *12,120*.
Snizort, Loch, *arm of sea* (14 m. long), N. of I. of Skye, Scot.
Snohetten, *mtn.*, highest in Dovrefjeld range, Norway; alt. 7,565 ft.
Snowdon, *mtn.*, nr. Caernarvon, Wales; (highest in Eng. and Wales); alt. 3,571 ft.
Snowy, *R.*, N.S.W. and Victoria, Australia; rises in Mt. Kosciusko, flows S. into Bass Strait 80 m. W. of C. Howe; water carried through tunnel under Australian Alps to help irrigation in Murray valley; length 220 m.
Soar, *R.*, Leicester, Nottingham, Eng.; rises in uplands of S. Leics, flows N.W. through Leicester, Loughborough, into R. Trent nr. Long Eaton; hosiery and knitwear inds. in lower valley; 43 m. long.
Sobat, *R.*, Sudan, N.E. Africa; rises in S.W. of Abyssinian Highlands, flows N.W. into R. Nile 80 m. below L. No; one of ch. sources of Nile flood-water; Abyssinia receives monsoon rains April to Oct., max. discharge into White Nile, Nov. and Dec.; length over 500 m.
Soche, *see* **Yarkand**.
Society Is., *archipelago*, S. Pac. Oc.; between the Tuamotu Archipelago and Friendly Is., under Fr. protection; ch. I. Tahiti; ch. prod. phosphate and copper; cap. Papeete; p. *37,303*.
Socotra, *Brit. I.*, G. of Aden, Indian Ocean; S. of Arabia and E. of C. Guardafui; gums, dates, fishing, stock-raising; a. 1,382 sq. m.; p. *12,000*.
Sodbury, *rural dist.*, Glos, Eng.; aircraft, bricks, quarrying, coal-mining; p. (estd. 1956) *38,080*.
Söderala, *spt.*, Sweden; nr. Söderhamn; p. *12,299*.
Söderhamn, *spt.*, Sweden; on G. of Bothnia, N. of Gavle; timber, wood-pulp, iron; p. *11,634*.
Södermanland, *co.*, Sweden; S.W. of Stockholm; a. 2,634 sq. m.; p. (1950) *214,056*.
Södertälje, *t.*, Sweden; on L. Malar; engin., matches; resort; p. (1951) *25,266*.
Soerabaya or **Surabaya**, *spt.*, Java, Indonesia; dockyards and arsenal; exp. coffee, rice, cotton, sugar, tapioca; p. over *300,000*.
Soerakarta, or **Solo**, *t.*, Java, Indonesia; p. over *100,000*.
Soest, *c.*, N. Rhine–Westphalia, Germany; cath.; iron ind.; p. (estd. 1954) *30,600*.
Sofala and Manica, *prov.*, Mozambique; N. of Inhambane; by some identified with the "Land of Ophir" of the Bible; cap. Beira.
Sofia, *t.*, *cap.*, Bulgaria; the ancient Sardica, and the Triaditza of the Byzantine Greeks; on Golem Isker R.; univ.; sugar, beer, flour, leather, silk, tobacco, maize, linen, engin., chemicals; p. (1956) *725,756*.
Sogn og Fjordane, *co.*, Norway; a. 7,135 sq. m.; p. (1950) *97,680*.
Sogne Fjord, longest in Norway.
Sohâg, *t.*, Egypt; on R. Nile; p. (1947) *43,234*.
Soignies, *t.*, Belgium; on R. Senne; granite, flax; p. *10,309*.
Soissons, *t.*, Aisne, France; iron, copper, farm implements, glass, sugar; p. (1954) *20,484*.
Söke, *t.*, Turkey; liquorice, fruits, cereals, livestock; emery, lead; p. *11,887*.
Sokol, *t.*, R.S.F.S.R.; on R. Sukhona; paper; p. *10,000*.
Sokoto, *native st.*, Central Sudan, Africa; between Bornu and Ganda; now included in Nigeria; cotton-growing, dates, bananas; cattle-rearing.
Sol Iletsk, *t.*, R.S.F.S.R.; near Kazakhstan border; potash; p. *10,000*.
Soleftea, *t.*, Vasternorrland, Sweden; on G. of Bothnia; p. *7,607*.
Solent, The, *strait* separating the I. of Wight from the mainland; extends from Hurst Castle to Calshot.
Soleure (**Solothurn**), *can.*, N. Switzerland; arable, pastoral, and afforested; a. 306 sq. m.; p. *162,600*.
Solihull, *mun. bor.*, Warwick, Eng.; 5 m. S.W. of Birmingham; motor wks., drawing office equipment, stellite alloys mftg.; p. (1951) *67,977*.
Solikamsk, *t.*, R.S.F.S.R.; on R. Kama; potash and magnesium salts; chemicals, p. *10,000*.

Solingen, *t.*, N. Rhine–Westphalia, Germany; 15 m. E. of Düsseldorf; cutlery ctr.; p. (estd. 1954) *157,900.*

Sóller, *t.*, Majorca, Spain; p. *10,586.*

Solomon Is., *Brit. prot.*, S. Pac.; inc. all Is. in 900-m. archipelago, S. and S.E. of large I. of Bougainville; copra, trochus shell, timber; a. 11,500 sq. m.; p. (estd. 1958) *113,350.*

Solor I., Lesser Sunda Is., Indonesia; a. 114 sq. m.

Solothurn, *can.*, N.W. Switzerland; crossed by Jura mtns. and R. Aar; agr., pastoral, industl.; a. 306 sq. m.; p. (1950) *170,508.*

Solothurn (**Soleure**), *t.*, *cap.*, can. Solothurn, Switzerland; on R. Aar; watches, jewellery, cottons, motor production; p. (1941) *15,414.*

Sölvesborg, *spt.*, Sweden; ice-breakers necessary in winter; tanneries; p. *4,246.*

Solway Firth, *arm* of Irish Sea, between Dumfries, Kirkcudbright, Scot., and Cumberland; length 40 m.

Somalia, *ind. st.* (1 July 1960), N.E. Africa, formerly under Italian trusteeship; consists of torrid coastal strip extending S. along Indian Ocean to bdy. of Kenya, and up to 300 m. inland; mainly elevated and undulating scrubland; hot, dry climate; cattle; maize, food-crops; cap. Mogadishu; a. (approx.) 220,000 sq. m.; p. (estd. 1959) *1,270,000.*

Somaliland, *region*, N.E. Africa; "the Eastern Horn of Africa," from the Strait of Bab-el-Mandeb S. to the Equator.

Somaliland, British, *prot.*, N.E. Africa; extends along G. of Aden, and up to 150 m. inland; comprised mainly of plateau, alt. 7,000 –9,000 ft.; hot, dry climate (tempered inland by alt.); ch. prod., hides, ostrich feathers; cap. Berbera; a. 68,000 sq. m.; p. (1952) *640,000* Somali.

Somaliland, French, *col.*, N.E. Africa; extends inland for approx. 90 m. from straits of Bab-el-Mandeb; comprised of plain, mainly below 600 ft. alt.; hot, dry climate; ch. prod., coffee, hides, salt; cap. Jibuti (linked by rly. to Addis Ababa); a. 9,071 sq. m.; p. (1957) *63,700.*

Sombor, *t.*, Serbia, Jugoslavia; p. (1953) *26,637.*

Sombrero I., Brit. Leeward Is., T.W.I.; phosphate of lime; Board of Trade lighthouse.

Somerset, *S.W. co.*, Eng.; bounded inland by Glos, Devon, Wilts and Dorset; pasture, arable, orchard and woodland, with mines, quarries and mnfs.; impt. fisheries; co. t. Taunton; a. 1,620 sq. m.; p. (1951) *551,188.*

Somerset East, *t.*, C. of Gd. Hope, S. Africa; sheep, dairying, citrus fruits, angora hair; p. *7,419.*

Somerset West, *t.*, C. of Gd. Hope, S. Africa; wine, fruit, veg.; explosives; p. *5,011.*

Somersworth, *t.*, N.H., U.S.A.; on Salmon Falls R.; mnfs.; p. (1950) *6,927.*

Somerton, *par.*, Somerset, Eng.; milk processing; p. *1,776.*

Somerville, *c.*, Mass., U.S.A.; sub. of Boston; varied mnfs.; p. (1950) *102,351.*

Somme, *dep.*, N. France; mainly agr. with thriving textile inds.; cap. Amiens; a. 2,443 sq. m.; p. (1954) *464,153.*

Somme, *R.*, France; flows in deps. Aisne and Somme to English Channel; length 116 m.

Sommen, *L.*, Sweden (25 m. by 8 m.) 15 m. E. of L. Vättern.

Somport Tunnel, on bdy. France–Spain; carries main rly. from Pau to Zaragoza under Central Pyrenees; length 5 m.

Sönderborg, *spt.*, S. Jutland, Denmark; resort; cas. (military barracks); p. *14,125.*

Sondrio, *prov.*, Lombardy, Italy; silk; a. 1,233 sq. m.; cap. Sondrio; p. (1951) *153,376.*

Songea, *t.*, Tanganyika, Brit. E. Africa; admin. ctr.; wheat, coffee, tobacco.

Songkhala, *spt.*, S. Siam; exp. tin; p. *10,000.*

Song Koi (**Red R.**), *R.*, rises in Yunnan plateau, S.W. China, flows S.E. through Tongking, Fr. Indo-China, enters G. of Tongking, S. China Sea of Haiphong; lower valley densely populated and intensively cultivated; length approx. 800 m.

Sonneberg, *t.*, Thuringia, Germany; toys; p. (estd. 1954) *22,100.*

Sonora, *st.*, Mexico; on G. of Cal.; silver-mines, stock-raising, grain, cotton, sugar, fruit, tobacco growing; cap. Hermosillo; a. 70,477 sq. m.; p. (1950) *507,429.*

"**Soo**" **Canals**, *see* **Saulte Ste. Marie Canals.**

Soochow (**Wu-hsien**), *c.*, Kiangsu, China; nr. Shanghai; former treaty pt.; silk, weaving and exp.; cotton, rice; p. (estd. 1936) *389,797.*

Sopot, *spa, seaside resort*, Poland; on W. shore of Gdańsk B.; p. *26,917.*

Sopron, *t.*, N.W. Hungary; on R. Hunte; impt. horse fair; p. *42,255.*

Sorata, *t.*, Bolivia; 57 m. W. La Paz; nr. Andes peak of Ancohuma (Illampú); p. *2,000.*

Sorau, *see* **Zary.**

Sorel, *t.*, Quebec, Canada; sawmills, foundries, engin.; p. *12,251.*

Soria, *prov.*, Old Castile, Spain; agr. and cattle-rearing, with cheese, timber, wool and salt exp.; cap. Soria; a. 2,977 sq. m.; p. (1950) *161,182.*

Soria, *t.*, *cap.*, Soria, Spain; on R. Douro; p. (1949) *17,066.*

Soriano, *dep.*, Uruguay; a. 3,561 sq. m.; cap. Mercedes; p. (1953) *99,927.*

Sormova, *t.*, Byelorussian S.S.R.; machin., diesel motors, boilers, linen.

Soro, *t.*, Zealand, Denmark; p. *3,191.*

Sorocaba, *t.*, Brazil; rly. wks.; textiles, cement, footwear, wines; p. *48,594.*

Soroki, *t.*, Moldavian S.S.R., U.S.S.R.; on R. Dniester; tr. in wine, corn, cattle, wool and fruit; p. *10,000.*

Soroti, *t.*, Uganda; Brit. E. Africa; on Kioga L.; admin. ctr.; cotton ginning.

Sorrento, *cst. t.*, S. Italy; nr. S. extremity G. of Naples; popular resort, anciently celebrated for its fine wines; p. *26,325.*

Sortavala, *t.*, R.S.F.S.R.; cellulose, sawmills, paper; p. *4,600.*

Sör-Tröndelag, *see* **Tröndelag.**

Sosnowiec, *t.*, S.W. Poland; rly. junction; coal, iron, textiles; p. (1957) *125,000.*

Sotteville-lès-Rouen, *t.*, Seine-Maritime, France; rly. wks.; p. (1954) *25,625*

Soufrière, *mtn.*, Basse-Terre I., Lesser Antilles Gr. W. Indies; volcanic; highest peak in Lesser Antilles; alt. 4,869 ft.

Sound, The, *channel* between the Kattegat and the Baltic, 3 m. across at narrowest part from Sweden to the Zealand cst.

Sousse (**Susa**), *spt.*, Tunisia; p. (1946) *36,566.*

South Africa, Union of, Brit. dominion, Africa; consisting of provs. of C. of Gd. Hope, Natal, Transvaal and O.F.S.; climate, Mediterranean to tropical; vegetation, evergreens in C. region, grassland (veld) in E.; cereals, cotton, sugar, vines, citrus fruit, sheep and cattle, ostriches, gold, diamonds, coal, copper, tin, various mnfs.; admin. cap. Pretoria; legislative cap. Cape Town; a. (inc. Walvis Bay) 472,494 sq. m.; p. (estd. 1958) *14,418,000.*

South America, *continent*; physical features, cst. regular except in S.W.; Andes Mtns. along whole of W. cst., Brazilian Highlands on E. cst., rolling plains in ctr.; climate, diverse, varying with latitude and alt.; equatorial, hot and wet; Atacama, a rainless desert on middle W. cst. In S. temperate; vegetation, varying with latitude, alt., climate, from coniferous, deciduous and tropical forest to tropical and temperate grasslands and deserts; ch. inds.; temperate and tropical agr.; cocoa, coffee, sugar-cane, rubber, cereals; cattle, sheep; minerals; gold, silver, copper, tin, diamonds, nitrates; factory inds. developing gradually; races: Europeans, mainly of Spanish and Portuguese descent, Indians, Negroes, mulattoes and mestizos (mixed races); a. 7,300,000 sq. m.; p. (estd.) *80,000,000.*

South Atlantic, *see* **Atlantic Ocean.**

South Australia, *see* **Australia, South.**

South Bend, *c.*, Ind., U.S.A.; carriage and wagon wks., iron foundries, paper- and flour-mills, farming implements, aeroplanes; seat of Notre Dame University; p. (1950) *115,911.*

South Carolina, *st.*, U.S.A.; level in E., and mtns. in W.; cereals, cotton, tobacco; industl.; cap. Columbia; ch. pt., Charleston; a. 31,055 sq. m.; p. (1950) *2,117,027.*

South Coast, *t.*, Queensland, Australia; p. (1957) *22,800.*

South Dakota, *st.*, U.S.A.; mixed farming, wheat; gold, silver, gypsum, lumbering, flourmilling, butter, cheese, meat-packing; cap. Pierre; a. 77,047 sq. m.; p. (1950) *652,740.*

South Downs, *range chalk hills*, Sussex and Hants, Eng.

South Georgia, *Brit. I.*, S. Atl. Oc.; a. 1,570 sq. m.; mtns., whaling ctr.
South Holland, *prov.*, Neth.; flat, intersected by Rs. and dykes; cap. The Hague; a. 1,130 sq. m.; p. (1948) *2,308,383*.
South I., *lge. I.*, part of Dominion of N.Z.; contains S. Alps (highest Mt. Cook, 12,349 ft.), Canterbury Plains; wool, mutton, dairy prod., fruit; a. 58,093 sq. m.
South Kensington, *dist.*, in W. London; contains Victoria and Albert Museum, the Geological and Science Museums, the Natural History collection of the Brit. Museum, the Imperial Institute, the Albert Hall.
South Molton, *mkt. t.*, *mun. bor.*, Devon, Eng.; at. S. foot of Exmoor, 10 m. S.E. of Barnstaple; textiles, cosmetics; p. (1951) *3,125*.
South Orange, *t.*, N.J., U.S.A.; p. (1950), *15,230*.
South Orkney Is., Antarctica; whaling; met. sta.
South Portland, *c.*, Me., U.S.A.; on Portland harbour; p. (1950) *21,866*.
South Queensferry, *bor.*, W. Lothian, Scot.; p. *2,214*.
South Sandwich Is., Antarctica; whaling.
South Shetland, *Brit. archipelago*, S. Atlantic; 600 m. S. C. Horn; whaling.
South Shields, *t.*, *co. bor.*, Durham, Eng.; on S. bank at mouth of R. Tyne; coming holiday resort; coal, engin.; p. (1951) *106,605*.
Southall, *t.*, *mun. bor.*, Middlesex, Eng.; 9½ m. W. of London; residtl.; many varied light inds.; p. (1951) *55,900*.
Southam, *mkt. t.*, *rural dist.*, Warwick, Eng.; 5 m. S.E. of Leamington; lime, cement, mineral spring; p. (1951) *12,726*.
Southampton, *spt.*, *co. bor.*, Hants, Eng.; at head of Southampton Water on peninsula between estuaries of Rs. Test and Itchen; extensive docks for passenger-liners and other shipping, engin.; p. (1951) *178,326*.
Southampton, *C.*, S. pt. of Coates I., Hudson Bay, Canada.
Southampton Water, *inlet*, Hants, Eng.; comprises drowned estuaries of Rs. Itchen and Test; gives access from Solent and Spithead to spt. of Southampton; length 9 m., width 1–1½ m.
Southborough, *t.*, *urb. dist.*, Kent, Eng.; in ctr. of The Weald, 2 m. N. of Tunbridge Wells; residtl.; chalybeate spring; p. (1951) *8,823*.
Southbridge, *t.*, Mass., U.S.A.; optical instruments and cutlery; p. (1950) *16,748*.
Southend-on-Sea, *t.*, *co. bor.*, Essex, Eng.; on N. side of Thames estuary; wireless factory, varied light inds.; p. (1951) *151,830*.
Southern Alps, *range of mtns.*, S.I., N.Z.
Southern Cross, *t.*, *rly. junction*, W. Australia; on main Transcontinental Rly. 220 m. E. of Perth; gold-mines, now declining.
Southern Ocean, surrounds Antarctica; pack ice.
Southern Rhodesia, *Brit. self-governing col.*, Africa; became member st. of "Federation of Rhodesia and Nyasaland" in 1953; climate healthy; tobacco, maize, fruit; cattle; gold, coal, asbestos, chrome ore; cap. Salisbury; a. 150,333 sq. m.; p. (1951) *2,106,206*.
Southgate, *mun. bor.*, Middlesex, Eng.; N. sub. of London; residtl.; p. (1951) *73,376*.
Southland, *div.*, Otago; S.I., N.Z.; a. 11,170 sq. m.; p. (1948) *74,400*.
Southport, *t.*, *co. bor.*, Lancs, Eng.; on S. side of Ribble estuary; 12 m. N. of Liverpool; seaside resort; residtl.; p. (1951) *84,057*.
Southport, *wat. pl.*, Queensland, Australia; 50 m. S. of Brisbane; pastoral, dairying, fruit-growing and timber dist.; p. (1947) *8,432*.
Southsea, *dist.*, Portsmouth, Hants, Eng.; seaside resort.
Southwark, *metropolitan bor.*, London, Eng.; on R. Thames; wharves, warehouses, etc.; p. (1951) *97,191*.
Southwell, *mkt. t.*, *rural dist.*, Notts, Eng.; cath.; coal-mining, agr.; p. (rural dist. 1951) *39,705*.
South-West Africa, mandate of Union of S. Africa; mostly desert, scanty rainfall; cattle, ostriches; diamonds, tin, copper; cap. Windhoek; a. 317,725 sq. m.; p. (1946) *360,040* (inc. *40,000* Europeans).
Southwick, *urb. dist.*, W. Sussex, Eng.; on S. cst. 4 m. W. of Brighton; p. (1951) *10,718*.
Southwold, *spt.*, *mun. bor.*, E. Suffolk, Eng.; on E. cst. 8 m. S. of Lowestoft; fishing; resort; p. (1951) *2,473*.
Soviet Harbour, *spt.*, G. of Tartary, R.S.F.S.R.; sawmilling; p. (1954) *75,000*.
Sowerby Bridge, *t.*, *urb. dist.*, W.R. Yorks, Eng.; on R. Calder, 3 m. W. of Halifax; woollens; p. (1951) *18,770*.
Sowjetsk (Tilsit), *t.*, R.S.F.S.R.; German before 1945; on R. Memel; cas.; foodstuffs, machin., wood; p. (1954) *50,000*.
Sozh, *R.*, Ukrainian S.S.R.; trib. of R. Dnieper; length 240 m.
Spa, *t.*, Liége, Belgium; mineral springs, resort; p. *9,372*.
Spaask, *t.*, R.S.F.S.R.; nr. L. Khanka; beet sugar, cement, engin.
Spain, *kingdom* (without a sovereign), S.W. Europe; interior plateau; climate varied, very hot summers, warm rainy winters, N.W. mild, and wet, central plateau extremes of heat and cold; evergreen trees and shrubs; cereals, vines, citrus fruits, olives, nuts; sheep, goats, pigs, etc.; coal, copper, iron, lead, zinc, mercury, colophony, turpentine, cork; mnfs. wine, sugar, silk, brewing, etc.; cap. Madrid; a. 189,890 sq. m.; p. (1950) *27,976,755*.
Spalding, *mkt. t.*, *urb. dist.*, Holland, Lincoln, Eng.; in The Fens, 10 m. up the R. Welland from The Wash; agr., bulb mkt., agr. machin., sugar-beet, fruit canning; p. (1951) *11,031*.
Spandau, *t.*, Brandenburg, Germany; firearms, gunpowder; previously gr. military ctr.
Spanish Sahara, *col.*, N.W. African cst.; cap. Villa Cisneros; a. 105,400 sq. m.; p. *37,000*
Spanish Wells, *I.*, Bahamas, W. Indies; p. (1953) *665*.
Sparrows Point, *t.*, Md., U.S.A.; situated on Chesapeake Bay at entrance to Bear Creek; impt. iron and steel ind.
Sparta, *famous ancient c.*, the Morea, Greece; on the R. Eurotas; passed under Roman rule, 146 B.C.; p. (1951) *11,040*.
Spartanburg, *t.*, S.C., U.S.A.; cotton; p. (1950) *36,795*.
Spartel, *C.*, International Zone, N.E. Africa.
Spartivento, *C.*, Italy; most S. point of Italian mainland.
Spenborough, *urb. dist.*, W.R. Yorks, Eng.; textiles, plastics, wire; p. (estd. 1956) *36,340*.
Spencer Gulf, *lge. inlet*, S. Australia; penetrates 240 m. inland, max. width 75 m.
Spennymoor, *t.*, *urb. dist.*, Durham, Eng.; 5 m. S. of Durham; mnfs.; p. (1951) *19,784*.
Sperrin Mtns., Tyrone and Londonderry, N. Ireland.
Spey, *R.*, Inverness, Moray, and Banff, the most rapid in Scot., flows N.E. to Moray Firth; length 107 m.
Speyer, *c.*, Rhineland-Palatinate, Germany; cas., its famous Diet of 1529 condemning the Reformation gave rise to the term "Protestant"; textiles, tobacco, machin., footwear, beer, sugar, paper; p. (estd. 1954) *33,900*.
Spezia, La, *spt.*, Liguria, Italy; on Bay of Spezia; arsenal, docks, maritime inds., elec. machin., and olive oil; p. (1951) *109,978*.
Spice Is., *see* **Moluccas**.
Spitalfields, *par.*, E. London, Eng.; formerly agr. silk-weaving ctr.
Spithead, *roadstead*, between Portsmouth and the I. of Wight, Eng.; used by ships of Royal Navy.
Spitsbergen (Svalbard), *I. gr.*, belonging to Norway; well within Arctic Circle; mountainous; sealing and whaling; coal-mining; asbestos, copper, gypsum, iron, marble, mica, zinc and phosphate deposits; a. 24,294 sq. m.; p. (1956) Norwegian *1,530*, Russian *2,746*.
Split (Spalato), *c.*, Jugoslavia; wine, olive oil, bauxite, shipping; p. (1953) *75,695*.
Splügen Pass, Rhaetian Alps; between Lombardy and Grisons, Switzerland; alt. 6,939 ft.
Spokane, *R.*, Idaho, U.S.A.; flows to the R. Columbia at Washington; length 120 m.
Spokane, *t.*, Wash., U.S.A.; on R. Spokane, at the fall which is used for hydro-elec. power; gr. timber tr., flour and sawmills; p. (1950) *161,721*.
Spoleto, *t.*, Perugia, Italy; truffles; p. *32,600*.
Sporades, *I.*, Grecian Archipelago in the Ægean and neighbouring seas; belonging to Greece, includes Samos, Kos, etc.
Spree, *R.*, Saxony and Brandenburg, Germany; flowing W. past Berlin to the Havel at Spandau; length 227 m.
Spremberg, *t.*, Brandenburg, Germany; on R. Spree; lignite, mining, glass, elec., metals, cloth, bicycles, machin.; p. (estd. 1954) *19,300*.
Springbok, *t.*, *cap.*, Namaqualand, C. of Gd. Hope, S. Africa; copper-mining; p. *1,599*.

Springfield, *c.*, *cap.*, Ill., U.S.A.; gr. rly. ctr.; iron, watches, etc.; p. (1950) *81,628*.
Springfield, *c.*, Mass., U.S.A.; mnfs. cars, elec. apparatus and paper; p. (1950) *162,399*.
Springfield, *c.*, Mo., U.S.A.; flour milling; Congregational college; p. (1950) *66,731*.
Springfield, *c.*, Ohio, U.S.A.; agr. implements, motor lorries; p. (1950) *78,508*.
Springfontein, *t.*, O.F.S., S. Africa; rly. ctr.; p. *2,089*.
Springs, *t.*, Transvaal, Union of S. Africa; E. of Johannesburg; p. (1946) *25,355*.
Springsure, *t.*, Queensland, Australia; rly. term.; wheat; p. *1,113*.
Spurn Head, *C.*, E. Yorks, Eng.; at mouth of Humber estuary.
Sretensk, *t.*, R.S.F.S.R.; coal, machin., leather, woodworking.
Srinagar, *t.*, *cap.*, Kashmir, India; on R. Jhelum in W. Himalayas; 5,263 ft. above sea-level; silver and copper wares, carpet weaving, paper; p. (1941) *207,787*.
Sriracha, *t.*, Siam; sawmills; p. *81,471*.
Stade, *t.*, Lower-Saxony, Germany; nr. Hamburg; leather, wood, textiles; p. (estd. 1954) *30,100*.
Staffa, *I.*, the Inner Hebrides, W. Scot.; 6 m. N. Iona, off W. cst. Mull; Fingal's Cave, 227 ft. long, with other basaltic caves.
Stafford, *co. t.*, *mun. bor.*, Staffs, Eng.; on R. Sow, 15 m. N. of Wolverhampton; elec. engin., concrete; engin., footwear, salt; p. (1951) *40,275*.
Staffordshire, *W. midland co.*, Eng.; rich in iron and coal, the "Black Country" being famous; also lge. Potteries dist., brewing and many thriving mnfs.; co. t. Stafford; a. 1,153 sq. m.; p. (1951) *1,621,013*.
Staines, *mkt. t.*, *urb. dist.*, Middlesex, Eng.; on R. Thames, 4 m. S.E. of Windsor; linoleum, machin., petrol engines; p. (1951) *39,983*.
Stainmore, *pass*, N.R. Yorks, Eng.; crosses N. Pennines from Greta valley into upper Eden valley; used by main road but only minor rly.; alt. 1,370 ft.
Stalin, *t.*, Romania; on R. Otnal at foot of Transylvanian Alps; cloth, leather; p. (1956) *123,882*.
Stalin Canal (Baltic–White Sea Canal), U.S.S.R.; system of canals and canalised Rs.; links Leningrad via L. Ladoga and L. Onega to Soroka, on White Sea; opened 1933; approx. overall length 550 m.
Stalinabad, *t.*, *cap.*, Tadzhik. S.S.R.; engin., textiles; p. (1959) *224,000*.
Stalingrad, *c.*, R.S.F.S.R.; on R. Volga, S. of Saratov; steel, engin., chemicals, oil-refining; fierce siege and successful defence of S. Sept. to Nov. 1942 was turning point of the Second World War; p. (1959) *591,000*.
Stalino (**Varna**), *fortfd. spt.*, Bulgaria; on Black Sea; univ.; shipbldg., textiles, grain, trading; p. (1956) *119,769*.
Stalino, *t.*, Ukrainian S.S.R.; coal, iron and steel, engin., chemicals; p. (1959) *701,000*.
Stalinogorsk (**Bobriki**), *t.*, R.S.F.S.R.; on R. Don; lignite, fertilizers, chemicals; p. (1959) *107,000*.
Stalinsk, *t.*, R.S.F.S.R.; coal, iron and steel, engin., chemicals, aluminium p. (1959) *377,000*.
Stalybridge, *t.*, *mun. bor.*, Cheshire, Eng.; on R. Tame, 5 m. E. of Manchester; cotton and wool, engin., plastics, rubber goods, elec. cables; p. (1951) *22,544*.
Stamboul, *see* **Istanbul**.
Stamford, *c.*, Conn., U.S.A.; on shore of Long I. Sound; p. (1950) *74,293*.
Stamford, *mkt. t.*, *mun. bor.*, Kesteven, Lincoln, Eng.; 10 m. N.W. of Peterborough; malting, coal; p. (1951) *10,899*.
Standerton, *t.*, Transvaal, S. Africa; on R. Vaal; livestock, oats; p. *10,473*.
Standish-with-Langtree, *urb. dist.*, Lancs, Eng.; 4 m. N.W. of Wigan; coal-mining, silk mftg.; p. (1951) *8,991*.
Stanger, *t.*, Natal, S. Africa; tea, sugar, maize, wattle; p. *2,500*.
Stanimaka (**Asenovgrad**), *t.*, Bulgaria; wine tr.; p *20,920*.
Stanislaus, *R.*, Cal., U.S.A.; trib. of the San Joaquin R.; length 200 m.
Stanislav, *t.*, Ukrainian S.S.R.; oil; p. (1959) *66,000*.
Stanley, *t.*, *urb. dist.*, Durham, Eng.; 10 m. N.W. of Durham; mnfs.; p. (1951) *48,123*.
Stanley, *spt.*, *cap.*, Falkland Is.; whaling; p. (estd. 1958) *1,135*.
Stanley Falls, on the Upper Congo R., Belgian Congo, Africa; nr. the Equator named after the explorer, Sir H. M. Stanley.
Stanley Pool, an expansion of the Lower Congo, Africa; 25 m. long, 16 m. wide.
Stanleyville, *t.*, Belgian Congo, Africa; on R. Congo nr. Stanley Falls; named after the explorer; p. *27,312*.
Stanlow, inc. in Ellesmere Port, urb. dist., Cheshire; petrol ref., oil-storage dks., chemicals.
Stanovoi Mtns., *range of mtns.*, U.S.S.R.; extends from N. of R. Amur to nr. Sea of Okhotsk.
Stans, *cap.*, half-can. Nidwalden, Switzerland.
Star of the Congo, *t.*, Katanga, Belgian Congo, Africa; copper-mining.
Stara Planina (**Balkan Mtns.**), Bulgaria; highest peak, 7,780 ft.
Stara Zagora, *t.*, Central Bulgaria; copper smelting, mineral springs; p. (1956) *55,322*.
Stargrad, *t.*, Poland; prev. in Prussia; woollens, machin., cottons, spirits; p. *9,773*.
Start Point, *C.*, nr. Dartmouth, Devon, Eng.
Stassfurt, *t.*, Saxony-Anhalt, Germany; 12 m. S. of Magdeburg; potash salts, chemicals, machin., metals; p. (estd. 1954) *30,100*.
Staten I., the most S. point N.Y. st., U.S.A.; shipyards; also island off Tierra del Fuego, S. America; 45 m. long.
States of the Church, Italian terrs. ruled over by the Pope, in his secular capacity prior to 1870, now absorbed by other provs.
Stavanger, *spt.*, Rogaland, Norway; margarine and preserved-food, woollen mills, fish curing and canning, shipbldg.; p. (1946) *49,218*.
Staveley, *t.*, *urb. dist.*, Derby, Eng.; 3 m. N.E. of Chesterfield; coal, iron, mnfs.; p. (1951) *17,941*.
Stávnice, *t.*, Czechoslovakia; impt. mining ctr., producing silver, copper, lead.
Stavropol, *t.*, S. terr., R.S.F.S.R., U.S.S.R.; engin., natural gas; p. (1959) *140,000*.
Stawell, *t.*, Victoria, Australia; 150 m. N.W. of Melbourne; gold-mining, agr., pastoral and tobacco growing dist.; p. (1957) *5,720*.
Steelton, *bor.*, Penns., U.S.A.; steel foundries; p. (1950) *12,574*.
Steep Holm I., Bristol Channel, Eng.
Steep Rock, *see* **Atikokan**.
Stellenbosch, *t.*, C. Prov., Union of S. Africa; 25 m. E. of Cape Town; univ.; wines, fruit; p. (1946) *15,258*.
Stendal, *c.*, Saxony-Anhalt, Germany; nr. Magdeburg; cath.; iron, sugar wks.; p. (estd. 1954) *40,400*.
Stepney, *metropolitan bor.*, E. London, Eng.; p. (1951) *98,581*.
Sterlitamak, *t.*, Bashkir, R.S.F.S.R.; on S.W. flank of Ural Mtns., 120 m. N.E. of Chkalov (Orenburg); impt. oil-refineries on "Second Baku" oilfield; linked by pipeline to Stavropol; p. (1959) *111,000*.
Šternbeck, *t.*, Moravia, Czechoslovakia; N. of Olomouc; textile mftg.; p. *12,566*.
Stettin, *see* **Szczecin**.
Steubenville, *c.*, Ohio, U.S.A.; iron, steel, paper, glass, coal, natural gas; p. (1950) *35,872*.
Stevenage, *urb. dist.*, Herts, Eng.; 4 m. S.E. of Hitchin; one of "New Towns" designated 1946; agr. light engin., school furniture, elec. goods, chemicals; p. (estd. 1959) *33,500*.
Stewart, *R.*, trib. of R. Yukon, N.W. Terr., Canada.
Stewart I., S. or S.I., N.Z.; a. 670 sq. m.; oysters.
Stewarton, *burgh*, Ayr, Scot.; 5 m. N. of Kilmarnock; woollens, carpets; p. (1951) *2,800*.
Steyning, *vil.*, E. Sussex, Eng.; on R. Adur, 4 m. N. of Shoreham at entrance to gap through S. Downs; residtl.; p. *1,875*.
Steyr, *t.*, Austria; on R. Enns, nr. Linz; bicycles, lorries, small-arms factories; p. (1951) *36,727*.
Stilton, *vil.*, Huntingdon, Eng.; 6 m. S.W. Peterborough; famous for cheese.
Stinchar, *R.*, Ayr, Scot.; flows W. to sea at Ballantrae; length 30 m.
Stirling, *ancient burgh*, Stirling, Scot.; on R. Forth in gap between Campsie Fells and Ochil Hills; cas.; coal-mng., engin., concrete, rock, wool, rubber goods; p. (1951) *26,960*.
Stirling, *midland co.*, Scot., borders Firth of Forth; coal-mining, agr., textiles; a. 466 sq. m.; p. (1951) *187,432*.
Stockerau, *t.*, Austria; machin., chemicals; p. *10,790*.
Stockholm, *c.*, *cap.*, Sweden; on Is. at outlet of L. Malar; called the "Queen of the Baltic" for

the beauty of its surroundings; comm. ctr.; machin., textiles, leather, sugar, chemicals; many academic institutions; p. (1955) *776,947*.

Stockport, *t., co. bor.*, Cheshire, Eng.; on R. Mersey, 5 m. S.E. of Manchester; cotton, hats, engin.; p. (1951) *141,660*.

Stocksbridge, *urb. dist.*, W.R. Yorks; p. (1951) *10,277*.

Stockton, *t.*, Cal., U.S.A.; farm implements, flour, lumber; p. (1950) *70,853*.

Stockton-on-Tees, *mkt. t., mun. bor.*, Durham Eng.; 4 m. W. of Middlesbrough; impt. iron and steel inds., plywood; first rly. for passenger traffic opened in 1825 between Stockton and Darlington; 18th cent. town hall; racecourse; p. (1951) *74,024*.

Stoke-on-Trent, *c., co. bor.*, Staffs, Eng.; at S.W. foot of the Pennines; formed in 1910 by union of the "five towns" of Arnold Bennett's novels, Hanley, Burslem, Tunstall, Longton, and Fenton (with Stoke-upon-Trent); ceramics, coal, iron and steel, engin., brick and tile wks., precast concrete; p. (1951) *275,095*.

Stoke Newington, *metropolitan bor.*, N.E. London; p. (1951) *49,137*.

Stokesley, *mkt. t., rural dist.*, N.R. Yorks, Eng.; 7 m. S. of Middlesbrough; linen, gunpowder; p. (rural dist. 1951) *17,922*.

Stolberg, *t.*, N. Rhine–Westphalia, Germany; E. of Aachen; metals, glass, wood, chemicals; p. (estd. 1954) *32,500*.

Stolp, *see* **Slupsk.**

Stone, *mkt. t., urb. dist.*, Staffs, Eng.; on R. Trent, 7 m. S. of Stoke-on-Trent; footwear, tiles, porcelain, scientific glassware; p. (1951) *8,299*.

Stoneham, *t.*, Mass., U.S.A.; boots and shoes; p. (1950) *13,229*.

Stonehaven, *fishing t., burgh*, Kincardine, Scot.; on E. cst., 14 m. S. of Aberdeen; distilling, net mftg.; p. (1951) *4,438*.

Stonehenge, *prehistoric gr. of monumental stones*, on Salisbury Plain, Wilts, Eng.; date of erection estd. between 1860–1560 B.C.

Stonehouse, *par.*, Lanark, Scot.; coal, linen; p. *4,204*.

Stony Stratford, *mkt. t.*, Bucks, Eng.; on R. Ouse, nr. Buckingham; engin., lace.

Stornoway, *spt., burgh*, Ross and Cromarty, Scot.; on E. cst. of I. of Lewis, Outer Hebrides; ctr. Harris Tweed ind.; fishing ctr.; p. (1951) *4,954*.

Stour, *R.*, Kent, Eng.; flows past Canterbury to Pegwell Bay; length 40 m.

Stour, *R.*, Somerset, Dorset, and Hants, Eng.; trib. of R. Avon; length 55 m.

Stour, *R.*, Suffolk and Essex, Eng.; flows E. to sea at Harwich; length 42 m.

Stour, *R.*, Worcs, and Staffs, Eng.; trib. of R. Severn; length 20 m.

Stourbridge, *t., mun. bor.*, Worcs, Eng.; on R. Stour, 9 m. W. of Birmingham; coal, iron and steel, brick and glass wks.; p. (1951) *37,247*.

Stourport-on-Severn, *urb. dist., mkt. t.*, Worcs, Eng.; at confluence of Rs. Stour and Severn; carpets, iron and steel goods, porcelain, ceramics; p. (1951) *10,140*.

Stowmarket, *t., urb. dist.*, Suffolk, Eng.; on R. Orwell, 11 m. N.W. of Ipswich; chemical manures, engin., malting; p. (1951) *7,325*.

Strabane, *t., urb. dist.*, Tyrone, N. Ireland; salmon fishing, agr. ctr.; p. (1951) *6,620*.

Straits Settlement, *former Brit. col.*, Malay Peninsula; comprising Singapore, Penang, Malacca and Labuan; dissolved in 1946; Singapore became separate Crown Col., Penang and Malacca part of Federation of Malaya, and Labuan transferred to N. Borneo.

Stralsund, *spt.*, Mecklenburg, Germany; opposite Rügen I.; grain tr., machin., metals, fish smoking, shipbldg.; p. (estd. 1954) *50,500*.

Strand, *t.*, C. of Gd. Hope, S. Africa; resort; p. *9,270*.

Strangford Lough, *arm of sea*, Down, N. Ireland; 18 m. long, 6 m. wide at entrance.

Stranraer, *burgh*, Wigtown, Scot.; at head of Loch Ryan; steamer service to Larne, Antrim, N. Ireland; creameries, brewing, knitwear; p. (1951) *8,622*.

Strasbourg, *fortfd. c., cap.*, Bas-Rhin, France; on R. Ill just above confluence with R. Rhine; captured 1870, regained 1918; fine cath., univ., imperial palace, many handsome new public bdlgs.; extensive tr.; machin., tanning, jewellery, printing, hardware; exp. hops, sausages, famous pies, beer, etc., p. (1946) *175,515*.

Stratford, *dist.*, E. London, Eng.; in bor. of W. Ham; engine wks., mftg.

Stratford, *c.*, Ontario, Canada; woollens, farm machin., flour, sawmills, engine wks.; p. *17,038*.

Stratford, *t.*, on R. Housatonic, Conn., U.S.A.; aircraft; p. *30,800*.

Stratford-on-Avon, *t., mun. bor.*, Warwick, Eng.; on R. Avon, 9 m. S.W. of Leamington; birthplace of Shakespeare; memorial theatre, library, tourist ctr.; light inds.; p. (1951) *14,980*.

Strathaven, *t.*, Lanark, Scot.; cas.; knitwear, agr. engin., fibre glass; p. *4,207*.

Strathmore, *lowland belt*, central Scot.; extends from Crieff N.E. to Montrose; flanked to N. by Scot. Highlands, to S. by Sidlaw, and Ochil Hills; drained by Rs. Earn, Tay, Isla, S. Esk; famous for cereals and small fruits; length 60 m., width 7–10 m.

Strathpeffer, *wat. pl.*, Ross and Cromarty, Scot.; 5 m. W. of Dingwall; spa.

Strathspey, *valley of the Spey*, Scot.; 70 m. long.

Stratton and Bude, *resort*, N. Cornwall, Eng.; on N. cst. 12 m. S. of Hartland Point; p. *5,163*.

Straubing, *t.*, Bavaria, Germany; on R. Danube; cas.; brewing, tiles, chemicals, machin.; p. (estd. 1954) *36,100*.

Strawberry, *R.*, Utah, U.S.A.; on E. slopes of Wasatch Mtns. 80 m. S.E. of Salt Lake City; dammed to supply irrigation water, led through 3½ m. tunnel under Wasatch Mtns. to 100 sq. m. cultivable land round L. Utah.

Streatham, *residtl. dist.*, Surrey, nr. London, Eng.

Streator, *c.*, Ill., U.S.A.; bricks, glass, hardware, farm implements; p. *14,990*.

Street, *t., urb. dist.*, Somerset, Eng.; at foot of Polden Hills, 5 m. S.W. of Wells; footwear, leather, vehicle wks.; p. (1951) *5,300*.

Stresa, *vil.*, Piedmont, Italy; favourite health resort on L. Maggiore; p. (estd.) *4,500*.

Stretford, *mun. bor.*, S.E. Lancs, Eng.; sub. of Manchester; engin., chemicals; p. (1951) *61,532*.

Stromboli, *I.*, Lipari Is., N. of Sicily, Tyrrhenian Sea; active volcano, alt. 3,038 ft.; p. *853*.

Stromness, *mkt. burgh, pt.*, Mainland, Orkney Is., Scot.; 13 m. W. Kirkwall; p. (1951) *1,503*.

Stromstad, *spt.*, Sweden; on Skagerrak; seaside resort; shipbldg.; fishing.

Stronsay, Orkney Is., Scot.

Strood, *t.*, Kent, Eng.; in mun. bor. of Rochester; aluminium.

Stroud, *mkt. t., urb. dist.*, Eng.; in Cotswold Hills, on R. Frome; cloth, carpets, plastics, engin.; p. (1951) *15,977*.

Strumble Head, *promontory*, N. Pembroke, Wales.

Stryj, *R.*, Poland; trib. of R. Dniester.

Stryj, *t.*, Poland; sawmills, matches; p. *25,000*.

Sturgeon Falls, *t.*, Ontario, Canada; pulp paper; p. *4,576*.

Sturminster Newton, *mkt. t., rural dist.*, Dorset, Eng.; on R. Stour, 6 m. N.W. of Blandford; creameries; p. (rural dist. 1951) *9,297*.

Stuttgart, *c., cap.*, Baden-Württemberg, Germany; on R. Neckar; cas., cath.; publishing, textiles, chemicals, elec., metals, cars, paper; route ctr.; p. (estd. 1954) *566,100*.

Styr, *R.*, Poland; trib. of R. Prypei (Pripet); length 250 m.

Styria, *prov.*, Austria; grain, wine and fruit; stock-rearing, tourist tr.; a. 6,326 sq. m.; p. (1951) *1,109,335*.

Styrian Alps, that portion of the Alpine mtn. system E. of the Hohe Tauern.

Suakin, *spt.*, Sudan, N.E. Africa; on Red Sea; linked by rly. to Khartoum; p. *6,250*.

Subotica, *t.*, Serbia, Jugoslavia; boots, rly. material, farming, stock-raising; p. (1953) *115,352*.

Suceava, *t.*, S. Bukovina, Romania; former residence of Moldavian princes; fancy leather; p. (1945) *10,123*.

Suchan, *t.*, R.S.F.S.R.; coal; p. (1954) *50,000*.

Suchow (Tungshan), *t.*, Kiangsu, China; on Tai-Hu, 40 m. W. of Shanghai; gr. comm. and industl. ctr., silks, cottons, rice; p. (estd. 1935) *160,013*.

Sucre, *cap.*, Chuquisaca dep. and legal cap. of Bolivia; univ. and cath.; p. (1957) *53,825*.

Sucre, *st.*, Venezuela; cap. Cumana; p. (1941) *291,452*.

Sudan, *rep.*, 1 Jan. 1956, N.E. Africa, bounded by Egypt, Red Sea and Ethiopia, Kenya, Uganda, the Belgian Congo, Fr. Equatorial Africa and Libya; exp. cotton and ground nuts; cap.

Khartoum; a. 1,000,000 sq. m. (approx.); p. (1956) *10,200,000*, Arabs, Negroes and Nubian.
Sudanese Republic *See.* **French Sudan.**
Sudbury, *t., mun. bor.,* W. Suffolk, Eng.; on R. Stour, 12 m. N.W. of Colchester; p. (1951) *6,614*.
Sudbury, *t.,* Ontario, Canada; nickel, copper; p. [(1941) *32,203*.
Sudetes Mtns., *range,* Poland, Czechoslovakia; separating Bohemia and Moravia from Silesia.
Suez, *spt.,* Egypt, N.E. Africa; at head of G. of Suez (arm of Red Sea) and S. entrance of Suez Canal, which crosses the Isthmus of Suez to the Mediterranean at Port Said and is of very gr. value to shipping; the ancient Arsinoë; Port Tewfiq adjoining has quay and docks; p. (1947) *108,250*.
Suez, *G.,* Red Sea; N.W. arm of Red Sea between Arabian Desert and Sinai Peninsula, Egypt; southern approach to Suez Canal; length 190 m., width varies from 12 to 25 m.
Suez Canal, *ship canal,* Egypt, N.E. Africa; connects Mediterranean Sea (Pt. Said) with Red Sea (Suez) through Ls. Manzala, Timsah and Bitter; saves over 4,000 m. on journey N.W. Europe to India, 1,000 m. to Australia; opened 1869; length, 101 statute m., depth 34 ft., average width 200 ft.
Suffolk, *most E. maritime co.,* Eng.; bounded by Essex, Norfolk, Cambridge and the N. Sea; mixed agr., dairying; fisheries; mnf. of agr. implements; civil nuclear power-sta. at Sizewell, due 1966; co. t. Ipswich; a. 1,482 sq. m. divided for admin. purposes into Suffolk E. p. (1951) *321,849* and Suffolk W. p. (1951) *120,590*.
Suhl, *t.,* Thuringia, Germany; toys, armaments; p. (estd. 1954) *24,700*.
Suir, *R.,* Ireland; flows E. to Waterford Harbour.
Suiyuan, *prov.,* China; cap. Kweihwacheng; a. 134,181 sq. m.; p. (1947) *2,084,000*.
Sukhumi, *spt.,* Georgian S.S.R.; resort; sawmilling; p. (1959) *64,000*.
Sukkur, *t.,* Pakistan; on. R. Indus, 230 m. N.E. of Karachi; gr. dam for irrigation; p. (1941) *66,466*.
Sulaiman, *mtns.,* Asia; range bounding the Punjab and Baluchistan.
Sulaimaniya, *liwa,* Iraq; a. 4,554 sq. m.; p. (1956) *272,442*.
Sulina, *t.,* Romania; at mouth of Sulina branch of Danube R.; considerable grain tr.; p. *5,925*.
Sullana, *t.,* N. Peru; rly. ctr.; maize, cotton, cinchona bark; p. (estd. 1950) *27,379*.
Sultanabad, *t.,* Persia; carpet mftg.; p. *55,000*.
Sulu Is., Philippines; archipelago between Borneo and the Philippines; a. 950 sq. m.; acquired by the U.S.A. 1898.
Sumatra, *I.,* Malay Archipelago, Indonesia; separated from Java by Strait of Sunda; coffee, sugar, rice, pepper; gold, tin, petroleum, coal; a. 161,612 sq. m.; p. (1930) *7,841,175*.
Sumba, *I.,* Indonesia; part of Timor Archipelago.
Sumbawa, one of the Lesser Sunda Is., Indonesia; in the E. Indian Archipelago, E. of Lombok; a. (with neighbouring Is.) 5,240 sq. m.; p. *314,843*.
Sumy, *t.,* Ukrainian S.S.R.; engin., chemicals, textiles; p. (1959) *97,000*.
Sunart, Loch, *sea arm,* Argyll cst., W. Scot.; 19½ m. long.
Sunbury-on-Thames, *urb. dist.,* Middx., Eng.; W. of London; residtl., water wks., gravel pits; p. (1951) *23,396*.
Sunda Strait, between Java and Sumatra, Indonesia; 13 m. wide, contains the volcanic I. of Krakatao.
Sundarbans, The, *tract of forest and swamps,* fringing the delta of the Ganges, E. Pakistan; 165 m. long, 81 m. wide; rice grown in N.; tigers and crocodiles found in S.
Sunday I., lgst. of Kermadec Is., N.Z.; 20 m. in circuit and with a p. of *28* is the only one of the Kermadec Is. that is inhabited; met. and radio sta. established on I.
Sunday, *R.,* C. of Gd. Hope, S. Africa; flows into Algoa Bay; length 200 m.
Sunderland, *spt., co. bor.,* Durham, Eng.; at mouth of R. Wear; gr. shipbldg. and coal-exp. ctr. (inc. Monkwearmouth and parts of Bishopwearmouth), best gas coal, also engin., glass, paper and rope; fine harbour, piers and docks; p. (1951) *182,515*.
Sundsvall, *spt.,* Västernorrland, Sweden; on a wide bay of the Baltic nr. Hernösand; timber and wood-pulp inds.; p. (1951) *25,775*.
Sungait, *t.,* Azerbaydzhan S.S.R.; N. of Baku; steel, chemicals, synthetic rubber, aluminium; p. (1954) *50,000*.
Sungari, *R.,* Manchuria, N. China; trib. of R. Amur; inc. the Nonni; length over 1,000 m.
Sungkiang, *prov.,* Manchuria; cap. Mutankiang; a. 30,703 sq. m.; p. (1947) *4,923,000*.
Sungpan, *t.,* Szechwan, China; silver, gold, lead; linseed oil, paper; smelting, engin.
Superior, *c.,* Wis., U.S.A.; at head of L. Superior; gr. tr. in grain, timber, coal, shipbldg. and flour mills; p. (1950) *35,325*.
Superior, *L.,* N. America; lgst. sheet of fresh water in the world; lies between Canada and the U.S.A.; one of the chain of gr. Ls. in the St. Lawrence system; outlet to L. Huron by the St. Mary's R., receives the waters of the St. Louis, Pigeon and Nipigon; a. 32,000 sq. m.
Surat, *c.,* Bombay, India; on R. Tapti; cotton, silk, embroidery; p. (1951) *223,182*.
Surbiton, *mun. bor.,* Surrey, Eng., on R. Thames, nr. Kingston; residtl.; light engin., bricks, tiles, elec. components; p. (1951) *60,675*.
Suresnes, *t.,* Seine, France; p. (1954) *37,149*.
Surinam, *R.,* Neth. Guiana, S. America; flows N. to Atl. Oc. nr. Paramaribo; length 300 m.
Surinam (Neth. Guiana), *Dutch col.,* S. America; ch. exp. bauxite, timber, rubber, rice, fruit; cap. Paramaribo; a. 55,000 sq. m.; p. (1957) *236,000*.
Surrey, *S. co.,* Eng.; S. of R. Thames; cereals, livestock, vegetables; residtl.; a. 722 sq. m.; p. (1951) *1,601,555*.
Sus, *R.,* S. prov. Morocco, N. Africa; flowing to the Atlantic nr. Agadir; length 130 m.
Susa, *see* **Sousse.**
Susak, *spt.,* Jugoslavia; timber and products, foods, cement; p. *16,104*.
Susquehanna, *R.,* N.Y., Penns., and Md., U.S.A.; flows to Chesapeake Bay through highly industl. a.; routeway, W. from Philadelphia and Baltimore across Appalachian Mtns.; length 422 m.
Sussex, *maritime co.,* S.E. Eng.; adjoining Surrey, Kent and Hants, and washed by Eng. Channel; traversed E. to W. by the S. Downs; co. t. Lewes; a. 1,457 sq. m.; divided administratively into Sussex E. p. (1951) *618,083* and Sussex W. p. (1951) *318,611*.
Susten Pass, *modern alpine road,* alt. 7,296 ft., between Haslital and Reuss valley, links Bernese Oberland with Gotthard road.
Sutherland, *N. co.,* Scot.; N.W. Moray Firth, washed by Atlantic and N. Sea; grazing and forest land, most sparsely pop. in Scot.; mountainous, with many lochs; co. t. Dornoch; a. 2,102 sq. m.; p. (1951) *13,664*.
Sutherland Falls, Milford Sound, S.I., N.Z.; height 1,904 ft.
Sutlej, *R.,* E. Punjab, India; rises in the Himalayas and flows to the R. Indus; used for lge.-scale irrigation; length 1,000 m.
Sutton and Cheam, *mun. bor.,* Surrey, Eng.; nr. Croydon; mainly residtl.; p. (1951) *80,664*.
Sutton, *see* **Mablethorpe and Sutton.**
Sutton Coldfield, *t., mun. bor.,* Warwick, Eng.; 6 m. N.E. of Birmingham; hardware, plastics; television transmitter; granted royal charter by Henry VIII.; p. (1951) *47,590*.
Sutton-in-Ashfield, *t., urb. dist.,* Notts, Eng.; 3 m. S.W. of Mansfield; coal, light engin.; hosiery; p. *39,800*.
Suva, *c., cap.,* Fiji Is.; on Viti Levu I., fine harbour; p. (1956) *37,371*.
Suwalki, *t.,* N.E. Poland; nr. bdy. of Lithuanian S.S.R.; timber, grain, woollens; p. *14,000*.
Suwannee, *R.,* Fla., and Ga., U.S.A.; flows to G. of Mexico; known as "Swanee River," length 250 m.
Svalbard, *see* **Spitsbergen.**
Svendborg, *spt.,* Fyn, Denmark; mnfs., earthenware, tobacco, exp. butter, etc.; p. *21,356*.
Sverdlovsk, *t.,* R.S.F.S.R.; on R. Iset, at E. base of the Ural Mtns.; steel, engin., chemicals, textiles; p. (1959) *777,000*.
Svetlyy, *t.,* S.E. Siberia, R.S.F.S.R.; on R. Zhuga; gold; p. *2,500*.
Sviatoi Nos, *C.,* Arctic cst., U.S.S.R.; nr. entrance of White Sea.
Svir, *R.,* U.S.S.R.; flowing between L. Onega and L. Ladoga; length 125 m.
Svistov, *t.,* Bulgaria; on R. Danube, Romanian border; p. *12,949*.
Svolær, *spt.,* Norway; ch. t. Lofoten Is.; fishing.
Swabia, *dist.,* Bavaria, Germany; a. 3,807 sq. m.; cap. Augsburg.

Swabian Alps, *mtns.*, Württemberg, Germany; inc. the Swabian Jura range between valleys of Neckar and Danube.
Swadlincote, *t.*, *urb. dist.*, Derby, Eng.; 3 m. E. of Burton-on-Trent; collys., potteries, earthenware; p. (1951) *20,909*.
Swaffham, *mkt. t.*, *urb. dist.*, Norfolk, Eng.; 11 m. S.W. of King's Lynn; forestry; p. (1951) *2,863*.
Swakopmund, *t.*, S.W. Africa; former spt.; resort; p. *2,942*.
Swale, *R.*, N.R. Yorks, Eng.; joins R. Ure to form R. Ouse; length 60 m.
Swale, *channel*, between I. of Sheppey and Kentish mainland, Eng.; 16 m. long.
Swan, *R.*, W. Australia; flows to Indian Ocean, nr. Perth.
Swan Hill, *t.*, Victoria, Australia; fruit growing and dairying under irrigation; p. (1957) *5,740*.
Swanage, *mkt. t.*, *urb. dist.*, Dorset, Eng.; on bay, E. cst. I. of Purbeck; seaside resort; stone quarries; p. (1951) *6,853*.
Swanland, *region*, W. Australia; consists of extreme S.W. corner of W. Australia; hot, dry summers and mild winter with adequate rain; forests of Karri and Jarrah; agr. vines, citrus and deciduous fruits, wheat; highest pop. density in W. Australia; ch. ts. Perth, Fremantle, Bunbury.
Swansea, *spt.*, *co. bor.*, Glamorgan, Wales; on Swansea Bay, Bristol Channel; coal and iron, copper, steel, zinc, chemicals; lge. exp. anthracite, aluminium wire and cable; p. (1951) *160,832*.
Swat, *dist.*, Malakand, N.W. Frontier Agencies and Tribal Areas, Pakistan.
Swatow (Shantou), *c.*, *spt.*, Kwangtung, S. China; on S.E. cst. nr. mouth of Han Kiang, 200 m. N.E. of Hong Kong; gd. harbour; fishing; sm. coastal tr., mainly with Hong Kong; exp. tangerines; p. (estd. 1946) *146,864*.
Swaziland, *Brit. prot.*, S. Africa; S.E. of the Transvaal; agr., maize, tobacco, fruit, cattle, asbestos, gold, tin, barytes; seat of administration, Mbabane; a. 6,704 sq. m.; p. (1956) *242,960* (inc. *5,919* Europeans).
Sweden, *kingdom*, N. Europe; forming E. (and larger) part Scandinavian Peninsula; mountainous W., but otherwise flat and dissected by Rs. and many Ls., while one-fourth of the land is forest; gr. timber exp. and mining of iron ore, lead, silver, arsenic; cereals, root crops, hay, livestock; mnfs., textiles, matches, machin., glass, chemicals, etc.; cap. Stockholm; a. 173,426 sq. m.; p. (1950) *7,044,039*.
Swellendam, *t.*, C. of Gd. Hope, S. Africa; fruit, wines, wool, grain, oranges; p. *3,993*.
Swidnica (Schweidnitz), *t.*, Lower Silesia, Poland; German before 1945; textiles, machin.; p. (estd. 1939) *39,000*.
Swift Current, *t.*, Saskatchewan, Canada; p. (estd. 1957) *10,612*.
Swilly, Lough, *arm of the Atlantic*, cst. of Donegal, Ireland; 25 m. long.
Swindon, *t.*, *mun. bor.*, Wilts, Eng.; in upper Thames Valley (Vale of White Horse), 27 m. S.W. of Oxford; gr. rly. wks.; impt. rly. junction; mkt. for local dist.; heavy engin., textiles, tobacco, cars; p. (1951) *68,932*.
Swinemünde, *see* Świnoujscie.
Świnoujscie (Swinemünde), *spt.*, Pomerania, Poland, German before 1945; on I. of Usedom (Uznam), Baltic Sea; spt. for Szczecin; spa and summer resort; p. (1946) *5,771*.
Swinton, *t.*, *urb. dist.*, W.R. Yorks, Eng.; in Don valley, 3 m. N.E. of Rotherham; coal, iron, potteries, bricks and tiles; p. (1951) *11,922*
Swinton and Pendlebury, *mun. bor.*, Lancs, Eng.; 5 m. W. of Manchester; cotton spinning, coal, engin., accumulator mftg.; p. (1951) *41,294*.
Switzerland, *fed. rep.*, Cen. Europe; upland region, with Jura Mtns. on N. and Alps to S.; dairying, butter, cheese, chocolate, etc., wine; watches and clocks, elec. machin.; very dependent on lge. tourist tr.; 4 national languages; cap. Bern; a. 15,944 sq. m.; p. (1950) *4,714,992*.
Sydenham, *S.E.*, *subn. dist.*, London, Eng.; residtl.; site of the Crystal Palace, burnt down 1936.
Sydney, *c.*, *cap.*, N.S.W., Australia; principal spt. on shore of Pt. Jackson Bay; many beautiful bdlgs. and parks, stretching S. to Botany Bay; has univ.; lge. comm. and active inds.; magnificent bridge, harbour and docks; p. (1958) *2,016,620*.
Sidney or S. Sydney, *spt.*, C. Breton I., Nova Scotia; iron and steelwks., coal, chemicals; p. (1956) *32,162*.
Sydney Mines, *t.*, Nova Scotia, Canada; coal; p. (1956) *8,731*.
Syktyvkar, *t.*, R.S.F.S.R.; on Vychegda R.; sawmilling, engin.; p. (1959) *64,000*.
Sylhet, *t.*, E. Pakistan; weaving and bamboo goods; p. *28,128*.
Syra, *I.* of the Cyclades, Ægean Sea; part of Greece; p. (1940) *27,663*.
Syracusa, *t.*, Sicily, Italy; on I. of Ortygia, off E. cst.; cath.; exp. olive oil, oranges, lemons, locust beans, almonds, wine, chemicals, pottery, etc; chemicals at Priolo; p. (1951) *70,300*.
Syracuse, *c.*, N.Y., U.S.A.; chemicals, salt, machin., motor cars, elec. appliances, woollens; seat of Syracuse Univ.; p. (1950) *220,583*.
Syr Darya, *R.* Kazakhstan, U.S.S.R.; flowing into Aral sea.
Syria, *rep.*, S.W. Asia; united with Egypt Feb. 1958 to form United Arab Republic which federated with Yemen April 1958 to form United Arab States; stretches along E. shore of Mediterranean and E. to the R. Euphrates; chiefly agr.; cereals, olives, fruit, goats, sheep; silk, wool; cap. Damascus; a. 66,046 sq. m.; p. (estd. 1950) *3,252,687*.
Syzran, *t.*, R.S.F.S.R.; on R. Volga; petroleum refining, engin.; p. (1959) *148,000*.
Szarvas, *t.*, Hungary, S. of Mezötúr; industl.
Szczecin, *prov.*, Poland; cap. Szczecin; a. 12,100 sq. m.; p. (estd. 1950) *512,681*.
Szczecin (Stettin), *spt.*, Pomerania, Poland, German before 1945; at mouth of R. Odra (Oder); cas.; engin., iron, textiles, paper; birthplace of Russian Empress Catherine II; p. (1957) *244,000*.
Szczecinek (formerly German **Neustettin**), *t.*, W. Polish Pomerania; p. *15,000*.
Szechwan, *prov.*, China; cereals, sugar, tea, cotton, silk, coal, iron, salt, petroleum; cap. Chengtu; a. 144,996 sq. m.; p. (1953) *62,303,999*.
Szeged, *t.*, Hungary; on Theiss R., 100 m. S.E. of Budapest; gr. comm. and industl. ctr.; soap, leather, breweries; p. (estd. 1957) *100,600*.
Székesfehérvár, *t.*, Hungary; nr. Budapest; wine, shoes; p. (1941) *47,968*.
Szentes, *t.*, Hungary; p. *34,394*.
Szolnok, *t.*, Hungary; on R. Tisza, E. of Budapest, machin.; p. (1941) *42,011*.
Szombathely, *t.*, Hungary; rly. ctr.; textiles, wine, agr. implements; p. (1941) *42,870*.

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Taasinge, *I.*, Denmark; S. of Fyn; 9 m. long.
Tabarka, *spt.*, Tunisia; mkt. exp. cork, tanning, charcoal; fishing; p. *1,500*.
Tabasco, *maritime st.*, Mexico; on Bay of Campeche, adjoining Guatemala; cacao, sugarcane, tobacco, rubber, pepper, maize, rice and hard-woods; cap. Villa Hermosa; a. 9,782 sq. m.; p. (1950) *361,995*.
Tabatinga, *t.*, Brazil; on junction of Rs. Javari and Amazon.
Table Bay, *inlet of Atlantic*, cst. of C. of Gd. Hope, S. Africa; site of Cape Town.
Table Mountain, C. of Gd. Hope, S. Africa, nr. Cape Town; alt. 3,549 ft.
Tabor, *t.*, Czechoslovakia; S. of Prague, on R. Luznice; trib. of R. Vltava; cigars, beer; p. *17,596*.
Tábor, Mt., N. Palestine; S.E. of Nazareth.
Tabora, *t.*, Central Tanganyika; Brit. E. Africa; at junction of rlys. from Dar es Salaam and L. Victoria; p. *12,768*.
Tabriz, *prov. cap.*, Azerbaijan, Persia; gr. comm. ctr., formerly ch. emporium for the tr. of Persia in the W., much of which is now diverted by the rly. through the Caucasus; dried fruits, carpets; match factories; famous Blue Mosque; p. (1956) *290,195*.
Tabu, *spt.*, Ivory Cst., W. Africa; exp. palm oil, rice, cocoa, coffee.
Tachira, *st.*, Venezuela, S. America; cap. San Cristobal; p. (1941) *245,722*.
Tacna, *dep.*, Peru; terr. transferred by treaty from Chile, 1929; mainly desert; nitrate of soda, silver, copper; subject to earthquakes; a. 4,930 sq. m.; ch. t. T.; p. (1947) *42,070*.

Tacoma, *spt.*, Wash., U.S.A.; on Puget Sound; lge. timber and grain tr., copper smelting; p. (1950) *143,673*.
Tacuarembo, *dep.*, Uruguay, S. America; a. 8,112 sq. m.; cap. Tacuarembo; p. (1953) *119,658*.
Tadcaster, *rural dist.*, *mkt. t.*, on R. Wharfe, W.R. Yorks, Eng.; brewing, stone; p. *25,520*.
Tadmor, *see* **Palmyra**.
Tadoussac, *t.*, Quebec, Canada; on left bank of R. Saguenay, where it enters St. Lawrence R.; tourist ctr.; oldest settlement in Canada (1599).
Tadzhik, *constituent rep.*, U.S.S.R.; mainly farming, cereals, cotton, fruit, horticulture, cattle breeding; minerals, gold, petroleum, coal; cap. Stalinabad; a. 55,700 sq. m.; p. (1959) *1,982,000*.
Taegu, *c.*, S.Korea; silk-spinning and cotton-ginning mills; p. (1949) *313,705*.
Taejon, *t.*, S. Korea; S. of Seoul; fish, petroleum, cereals; p. (1949) *126,704*.
Taff, *R.*, Glamorgan, Brecknock, Wales; rises in Brecon Beacons, flows S.E. across coalfield to Bristol Channel at Cardiff; length 40 m.
Tafilalet, Morocco, N. Africa; oasis of the Sahara, E. of Atlas; ch. t. Abuam; dates.
Taganrog, *spt.*, R.S.F.S.R.; on Sea of Azov; steel, engin.; p. (1959) *201,000*.
Tagliamento, *R.*, N.E. Italy; rises in Carnic Alps, flows S. into Adriatic Sea (G. of Venice); valley used by main rly. from Venice to Vienna via Semmering Pass; length approx. 100 m.
Tagus, *R.*, Spain and Portugal; flows W. across Meseta to Atlantic at Lisbon; length 540 m.
Tahiti, *principal I.*, of Society gr.; Pac. Oc.; fertile cst. land, picturesque; a. 402 sq. m.; cap. Papeete; p. *24,820*.
Tahoe, *L.*, Cal., Nevada, U.S.A.; in Yosemite National Park, Sierra Nevada, at alt. 6,225 ft., surrounded by summer resorts; a. 200 sq. m.
Taichow, *t.*, Chekiang, China; nr. iron-ore mines.
Taif, *t.*, Hejaz, Saudi Arabia; about 50 m. from Mecca; about 5,900 ft. above sea-level; summer resort; honey and fruit; p. *25,000*.
Taihape, *t.*, N.I., N.Z.; 161 m. N.E. of Wellington; in the King Country, on the Hautapu R.; sheep and dairy farming and saw-milling.
Taihoku, *see* **Tei-pei**.
Tai Hu, *L.*, Kiangsu, China; focus of intensive system of sm. canals and waterways 60 m. N. of Shanghai; a. approx. 100 sq. m.
Taima, *t.*, Saudi Arabia; cereals, dates, fruit, tobacco, rock salt.
Taimyr Peninsula, N. cst., Siberia, U.S.S.R.; terminates with C. Chelyuskin.
Tain, *burgh*, Ross and Cromarty, Scot.; on S. side of Dornoch Firth, 20 m. N.E. of Dingwall; p. (1951) *1,602*.
Tainan, *t.*, Taiwan, China; sugar, rice; p. (1957) *229,500*.
Taipei, *cap.*, Taiwan; p. (1957) *759,200*.
Taiping, *t.*, Malaya; p. *41,361*.
Taiwan, *see* **Formosa**.
Taiyuan, (**Yangchu**), *c.*, Shansi, China; on Fuen-Ho; p. (estd. 1956) *500,000*.
Taizz, *t.*, Yemen; mkt. agr. products; p. *4,000*.
Takamatsu, *t.*, Japan; N. cst. Shikoku; gr. tr.; p. (1950) *124,545*.
Takao, *spt.*, Formosa, China ; on S.W. cst.; exp. rice, sugar; p. (estd. 1947) *150,846*.
Takaoka, *t.*, Honshu, Japan; ctr. of rice tr.; lacquer wk.; p. (1950) *142,046*.
Takasaki, *t.*, Honshu, Japan; coal mines, raw silk; p. (1947) *82,582*.
Takoradi, *spt.*, Ghana, W. Africa; as spt. has superseded Sekondi; rly. to Kumasi; exp. cocoa, palm-oil, rubber, bauxite, gold, manganese, industl. gases; p. *5,478*.
Taku, *dockyard*, at mouth of R. Pelho, China, at entrance to Tientsin and Peking.
Talara, *t.*, N. Peru, S. America; on C. Pariñas; p. *14,467*.
Talavera, *c.*, Spain; on Tagus R.; cloth, leather, wine; p. *18,631*.
Talbes, *t.*, Siberia, R.S.F.S.R.; iron and steel.
Talca, *prov.*, Chile; cap. Talca; a. 3,721 sq. m.; p. (1957) *208,463*.
Talca, *t.*, cap. Talca prov., Chile; S. of Santiago; cereals, mixed farming, impt. tr. ctr.; p. (1952) *55,059*.
Talcahuano, *spt.*, Chile, nr. Concepción; naval sta.; p. (1952) *54,782*.
Talence, *t.*, Gironde, France; p. (1954) *22,695*.
Tali, *t.*, Shensi, China; in fertile valley; wheat; p. *50,000*. [27,237.
Tallahassee, *c.*, Fla., U.S.A.; cigars; p. (1950)
Tallahatchee, *R.*, trib. of Miss., U.S.A.; flows S.W. and becomes R. Yazoo; length 240 m.
Tallin, *spt.*, *cap.*, Estonian S.S.R., U.S.S.R.; timber, shipbldg., textiles; p. (1959) *280,000*.
Taltal, *spt.*, Chile; S. of Antofagasta; exp. nitrates and silver; p. *5,659*.
Tamale, *ch. t.*, Northern Terr., Ghana, W. Africa; p. (1948) *16,164*.
Tamar, *R.*, Devon and Cornwall, Eng.; flows S. to Plymouth Sound; length 45 m.
Tamar, *R.*, Tasmania, Australia; rises in N.E. Tasmania, flows W. and N. into Bass Strait nr. Georgetown; navigable 42 m. up to Launceston.
Tamatave, *one of the ch. pts.*, Madagascar; lge. meat-preserving factories; exp. graphite, hides, raffia; p. (1946) *30,411*.
Tamaulipas, *st.*, Mexico; on G. of Mexico, S. of Texas; nitrates, cereals, sugar, coffee, cattle, petroleum; cap. Ciudad Victoria; a. 30,731 sq. m.; p. (1950) *717,267*.
Tambov, *t.*, R.S.F.S.R.; on R. Oka; synthetic rubber, engin., chemicals; p. (1959) *170,000*.
Tammerfors, *see* **Tampere**.
Tampa, bay on W. cst. Fla., U.S.A.; 40 m. long.
Tampa, *t.*, Fla., U.S.A.; popular winter resort, cigar factories, phosphates; p. (1957) *240,000*.
Tampere (**Tammerfors**), *t.*, S. Finland; on rly. between Helsinki and Vaasa; textiles, leather, paper; p. (1959) *122,836*
Tampico, *spt.*, Mexico; on the R. Panuco, 9 m. from the G. of Mexico; fruits, sugar, maize; p. (1940) *84,037*.
Tampico, *R.*, Mexico, flows to G. of Mexico; length 200 m.
Tamworth, *t.*, N.S.W., Australia; on R. Peel; milling; ch. comm. ctr. of Northern Tableland; p. (1958) *17,903*.
Tamworth, *t.*, *mun. bor.*, Staffs, Eng.; on R. Tame, 5 m. S.E. of Lichfield; ancient cas.; coal, light engin.; p. (1951) *12,889*.
Tana, *lge. L.*, N. Ethiopia, nr. Gondar, source of Blue Nile, 45 m. long, 40 m. wide; surrounded by marsh, papyrus swamp.
Tana, *R.*, forming part of bdy. between Finland and Norway, flows into Arctic Ocean.
Tana R., *ch. R.*, Kenya Col., E. Africa.
Tananarive, *c.*, *cap.*, Madagascar; connected by air-line with Paris; ctr. of commerce and communications; lge. meat-preserving factories; p. (1957) *193,162*.
Tanaro, *R.*, N. Italy; trib. of R. Po; 125 m. long.
Tanauan, *t.*, on Luzon I., Philippines.
Tanda, *t.*, Uttar Pradesh, India; nr. R. Gogra; cotton weaving, artificial silk; p. *8,404*.
Tandi, *t.*, Argentina; p. *32,400*.
Tandjoengbalei, *spt.*, Sumatra, Indonesia; exp. tobacco, copra, shipyards.
Tandur, *t.*, Hyderabad, India; coal; p. *8,462*.
Tanga, *spt.*, Tanganyika, Brit. E. Africa; rly. terminus; on plateau overlooking Tanga Bay; p. *11,000*.
Tangalla, *t.*, S. cst. Ceylon.
Tanganyika, *gr. L.*, E. Central Africa; 400 m. long, greatest width 45 m.; a. about 12,700 sq. m.; 2,800 ft. above sea; discovered by Burton and Speke in 1868, and since explored by Livingstone, Stanley and others.
Tanganyika Terr., *Brit. Trusteeship*, E. Africa; former German E. Africa; climate tropical, varies with elevation; ch. prod., sisal, coffee, cotton, groundnuts, pyrethrum, copra, ebony, hardwoods; cap. Dar es Salaam; a. 362,688 sq. m.; p. (1957) *8,762,470* (inc. *20,598* Europeans).
Tanimbar Is., S. Moluccas, Indonesia; gr. of 66 islands; forests, swamps; maize, rice, coconuts, sago; p. *31,847*.
Tangier, *spt.*, Morocco, N. Africa; on Strait of Gibraltar; ceded to Eng. in 1662 when Catherine of Braganza married Charles II, but abandoned to the Moors 22 years later; no longer internationalised zone but integral part of kingdom of Morocco; cigarettes, fishing; p. of t. (estd. 1947) *84,628*.
Tanjong Pandan, *spt.*, Billiton, Sumatra, Indonesia; exp. tin; p. *11,589*.
Tanjore, *t.*, Madras, India; silks, carpets, jewellery, inlaid metals; impt. Brahman ctr.; p. (1951) *100,680*.
Tanta, *t.*, Lower Egypt; 55 m. N. of Cairo; impt. rly. junction; religious fairs; p. (1948) *139,816*.

Tapachula, *ch. t.*, S. Mexico; coffee, cattle, tobacco, sugar refineries, sawmills; p. (1940) *43,032*.
Tapajóz, *R.*, trib. of R. Amazon.
Tapti, *R.*, W. India; flows W. to G. of Cambay at Surat from Betul dist., Madhya Pradesh; length 450 m.
Tapungato, *mtn.*, W. Argentina; alt. 22,300 ft.
Taquari, *R.*, Brazil; trib. of R. Paraguay; length 400 m.
Tara, *R.*, Siberia, R.S.F.S.R.; trib. of R. Irtysh; length 200 m.
Tarakan, *spt.*, Borneo, Indonesia; on Tarakan I.; oil; p. (of I.) *12,000*.
Taranaki, *prov.*, N.I., N.Z.; a. 3,750 sq. m.; p. (estd. 1958) *97,000*.
Taranto, *t.*, Lecce, Italy; on G. of Taranto, inlet of Ionian Sea; maritime arsenal with gr. comm. and industl. interests; strong cas.; cottons, velvets, soap, oil; famous for its oyster and mussel fisheries; p. (1951) *167,166*.
Tarapaca, *prov.*, N. Chile; rich in nitrates and silver; cap. Iquique; a. 21,340 sq. m.; p. (1957) *123,365*.
Tarascon, *t.*, Bouches-du-Rhône, France; connected by bridges with Beaucaire on opposite bank of R. Rhône; old cas., famous festival; silk and fruit; p. (1954) *7,744*.
Tarbat Ness, *promontory*, N. Side of Moray Firth, Ross and Cromarty, Scot.
Tarbes, *t.*, *cap.*, Hautes-Pyrénées, France; on R. Adour; cath., paper, flax, woollens, machin., aircraft, leather; p. (1954) *40,242*.
Taree, *t.*, N.S.W., Australia; dairying, agr., fishing, oysters, timber, limestone; p. (1958) *10,105*.
Târgu-Jiu, *t.*, Romania; coal, petroleum, timber; p. *17,698*.
Târgul-Mures, *t.*, Romania; on R. Maros; famous old fort, with Gothic Calvinist cath., where in 1571 religious liberty was promulgated for the first time in Europe; gd. tr.; p. (1945) *41,118*.
Tarifa, *c.*, Cadiz, Spain; on Gibraltar Strait; fish tr., cereals, oranges, wines; p. *14,815*.
Tarija, *prov.*, Bolivia; cap. Tarija; a. 24,786 sq. m.; p. (1950) *126,752*.
Tarija, *t.*, *cap.*, Tarija prov., Bolivia; S.E. of Potosi; gd. tr.; p. (1957) *19,089*.
Tarim, *t.*, Aden Prot., Arabia; mkt.; religious teaching ctr.
Tarkastad, *t.*, C. of Gd. Hope, S. Africa; sheep; rich arable land; p. *2,877*.
Tarma, *t.*, Peru, S. America; alt. 9,980 ft.; alfalfa, maize, beans; p. *7,876*.
Tarn, *R.*, France; trib. of R. Garonne; has famous rocky gorge 31 m. long in its upper course; length 235 m.
Tarn, *dep.*, S. France, watered by Tarn and its tribs.; wheat and wine; cap. Albi; a. 2,232 sq. m.; p. (1954) *308,197*.
Tarn-et-Garonne, *dep.*, W. France; corn, wine, woollens, paper, silk; cap. Montauban; a. 1,440 sq. m.; p. (1954) *172,379*.
Tarnopol, *see* **Ternopil**.
Tarnow, *t.*, Poland; E. of Kraków; agr.; farm implements, glass; industl. development since 1950; p. (1957) *62,000*.
Tarragona, *prov.*, Spain; on the Mediterranean; vineyards and agr.; cap. Tarragona; a. 2,426 sq. m.; p. (1950) *356,811*.
Tarragona, *fortfd. spt.*, cap. Tarragona, Spain; at mouth of R. Franconi; mnfs. alcohol, liqueurs, chocolate, paper, silk, fish-salting; p. (1949) *4,211*.
Tarrasa, *t.*, Barcelona, Spain; in fruit and vine-growing dist.; royal college; thriving inds.; p. (1950) *58,880*.
Tarsus, *ancient c.*, Turkey; nr. Adana, opposite Cilician Gates; surrounded by orange and citron groves; ruined Roman temple; birthplace of Apostle Paul; exp. cotton, wool, hides; p. *28,789*.
Tartary or **Tatary**, *region*, Central Asia; now divided into Chinese or E. Turkestan, and W. Turkestan, U.S.S.R.
Tartary, Gulf of, *arm of the Sea of Japan*, separating Sakhalin from the Siberian mainland.
Tartu (formerly **Dorpat**), *t.*, Estonian S.S.R.; engin.; p. (1959) *74,000*.
Tarudant, *t.*, Morocco, N. Africa; mkt., orange water, leather, pottery, copper and brass; p. *12,877*.
Tashkent, *cap.*, Uzbek. S.S.R. on Syr Darya R.; has extensive silk mnfs.; engin; p. (1959) *911,000*.
Tasman Bay, *lge. inlet*, S.I., N.Z.; penetrates N. cst., between Separation Point and D'Urville I.; enclosed by mtns., sheltered, fertile, coastal fringe; ch. ts. Nelson, Motueka.
Tasman Glacier, S.I., N.Z.; one of the lgst. in the world.
Tasmania (formerly **Van Dieman's Land**), *I.*, *st.*, Australia; plateau with fertile valleys; temperate climate; forest and grasslands, grain, fruit, cattle-raising; copper, coal, zinc, lead, tin, silver; whaling; mnfs. being developed; cap. Hobart; a. 26,215 sq. m.; p. (estd. 1958) *336,516*.
Tatar, *autonomous Soviet-Socialist rep.*, U.S.S.R.; ch. t. Kazan on R. Volga; p. *3,000,000*.
Tatra Mtns. (**High Tatra**), highest Carpathian gr., Czechoslovakia, alt. 8,743 ft.
Taubaté, *t.*, Brazil; p. *28,070*.
Tauber, *R.*, Germany; trib. of R. Main; l. 74 m.
Taunton, *co. t.*, *mun. bor.*, Somerset, Eng.; on R. Tone at W. end of Vale of Taunton; old cas.; apples, cider, clothing tr., engin., plastics; p. (1951) *33,613*.
Taunton, *c.*, Mass., U.S.A.; cotton, iron foundries; p. (1950) *40,109*.
Taunus, *mtn. range*, Hessen, Germany; between the R. Lahn and the Rs. Rhine and Main.
Taupo, *L.*, N.I., N.Z.; lgst. L. in N.Z.; geysers, hot springs in vicinity; 25 m. by 17 m.
Taurida or **Krim**, *dist.*, Crimean Peninsula, U.S.S.R., separated from Ukraine by Perekop Peninsula, divided by R. Salgir; a. 24,540 sq. m.; wheat, tobacco, fruit.
Taurus Mtns., *range*, S. Turkey.
Tavastehus (**Häme**), *dep.*, Finland; cap. Tavastehus; a. 7,118 sq. m.; p. (1940) *420,438*.
Tavira, *t.*, S. Portugal; fishing; p. *12,364*.
Tavistock, *mkt. t.*, *urb. dist.*, Devon, Eng.; on R. Tavy, 12 m. N. of Plymouth; impt. mkt.; p. (1951) *15,889*.
Tavoy, *t.*, Burma; between Siam and the Bay of Bengal, W. of Bangkok; rice, tin-mining; p. *29,018*.
Tavy, *R.*, Devon, Eng.; trib. of R. Tamar; length 20 m.
Taw, *R.*, Devon, Eng.; flows from Dartmoor to Barnstaple Bay; length 50 m.
Taxco, *t.*, Mexico; alt. 5,600 ft.; gold- and silver-mining; tourist ctr.; p. (1940) *26,704*.
Tay, *R.*, Scot.; flows S.E. from Loch Tay in Perth, to the Firth of Tay; longest R. in Scotland.
Tay Bridge, *rly. bridge*, E. Scot.; spans Firth of Tay from Wormit (Fife) to Dundee (Angus); carries main E. cst. rly. from Edinburgh to Aberdeen; length 2 m.
Tay, Firth of, *lge. inlet*, E. cst. Scot.; extends inland almost to Perth; length 27 m., max. width 3 m.
Tayabas, *t.*, Luzon, Philippines; on slope of extinct volcano Banajao; in rice- and coconut-growing dist.
Tayeh, *industl. t.*, Hupeh, China; lies to S. of Yangtze-Kiang, 42 m. S.E. of Wuhan; ctr. of very impt. iron-ore deposits; iron and steel inds., heavy engin.
Tayport, *burgh*, Fife, Scot.; at entrance to Firth of Tay; opposite Broughty Ferry; linen, jute; p. (1951) *3,222*.
Taz, *R.*, Siberia, R.S.F.S.R.; flows to Bay of Tazovsk in Gulf of Obi; length 300 m.
Tbilisi (**Tiflis**), *cap.*, Georgian S.S.R., petroleum refining, engin., textiles; p. (1959) *694,000*.
Tchernjachowsk (**Insterburg**), *t.*, E. Prussia, U.S.S.R.; German before 1945; cattle mkt., rly. junction; p. (estd. 1939) *48,000*.
Tczew (**Dirschau**), *t.*, Pomerania, Poland; on R. Vistula; rly. wks., sugar, agr. implements; p. *21,000*.
Team Valley, Durham, Eng.; impt. trading estate has been developed here.
Te Aroha, *t.*, N.I., N.Z.; between Hamilton and Thames; one of the ch. resorts in the thermal springs dist.; p. (1951) *2,664*.
Te Awamutu, *t.*, N.I., N.Z.; S. of Hamilton agr. and dairying dist.; p. (1951) *3,874*.
Tebessa, *t.*, Algeria; alt. 2,789 ft.; mkt.; embroidery, carpets; phosphate deposits near by; p. (1946) *18,293*.
Tecuci, *t.*, Romania; N.W. of Galati; battle, 1476; p. *2,029*.
Teddington, *t.*, Middx., Eng.; sub. of London; on R. Thames; National Physics Laboratory.

Tedzhen, *R.*, Turkmen and N. Persia; flowing into Hari-Rud.
Tees, *R.*, N. Eng.; flows E. from Pennines to N. Sea between Yorks and Durham; length 70 m.
Teffe, *R.*, Brazil; trib. of R. Amazon; length 500 m.
Tegal, *spt.*, Java, Indonesia; sugar mnfs. and exp.; p. *43,015.*
Tegucigalpa, *cap.*, Honduras, central America; lies on R. Choluteca; alt. 3,200 ft. above sea-level; univ.; an Inter-Ocean Highway, connecting the t. with both the Caribbean Sea and the Pacific, is being constructed; bananas; p. (1945) *55,715.*
Tehran, *c.*, *cap.*, Persia; became the residence of the Shah at end of 18th century; stands 70 m. due S. of the Caspian; alt. 3,447 ft.; a. (within the bastions) 7½ sq. m.; glass, small arms, ammunition, chemical and match factories; has twelve gates, closed at night; nuclear ctr. for Central Treaty Organisation; p. of t. and dist. (1956) *1,513,164.*
Tehri-Garhwal formerly Himalayan princely st., India, now merged tog with Kampur and Benares, into st. of Uttar Pradesh; p (estd). *412,047.*
Tehuantepec, *t.*, Mexico; on the Tehuantepec R., nr. the Pacific cst. of the Isthmus; once an Indian cap.; cath.; p. *6,731.*
Tehuantepec, Isthmus of, separates G. of Mexico from the Pacific at narrowest point of Mexico; width 130 m.
Teifi, *R.*, S.W. Wales; rises in Cambrian Mtns. nr. Strata Florida, flows S.W. and W. into Cardigan Bay 14 m. N.E. of Fishguard; forms bdy. between Cardigan and Carmarthen, Cardigan and Pembroke; sm. flannel ind. in ts. and vils. in lower valley; length 94 m.
Teign, *R.*, Devon, Eng.; flows to sea at Teignmouth from Dartmoor; length 30 m.
Teignmouth, *t.*, *urb. dist.*, Devon, Eng.; at mouth of R. Teign, 13 m. S. of Exeter; resort; yacht-bldg.; p. (1951) *10,589.*
Tei-pei (Taihoku), *c.*, *cap.*, Formosa (Taiwan), China; on cst. plain at N. end of I. of Formosa; p. (estd. 1946) *271,754.*
Tekirdag, *t.*, Turkey; on Sea of Marmara, W. of Istanbul; grain; p. (1945) *14,780.*
Tela, *spt.*, Honduras Central America; on Atlantic cst.; p. *10,454*
Tel Aviv, *c.*, Israel, founded by Zionists, 1909; first all-Jewish c.; many mnfs.; p. with Jaffa (estd. 1951) *370,000.*
Telemark, *co.*, Norway; a. 5,837 sq. m.; p. (1950) *136,371.*
Tellicherry, *t.*, *spt.*, Madras, India; exp. coffee, cardamons, sandalwood, and coconuts; p. (1941) *36,320.*
Telok Anson, *t.*, Perak, Malaya; p. *23,055.*
Telok Betong, *spt.*, Sumatra, Indonesia; exp. pepper, agr. products; p. *25,170.*
Teme, *R.*, on border of Wales and Worcester, Eng.; trib. of R. Severn; length 70 m.
Temes, *R.*, S.W. Romania; flows to R. Danube, nr. Belgrade; length 180 m.
Temir-Tau, *t.*, Kazakh S.S.R.; p. (1959) *54,000.*
Temora, *t.*, N.S.W., Australia; gold, wheat; p. (1947) *4,113.*
Temple, *rly. t.*, Texas, U.S.A.; in cotton-growing dist.; p. (1950) *25,467.*
Templemore, *mkt. t.*, *urb. dist.*, Tipperary, Ireland; on R. Suir; p. (1951) *1,964.*
Temuco, *t.*, Chile; p. (1952) *51,497.*
Tenasserim, *div.*, lower Burma; on Siamese border; tin, rice; p. *2,110,420.*
Tenasserim, *t.*, lower Burma; on cst. at mouth of R. Tenasserim; length 250 m.; p. *10,000.*
Tenbury, *mkt. t.*, Worcs, Eng.; 5 m. S.E. of Ludlow; p. *1,922.*
Tenby, *mkt. t.*, *mun. bor.*, Pembroke, Wales; on W. side of Carmarthen Bay, Bristol Channel; seaside resort; p. (1951) *4,597.*
Tenedos, *I.*, Ægean Sea; off W. cst. Turkey; 7 m. long; Turkish possession.
Tenerife, *I.*, Canary Is.; tourist resort; wheat, fruits, wines; contains extinct volcanic peak of Tenerife; alt. 12,182 ft.; cap. Santa Cruz; a. 782 sq. m.; p. *73,120.*
Tengri-Nor, *L.*, Tibet; N.W. Lhasa; 80 m. long, 40 m. wide.
Tengyüeh, *former treaty pt.*, China; p. (1931) *19,000.*
Tennessee, *R.*, Tenn., Ky., U.S.A.; lgst. and most impt. branch of the Ohio; its valley once liable to flooding, now controlled by dams, and land improved by the Tennessee Valley Authority; length 782 m.
Tennessee, *S. central st.*, U.S.A.; between Mississippi R. and the Appalachian Mtns.; agr.: cotton, pecans, sorghum, maize; oil, natural gas, lignite, cement, salt; inds.: chemicals, synthetic rubber, primary magnesium (from sea-water), steel wks.; cap. Nashville; ch. pt. Memphis; a. 42,244 sq. m.; p. (1950) *3,291,718.*
Tenos, *I.*, Greek Archipelago, Ægean Sea; one of the Cyclades.
Tenterden, *mkt. t.*, *mun. bor.*, Kent, Eng.; 8 m. N. of Rye; church with famous steeple; p. (1951) *4,225.*
Tepic, *cap.*, Nayarit st., Mexico, U.S.A.; p. (1940) *33,239.*
Teplice-Sanov, *wat. pl.*, former prov. of Bohemia, N.W. of Prague; textile and hardware inds.; p. (1957) *37,940.*
Teramo, *prov.*, Abruzzi, Italy; a. 1,067 sq. m.; cap. Teramo; p. *240,183.*
Teramo, *t.*, Italy; pottery and silks; ancient Interamnium; p. (1951) *38,751.*
Terek, *R.*, N. Caucasia, R.S.F.S.R.; flows to Caspian Sea; length 350 m.
Teresina, *t.*, *cap.*, Piaul st., Brazil; cotton and thread factory; p. (1947) *77,228.*
Termini, *spt.*, Sicily, Italy; S.E. of Palermo; tunny fishing, macaroni, olive oil; wine, sulphur; p. *19,050.*
Ternate, Moluccas Is., Indonesia; sago, spices; p. (1930) *19,533.*
Terneuzen, *t.*, Neth.; on W. Schelde R.; p. *11,494.*
Terni, *t.*, Perugia, Italy; amongst the Apennines; iron and steelwks., arms factory, jute; p. (1951) *83,931.*
Ternopil (Tarnopol), *t.*, Ukrainian S.S.R.; E. of Lvov; engin.; p. (1959) *52,000.*
Terranova, *t.*, Sardinia, Italy; on N.E. cst.; textiles, fishing; p. *10,157.*
Terre Adélie, name given to Fr. terr. and I. in Antarctic; estd. a. 160,000 sq. m.
Terre Haute, *c.*, Ind., U.S.A.; coal, natural gas, flour, paper, glass, foundries; p. (1950) *64,214.*
Terschelling, *I.*, Frisian Is., Neth.; at entrance to Zuyder Zee.
Teruel, *prov.*, S. Aragon, Spain; timber forests, coal, weaving, etc.; cap. Teruel; a. 5,721 sq. m.; p. (1950) *236,002.*
Teruel, *t.*, *cap.*, Teruel prov., on R. Turia; cath.; p. (1949) *19,047.*
Teschen, *see* **Cesky Têsin.**
Teslin Lake, S. of Yukon, N.W. Terr., Canada; source of R. Lewes.
Test or Anton, *R.*, Hants, Eng.; flows to head of Southampton Water; a well-known trout stream.
Tettenhall, *urb. dist.*, Staffs, Eng.; industl.; p. (1951) *7,742.*
Tetuan, *ch. spt.*, Morocco, N. Africa; p. (1945) *93,658.*
Tetyukhe, *t.*, R.S.F.S.R.; on cst. N.E. of Vladivostock; cadmium refinery; p. *5,000.*
Teutoburger Wald, *mtn. range*, Germany.
Teviot, *R.*, Roxburgh, Scot.; trib. of R. Tweed; length 37 m.
Tewkesbury, *mkt. t.*, *mun. bor.*, Glos, Eng.; on R. Avon, 1 m. above confluence with R. Severn; old houses, Norman Abbey, milling, light engin.; p. (1951) *5,292.*
Texarkana, *c.*, Texas and Ark., U.S.A.; bdy. passes down middle of main street, timber and cotton region; rly. wkshps.; total p. (1950) *40,628.*
Texas, *st.*, S.W. U.S.A.; a. 263,644 sq. m.; prairie, mtns. in W.; leading cotton-producing st., also cereals, fruits, etc., petroleum (leading st.), coal, sulphur, mnfs., flour, cotton-seed oil, etc.; cap. Austin; ch. pt. Galveston; a. 267,339 sq. m.; p. (1950) *7,711,194.*
Texel, *I.*, W. Frisian Is., Neth.; a. 83 sq. m.; scene of several naval battles.
Tezcuco or Texocco, *L.*, Mexico; a. 77 sq. m.; less than 2 ft. deep; contains no fish.
Thame, *mkt. t.*, *urb. dist.*, Oxford, Eng.; on R. Thame, 7 m. S.W. of Aylesbury; p. (1951) *3,585.*
Thame, *R.*, trib. of R. Thames, Eng.; length 35 m.
Thames, *R.*, Eng.; rises in the Cotswold Hills,

Glos. and flows past Oxford, Reading, Windsor and London to the Nore; length 209 m.

Thames, *R.*, Ontario, Canada; flows into L. St. Clair; length 160 m.

Thames, *R.*, N.Z., flows N. to G. of Hauraki; length 86 m.

Thameshaven, *lge. oil refinery*, Essex, Eng.; on N. cst. of Thames estuary 8 m. below Tilbury.

Than Hoa, *t.*, Viet-Nam, Indo-China; mkt. and agr. ctr.; rice; p. *25,000*.

Thanet, I. of, *lge. promontory*, N.E. extremity, Kent, Eng.; formed by bifurcation of R. Stour; contains Margate, Ramsgate and Broadstairs, with other seaside resorts.

Thar Desert, on bdy. between India and W. Pakistan; covers slopes between N.W. Deccan and irrigated valley of R. Indus; completely barren, lack of Rs. or level land prevents irrigation; crossed only by caravan routes.

Tharawaddy, *dist.*, Pegu, Burma; mainly forest, with rice fields in the clearings; p. *7,131*.

Thaton, *dist.*, Tennasserim div., Burma; rice and tobacco.

Thaxted, *mkt. t.*, Essex, Eng.; nr. source of R. Chelmer, 5 m. S.E. of Saffron Walden; p. *1,596*.

Thaya, *R.*, Austria; trib. of the R. March; length 130 m.

Thayetmyo, *dist. t.*, Pegu div., Burma; forest, rice, tobacco; p. (of t.) *9,279*.

Thebes, *ruined ancient cap.*, Upper Egypt; on both banks of R. Nile; site now partly occupied by vils. Karnak and Luxor; impt. arch. discoveries in Valley of the Kings in 1923.

The Congo, Republic of, rep. within Fr. Community, formerly Middle Congo, Equatorial Africa; cap. Brazzaville; a. 166,069 sq. m.; p. (estd. 1957) *749,300* Africans; *10,424* Europeans.

Theiss, *see* **Tisa**.

Theodore, *t.*, Queensland, Australia; on R. Dawson; irrigation; cotton, fodder crops.

The Pas, *t.*, Manitoba, Canada; on R. Saskatchewan 80 m. upstream from L. Winnipegosis; rly. junction on line from Prairie Provs. to Churchill on Hudson Bay; branch line to Flin Flon.

The Sound, *see* **Sound, The**.

The West Indies, new Federation 1957, comprising British Colonies of Antigua, Barbados, Dominica, Grenada, Jamaica, Montserrat, St. Kitts-Nevis and Anguilla, St. Lucia, St. Vincent, and Trinidad and Tobago; fed. cap. Chaguaramas, Trinidad.

Thera, *volcanic I.*, Greek archipelago, Ægean Sea; 10 m. long; cap. Thera.

Thermopylæ or **Pylæ**, celebrated pass between Mt. Æta and the sea, N.E. Greece; battle between Persians and Spartans, 480 B.C.

Thesprotia, *prefecture*, Epirus, Greece; cap. Hegoumenitsa; p. (1951) *47,565*.

Thessaloniki (Salonika), *prefecture*, Greece; p. (1951) *459,956*.

Thessaloniki, *t.*, Greece; at head of G. of Thessaloniki; woollens, soap, cottons, brewing, import and exp. tr.; contains fiscal free zone; p. (1951) *217,049*.

Thessaly, *dist.*, Central Greece; containing two main prefectures, Larisa and Trikkala; horse-breeding; a. 5,208 sq. m.; p. (1940) *579,145*.

Thetford, *t.*, *mun. bor.*, Norfolk, Eng.; on Little R. Ouse; fruit and vegetable canning, pulp mftg., engin.; p. (1951) *4,445*.

Thetford Mines, *t.*, Quebec, Canada; asbestos mining ctr.; p. *12,716*.

Thielt, *t.*, Belgium; 17 m. W. of Ghent; lace, wool, cotton, linen; p. (1938) *12,478*.

Thiers, *t.*, Puy-de-Dôme, France; cutlery; p. (1954) *16,243*.

Thiès, *t.*, Senegal, Mali, W. Africa; rly. ctr. and wkshps.; groundnuts; p. (1948) *24,000*.

Thionville, *t.*, Moselle, N. France; nr. Luxembourg border; fruit, vegetables, tanning, brewing; p. (1954) *23,054*.

Thirlmere, *L.*, Cumberland, Eng.; 3 m. long; furnishes part of the water supply of Manchester by a conduit of 96 m.

Thirsk, *mkt. t.*, *rural dist.*, N.R. Yorks, Eng.; in wide gap between Pennines and Cleveland Hills, 7 m. S.E. of Northallerton; flour, farm implements; p. (rural dist. 1951) *13,525*.

Thisted, *t.*, Thyland, Denmark; on Lim Fjord; p. *9,425*.

Thok-Jalung, *t.*, Tibet; in Aling Kangri Mtns.; gold-mining ctr.

Thomar, *t.*, Portugal; paper, cheese; route ctr.; p. *11,333*.

Thomasville, *c.*, Ga., U.S.A.; cotton region; p. (1950) *14,424*.

Thompson, *R.*, B.C., Canada; rises in Monashee Mtns. flows S.W. into R. Frazer 140 m. upstream from Vancouver; valley forms impt. routeway used by trunk rlys. from Vancouver E. towards Yellowhead Pass (Canadian National Rly.) and Kicking Horse Pass (Canadian Pacific Rly.); length approx. 280 m.

Thonon-les-Bains, *t.*, Haute Savoie, France; resort on L. Geneva; p. (1954) *14,016*.

Thornaby-on-Tees, *t.*, *mun. bor.*, N.R. Yorks; opposite Stockton-on-Tees; heavy engin., wire ropery, flour and sugar milling; p. (1951) *23,413*.

Thornbury, *mkt. t.*, *rural dist.*, Glos, Eng.; 10 m. N. of Bristol; aircraft mftg.; p. (rural dist. 1951) *25,848*.

Thornton Cleveleys, *t.*, *urb. dist.*, Lancs, Eng.; 4 m. N.E. of Blackpool; p. (1951) *15,437*.

Thörshavn, *cap.*, Faroe Is.; p. (1945) *3,600*.

Thousand Isles, *L.*, at outfall of L. Ontario; the islets really number 1,500–1,800, and are partly situated in N.Y. State and partly in Canada.

Thrace, ancient name of terr. in S.E. Europe, part of which has been added to Greece; successively under Macedonian, Roman, Byzantine and Turkish rule, before passing to Greece; tobacco; a. 3,315 sq. m.; p. (1951) *336,736*.

Three Points, *c.*, Ghana; W. extremity of Bight of Benin.

Three Rivers (Trois Rivières), *c.*, *pt.*, Quebec, Canada; at confluence of St. Maurice and St. Lawrence Rs.; wood-pulp mnf.; exp. grain, cattle; p. (1956) *50,483*.

Thule, N.W. Greenland; 1,000 m. from N. Pole; American air base, regular services planned; spt. open only 2–3 mths. per annum.

Thun, *L.*, Berne can., Switzerland; occupies valleys of R. Aar where it leaves Alpine region; separated from L. Brienz by deltaic neck of land on which is situated Interlaken; a. 35 sq. m.

Thun, *t.*, Berne, Switzerland; on N.W. end of L. Thun, 16 m. S.E. of Berne; mil. training ctr.; cas. on hill above t.; p. (1941) *20,239*.

Thur, *R.*, Switzerland; flows to R. Rhine, nr. Schaffhausen; length 70 m.

Thurgau, *can.*, N.E. Switzerland, on L. Constance, watered by Thur R.; dairying, fruit, textiles; cap. Frauenfeld; a. 388 sq. m.; p. (1950) *149,738*.

Thuringia, *st.* or *Land*, Germany; situated between Franconia, the Harz Mtns., and the Rs. Saale and Werra and comprising in great part the mountainous Thüringer Wald dist.; oats, potatoes, potash; a. 6,022 sq. m.; p. (1946) *2,927,497*.

Thuringian Forest or **Thüringer Wald**, *wild, wooded hill range*, Central Germany; 95 m. long; famous for romantic scenery and legends.

Thurles, *mkt. t.*, Tipperary (N. Riding), Ireland; on R. Suir; horse fair; p. (1951) *6,276*.

Thursday, *I.*, Torres Strait, Queensland; pearl and trochus fishery ctr.; p. (1957) *1,550*.

Thurso, *burgh*, Caithness, Scot.; on Thurso Bay; most N. t. on Scottish mainland; ancient stronghold of the Northmen; p. (1951) *3,203*.

Tiaret, *t.*, W. Algeria, N. Africa; in strategic pass; walled; agr. mkt.; cereals, wool, cattle; p. *22,344*.

Tiber, *R.*, Italy; flows from Apennines to Mediterranean, passing through Rome; l. 220 m.

Tiberias, *t.*, Israel; on Sea of Galilee (Lake Tiberias); gypsum quarried near by; inland pt.; p. (1946) *11,810*.

Tibesti, *mtns.*, on bdy. between Libya and Fr. W. and Equatorial Africa; barren in spite of slight rainfall; mainly above 6,000 ft., maximum alt. 11,155 ft.

Tibet, *lofty plateau*, Central Asia; called the "Roof of the World," its lowest plains being 12,000 ft. above sea-level; semi-desert; Chinese suzerainty restored, 1951; exp. wool, musk, gold, skins, and drugs; cap. Lhasa; a. 70,003 sq. m.; p. about *6,000,000*.

Ticino or **Tessin**, *can.*, Switzerland; forests, vineyards, olives, and agr.; contains parts of L. Maggiore and L. Lugano; cap. Bellinzona; lgst. t. Lugano; a. 1,086 sq. m.; p. *175,055*.

Ticino, *R.*, Switzerland and Italy; trib. of Po; forms S. approach to St. Gotthard Pass; length 150 m.

Tickhill, *urb. dist.*, W.R. Yorks, Eng.; cas.; p. (1951) *2,550*.
Tidore I., Moluccas, Indonesia; coffee, tobacco, fruit; a. 30 sq. m.; p. *19,126*.
Tien Shan or Celestial Mtns., *lofty chain*, N. frontier Chinese Turkestan; highest peak 24,000 ft.
Tientsin, *former treaty pt.*, *mun. prov.*, Hopei, China; 70 m. S.E. Peiping; cottons, silks; exp. wool, skins, soya-beans; p. (1953) *2,693,831*.
Tierra del Fuego, *archipelago*, extreme S. America, separated from Patagonia by Strait of Magellan, divided politically between Chile and Argentina; a. (Argentine part) 8,344 sq. m.; p. *7,600*.
Tiffin, *c.*, Ohio, U.S.A.; milling, brewing, foundries; p. (1950) *18,952*.
Tiflis, *see* Tbilisi.
Tigre, *st.*, Ethiopia, formerly an independent kingdom; cap. Adua.
Tigre, *R.*, S. America; rises in Ecuador and flows mainly through Peru to the R. Marañon (Amazon); length 400 m.
Tigris, *R.*, Turkey; rising in mtns. of Armenia and Turkestan, flowing S.E. to join the Euphrates 40 m. N.W. of Basra; length 1,100 m.
Tihwa (**Urumchi**), *t.*, Sinkiang, China; p. (estd. 1945) *80,000*.
Tijuco, *see* Diamantina.
Tikhvin, *t.*, R.S.F.S.R.; on R. Syas; aluminium ores; p. (1954) *50,000*.
Tilburg, *t.*, N. Brabant, Neth.; nr. Breda; flourishing woollens, mnfs., tobacco, leather; p. (estd. 1955) *128,000*.
Tilbury, *t.*, Essex, Eng.; on N. bank of R. Thames, 20 m. E. of London; docks; shoe mftg.
Till, *R.*, N. Northumberland, Eng.; trib. of R. Tweed; length 32 m.
Tillicoultry, *burgh*, Clackmannan, Scot.; on Devon R.; woollen, worsted, paper mkg.; p. (1951) *3,818*.
Tilmanstone, *mining vil.*, Kent, Eng.; on N. flank of N. Downs, 4 m. S.W. of Deal; on Kent coalfield, coal despatched by overhead cable to Dover.
Timaru, *t.*, S.I., N.Z.; wool, milling, skins; p. (estd. 1958) *25,500*.
Timbuktu, Fr. Sudan, Africa; 8 m. N. of the N. bend of R. Niger, on border of the Sahara desert; agr. tr. ctr.; p. (1957) *7,000*; flourished as comm. mart and Moslem ctr., 14–16th cent.
Timisoara, *t.*, W. Romania; impt. comm. and industl. ctr., tobacco, petroleum, paper; fortress, cas., cath.; p. (1956) *142,251*.
Timmins, *t.*, Ontario, Canada; gold; p. (1941) *28,790*.
Timor, *Portuguese possession*, E. Indies; consists of E. part of T.I. in Malay Archipelago, together with Ambeno, Pulo Cambing and Pulo Jako; ch. products coffee, sandalwood, copra, wax; cap. and ch. spt. Dili; total a. 7,330 sq. m.; p. (1936) *463,996*.
Timor Archipelago, *gr. of Is.*, Indonesia; of which the lgst. is Timor (E. part Portuguese; remainder Indonesian); total a. 24,450 sq. m.; fishing, exp. copra; p. *1,657,376*.
Timor Sea, that part of the Indian Ocean N.W. of W. Australia, and S. of Timor I.
Timsah, *L.*, Egypt, N.E. Africa; sm. L. midway along Suez Canal; formerly used for recreational purposes by Brit. garrison in Canal zone.
Tinnevelli, *t.*, Madras, India; rice, coffee, cotton, tobacco; p. (1941) *60,676*.
Tinogasta, *t.*, Catamarca prov., Argentina; in E. foot-hills of Andes 120 m. N.W. of Catamarca; impt. copper-mines.
Tintagel, *vil.*, Cornwall, Eng.; ruined cas.; reputed birthplace of King Arthur; tourists.
Tinto, *R.*, Huelva, Spain; flows W. to the Atlantic; length 65 m.
Tinto Hills, Lanark, Scot.; highest peak 2,300 ft.
Tipperary, *inland co.*, Munster, Ireland; a. 1,659 sq. m.; divided into Tipperary co. (N.R.), p. (1956) *55,689*, and Tipperary co. (S.R.), p. (1956) *73,542*.
Tipperary, *t.*, Tipperary, Ireland; 29 m. S.E. Limerick; mftg., butter, lace; p. (1951) *5,148*.
Tipton, *t.*, *mun. bor.*, Staffs, Eng.; 2 m. W. of W. Bromwich; metals, engin.; p. (1951) *39,382*.
Tiranë, *t.*, *cap.*, Albania; univ.; textiles, metallurgy; p. (estd. 1950) *64,300*.
Tiraspol, *t.*, Moldavian S.S.R.; on R. Dniester; heat and power-sta. recently constructed; milling tobacco; p. (1959) *62,000*.
Tire, *t.*, Aydin, Turkey; raisins, tobacco, cotton; p. *22,032*.
Tiree, *I.*, Inner Hebrides, Scot.; off cst. of Mull; sm. fresh-water lochs and Scandinavian forts.
Tirlemont (**Flemish Thienen**), *t.*, ctr. of Belgian sugar-refining; Brabant, Belgium; machin., woollens, leather; captured by Marlborough, 1705; p. (1947) *22,348*.
Tiruchirapalli, *formerly* **Trichinopoly**, *t.*, Madras, India; on R. Cauvery; cigars, goldsmith's wk.; p. (1951) *218,921*.
Tisa (**Tisza**), *R.*, U.S.S.R., Hungary, Jugoslavia; rises in E. Carpathians, flows N.W. to Cop, thence S. across flat, agr. plain of Gr. Arföld into R. Danube 45 m. below Novi Sad; approx. length 600 m; navigable in part.
Titicaca, *L.*, Bolivia, Peru, S. America; between 2 ranges of the Andes, on borders of Bolivia and Peru; 12,645 ft. above the sea; a. 3,200 sq. m.; average width 27 m. length 101 m.; almost cut in two by peninsula of Copacabana; nearly 700 ft. deep on E. side, shallow W. and S.; contains numerous Is., lgst. Titicaca; it is drained on the S. side by the R. Desaguadero.
Titograd (**Podgorica**), *t.*, Montenegro, Jugoslavia; nr. Albanian frontier; p. (1953) *16,324*.
Tiumen, *t.*, Siberia, R.S.F.S.R.; N.W. of Tobolsk; leather, carpets.
Tiverton, *mkt. t.*, *mun. bor.*, Devon, Eng.; 14 m. N. Exeter; lace and silk mftg.; p. (1951) *10,869*.
Tivoli, *t.*, Rome, Italy; sulphur baths.
Tiztuzu, *t.*, Algeria, N. Africa; admin. ctr.; livestock, honey, oil, corn; p. *40,526*.
Tlaxcala, *st.*, Mexico; adjoining Puebla; a. 1,555 sq. m.; cap. Tlaxcala; p. (1950) *284,226*.
Tlemcen, *t.*, Algeria, N. Africa; exp. textiles, carpets, ostrich feathers, olive oil, grain and onyx; p. (1948) *69,668*.
Tobago, *I.*, T.W.I.; belonged to Britain since 1762, administered by Trinidad; name said to derive from fact that Carib natives were addicted to tobacco; exp. sugar, rum, rubber, cotton, tobacco, coffee, etc.; cap. Scarborough on S. side; a. 116 sq. m.; p. (1946) *27,161*, nearly all Negroes.
Tobarra, *t.*, Spain; industl.; p. *13,110*.
Tobata, *ind. c.*, *spt.*, N. Kyushu, Japan; on S. shore of Shimonoseki Strait at ent. to Tokai Bay; iron and steel ind., engin., sugar-refining, glass, bricks; lge. mod. coal docks; p. (1947) *84,260*.
Tobermory, *burgh*, Argyll, Scot.; on I. of Mull at N. entrance to Sound of Mull; p. (1951) *692*.
Tobol, *R.*, W. Siberia, R.S.F.S.R.; trib. of R. Irtysh; length 500 m.
Tobolsk, *t.*, W. Siberia, R.S.F.S.R.; on R. Irtysh; fishery inds. and tr.; p. *23,500*.
Tobruk, *spt.*, Libya, N. Africa; on cst. 220 m. E. of Benghazi; p. (estd. 1951) *2,500*.
Tocantins, *R.*, provs. Pará and Goiaz, Brazil; flows N. through the Pará estuary to the Atlantic; navigation interrupted by rapids 200 m. above Pará; length, 1,700 m.
Toce, *R.*, N. Italy; rises in Lepontine Alps, flows S. and S.E. into L. Maggiore; valley used by trunk rly. from Milan to Berne as S. approach to Simplon Tunnel; length, 54 m.
Tocopilla, *spt.*, Chile; exp. nitrate, copper ore, sulphates, iodine; p. (1940) *17,287*.
Todmorden, *mkt. t.*, *mun. bor.*, W.R. Yorks, Eng.; nr. source of R. Calder, 6 m. N.E. of Rochdale; cottons, machin.; p. (1951) *19,072*.
Togoland, W. Africa; former German col., administered by Britain and France as trust terr.; dyewoods, rubber, coffee, cocoa, fruits, weaving, pottery, straw plaiting; a. 33,700 sq. m.; p. (1956) (British part) *423,000*. (Fr. part) *565,780*. Brit. part integrated in Ghana 1957. Fr. part became rep. 1958 and indep. st. April 1960.
Tokat, *t.*, Turkey; on Tokat I., N. of Sivas; copper and yellow leather mftg.; Armenian massacre 1895; p. *20,153*.
Tokay, (**Tokaj**), *t.*, Hungary; vineyard dist., Tokay liqueur wines are well known; p. *5,069*
Tokelau or Union Isles, *gr.* of 3 Is., Brit. col., Pac. Oc.; 300 m. N. of W. Samoa administered by N.Z.; a. 4 sq. m.; p. (1958) *1,690*.
Tokio, *c.*, *spt.*, *cap.*, Japan; world's 2nd lgst c.; on Tokio Bay, S.E. cst. of Honshu; univ., imperial palace; gr. comm. ctr; silks, machin., lacquer, pottery, "chlorela" artificial food production; p. (1957) *8,534,993*.
Tokushima, *t.*, E. cst. Shikoku, Japan; cottons; p. (1947) *88,520*.
Tolbukhin, *t.*, Bulgaria, former Dobrich; p. (1956) *42,815*.

Toledo, *prov.*, Spain; mountainous; agr., vineyards, stock-raising; a. 5,925 sq. m.; p. (1949) *532,278.*

Toledo, *ancient c., cap.*, Toledo, Spain; on R. Tagus; with cath., and many specimens of Gothic, Moorish and Castillian architecture in its picturesque narrow streets; famous Alcázar palace citadel; sword-mkg. still flourishes; p. (1949) *42,598.*

Toledo, *c.*, Ohio, U.S.A.; on Maumee R.; gr. rly. ctr. covering 28½ sq. m.; grain, flour, lumber, engin., motor cars; p. (1950) *303,616.*

Tolima, *volcano*, Andes, Colombia, S. America; alt. 18,143 ft.

Tolima, *dep.*, Colombia, S. America; a. 8,874 sq. m.; cap. Ibague; p. (1947) *691,360.*

Toluca, *t.*, Mexico; brewing, flour, cottons; p. (1950) *115,422.*

Tom, *R.*, Siberia, R.S.F.S.R.; trib. of R. Obi; length 400 m.

Tombigbee, *R.*, Miss., U.S.A.; flows S. to form the Mobile; length 500 m.

Tommot, *t.*, Yakutsk, R.S.F.S.R.; on R. Aldan; gold; p. *10,000.*

Tomsk, *region*, Siberia, R.S.F.S.R.; adjoining Chinese frontier; agr., dairying, stock-raising, fisheries, mining, mftg.

Tomsk, *c.*, Siberia, U.S.S.R.; on R. Tom, and branch of Trans-Siberian rly.; univ., cath.; engin., chemicals; p. (1959) *249,000.*

Tonala, *t.*, nr. G. of Tehuantepec, Chiapas, Mexico; p. *6,379.*

Tonawanda, *t.*, N.Y., U.S.A.; on Niagara R.; mnfs.; p. (1950) *14,617.*

Tonbridge, *t., urb. dist.*, Kent, Eng.; on R. Medway, 13 m. S.W. of Maidstone; malting, brewing, rly. wks., elec. apparatus, light inds.; p. (1951) *19,239.*

Tönder, *t.*, Denmark; old houses; cattle-breeding; p. *6,778.*

Tonga Is., *see* **Friendly Is.**

Tongariro, *volcanic peak*, N.I., N.Z.; in ctr. of volcanic dist.; alt. 6,458 ft.

Tongeren (**Tongres**), *episcopal c.*, Belgium; mineral springs; p. *13,484.*

Tongking, Viet Nam, Indo-China; rice, sugar-cane, tobacco, coffee, cotton, silk, coal, tin, limestone; a. 40,530 sq. m.; ch. t. Hanoi; ch. pt. Haiphong; p. (1942) *9,920,000.*

Tonk, *t.*, Rajasthan, India; mica; p (1941) *38,650.*

Tonlé Sap, *L.*, Cambodia, Indo-China.

Tönsberg, *t.*, Norway; on Bay nr. entrance to Oslo fjord; H.Q. of sealing- and whaling-fleet, oil mills; p. (1946) *11,388.*

Toowoomba, *c.*, Queensland, Australia; wheat, pastoral and dairying dist., flour-milling, tanning, brewing, wine; p. (1957) *45,900.*

Topeka, *t., cap.*, Kan., U.S.A.; on Kansas R.; flour-milling, engin., machin., lge. tr.; p. (1950) *78,781.*

Torcello, *I.*, with ancient Byzantine cath., on lagoon nr. Venice, Italy.

Torhout, *t.*, W. Flanders, Belgium; textiles; p. *12,223.*

Tormes, *R.*, Spain; trib. of Douro (Duero); length 150 m.

Toronto, *c., cap.*, Ontario, Canada; on Bay of Toronto, L. Ontario; spacious harbour; univ.; extensive tr. and mnfs.; foundries, distilleries, exp. grain, timber, cattle, etc.; fine parliament bldgs., parks, etc.; p. (1956) *667,706.*

Torontoy, *gorge*, Cuzco dep., Peru; located on R. Urubamba 50 m. N.W. of Cuzco.

Torpoint, *urb. dist.*, Cornwall, Eng.; on Plymouth Sound opposite Plymouth; p. (1951) *5,852.*

Torquay, *t., mun. bor.*, S. Devon, Eng.; on N. side of Tor Bay; seaside resort with all-year season; p. (1951) *53,216.*

Torre Annunziata, *t., spt.*, Italy; on Bay of Naples; arms factory, macaroni mftg., sericulture; p. *65,715.*

Torre del Greco, *spt.*, Italy; on Bay of Naples; at foot of Mt. Vesuvius; seaside resort; lava quarries, shipbldg.

Torredonjimeno, *t.*, Jaen, Spain; wine, wheat, fruit; p. *16,069.*

Torrens, *L.*, S. Australia; 130 m. long, 20 m. wide; varies from brackish lake to salt marsh.

Torreón, *t.*, Mexico; p. (1950) *132,101.*

Torres Vedras, *t.*, Portugal; sulphur baths; p. *11,898.*

Torres Strait, between C. York, Queensland, Australia, and New Guinea; 90 m. wide, dangerous navigation.

Torrevieja, *spt.*, Alicante, Spain; salt-beds, fisheries, etc.; p. *9,412.*

Torridge, *R.*, Devon, Eng.; flows from Hartland Dist. to Bideford Bay; length 53 m.

Torrington, *t.*, Conn., U.S.A.; metal-plate wk., woollens; p. (1950) *27,820.*

Torrington, *t., rural dist.*, Devon, Eng.; on R. Torridge, 4 m. S.E. of Bideford; ball clay; p. (rural dist. 1951) *7,387.*

Torrox, *spt.*, S. Spain; on Mediterranean Sea; p. *7,834.*

Tortona, *t.*, N. Italy; the Roman Dertona; cath.; p. *21,813.*

Tortosa, *fortfd. t.*, Spain; on R. Ebro; wine, oil, fruit, paper, leather; p. *38,285.*

Tortuga, *I.*, Caribbean Sea; located off N.W. cst of Hispaniola; provides shelter from N.E. Trade Winds for Port de Paix; length 25 m., width 10 m.

Torun (**Thorn**), *t.*, S. Pomerania, Poland; on R. Vistula; univ.; grain, timber; p. *68,085.*

Tosya, *t.*, Turkey; grapes, rice, cotton, wool, mohair, weaving; p. *10,740.*

Totana, *t*, Murcia, Spain; wheat, olives, oranges; p. *15,264.*

Totnes, *t., mun. bor.*, Devon, Eng.; on R. Dart, 6 m. N.W. of Dartmouth; cider; p. (1951) *5,534.*

Totonicapan, *t.*, Guatemala, Central America; hot springs, gardens; pottery, furniture, textiles; p. *6,932.*

Tottenham, *mun. bor.*, Middx., Eng.; N. of London; industl. and residtl.; p. (1951) *126,921*

Tottington, *urb dist.*, Lancs, Eng.; cotton and artificial silk goods; p. (1951) *5,824.*

Touggourt or **Tuggurt,** *t.*, S. Algeria; on edge of Sahara Desert; rly. terminus; dates; p. *243,363.*

Toul, *t.*, Meurthe-et-Moselle, France; on R. Moselle; wines, brandy, earthenware, lace. p. (1954) *12,134.*

Toulon, *c., spt., naval sta.*, Var, France; on Mediterranean cst.; arsenal, fine bldgs., shipbldg., lace-mkg., vines, olive oil, fisheries; p. (1954) *141,117.*

Toulouse, *t.*, Haute-Garonne, S. France; on R. Garonne; imposing bldgs., cath.; paper, leather, stained glass, aircraft engin.; p. (1954) *268,863.*

Touraine, *former prov.*, France; now divided into into Indre-et-Loire and part of Vienne deps.

Tourcoing, *t.*, Nord, France; 10 m. N.E. of Lille, textiles, carpets, cement; p. (1954) *83,416.*

Tournai, *t.*, Hainaut, Belgium; on R. Scheldt; nr. Mons; famous cath.; textiles, carpet mftg.; p. (estd. 1957) *33,342.*

Tours, *t.*, Indre-et-Loire, France; cath.; iron, steel, wines, leather, textiles; p. (1954) *83,618.*

Towcester, *mkt. t., rural dist.*, Northants, Eng.; 9 m. S.W. of Northampton; boot-mkg.; p. (rural dist. 1951) *14,540.*

Tow Law, *urb. dist.*, Durham, Eng.; in Wear Dale, 10 m. N.W. of Bishop Auckland; p. (1951) *3,186.*

Townsville, *spt.*, Queensland, Australia; on E. cst., 400 m. N. of Rockhampton; 2nd pt. of st.; exp. prods. of rich dairying, pastoral, and mining terr.; soap, beer; p. (1957) *42,900.*

Towy, *R.*, S. Wales; flows S.W. to Carmarthen Bay; length 65 m.

Towyn, *mkt. t., urb. dist.*, Merioneth, Wales; on cst. of Cardigan Bay, 3 m. N.W. of Aberdovey; p. (1951) *4,491.*

Toyama, *c.*, Honshu, Japan; located centrally on Etchu plain to E. of Noto Peninsula; administrative and comm. ctr. of region; aluminium smelting; p. (1950) *154,484.*

Trabzon, *spt.*, Turkey; on Black Sea cst.; caravan ctr.; exp. tobacco, carpets, hides; reputed to be the ancient Trapezus; p. (1945) *29,551.*

Trafalgar, *C.*, S.W. cst., Cadiz, Spain; Nelson's famous victory, 1805.

Trail, *t.*, B.C., Canada; lge. metallurgical smelter; p. (estd. 1958) *11,395.*

Tralee, *cst. t.*, Kerry, Ireland; on R. Lee; exp. grain, butter; p. (1951) *11,054.*

Tranent, *burgh*, E. Lothian, Scot.; 10 m. E. of Edinburgh; coal; p. (1951) *5,639.*

Trani, *spt.*, Apulia, Italy; on the Adriatic; 12th-century cath.; p. *30,551.*

Transbaikal, *dist.*, Siberia, R.S.F.S.R.; E. of L. Baikal; mineral wealth; ch. t., Chita.
Transcaucasia, name given to region of U.S.S.R. which comprises the constituent reps. of Georgia, Armenia, and Azerbaydzhan; ch. t., Tbilisi.
Transkei, *dist.*, C. of Gd. Hope, S. Africa; cereals, fruits, cattle, sheep.
Transvaal, *prov.*, Union of S. Africa; hot summers, temperate winters; grassland, agr., maize, tobacco, sheep, wool, cattle, gold, diamonds; coal, copper, tea, engin., brewing, pottery; a. 110,450 sq. m.; cap. Pretoria; p. (1951) *4,802,405* (inc. *1,205,458* whites).
Transylvania, *former prov.*, Hungary, now in Romania; cereals, tobacco, sheep, cattle, horses; surrounded and traversed by the Carpathians; p. (1948) *3,420,859*.
Transylvanian Alps, *range of high mtns.*, Romania.
Trapani, *fortfd. spt.*, W. Sicily, Italy; salt, wine, olive oil, fish, alabaster, coral, mother-of-pearl; exp.; p. (1951) *72,289*.
Trasimeno, *L.*, Umbria, central Italy; occupies lge. extinct volcanic crater; drained S. to R. Tiber; a. approx. 60 sq. m.
Tràs-os-Montes e Alto-Douro, *prov.*, N. Portugal; ch. t. Tua; a. 47,340 sq. m.; p. (1940) *592,079*.
Traun, *R.*, Austria; trib. of R. Danube; enters L. known as Traun See; length 100 m.
Travancore-Cochin, *former st.*, S. India; included in Kerala st. 1 Nov., 1956; rice, coconuts, pepper, tapioca, hardwoods; univ.; a. 9,155 sq. m.; p. (1951) *9,265,157*.
Traverse City, *t.*, Mich., U.S.A.; timber inds., tr.; p. (1950) *16,974*.
Trawden, *urb. dist.*, Lancs, Eng.; cotton, engin.; p. (1951) *2,114*.
Trawsfynydd, Merioneth, Wales; within N. Wales Nat. Pk.; atomic power sta. projected 1964.
Trebizond, *see* Trabzon.
Tredegar, *mining t.*, *urb. dist.*, Monmouth, Eng.; in narrow valley 3 m. W. of Ebbw Vale; p. (1951) *20,375*.
Treforest, *t.*, Glam., Wales; on R. Taff; lge. trading estate established in 1930s to alleviate unemployment in primary inds. of S. Wales; chemical, pharmaceutical, rayon, metal wks.
Tregaron, *t.*, *rural dist.*, Cardigan, Wales; in upper Teifi valley, 10 m. N.E. of Lampeter; p. (rural dist. 1951) *5,447*.
Treinta y Tres, *dep.*, Uruguay; a. 3,682 sq. m.; cap. Treinte y Tres; p. (1953) *72,063*.
Trelew, *t.*, Patagonia, Argentina; ch. comm. t.; sheep; p. *7,000*.
Trelleborg, *t.*, S. Sweden; p. *15,311*.
Tremadoc Bay, N. Wales; N. part of Cardigan Bay between Lleyn peninsula and cst. of Merioneth.
Trengganu, *st.*, Malaya; mining both tin and iron; rice, rubber, coconuts; cap. Kuala Trengganu; a. 5,050 sq. m.; p. (1957) *278,147*.
Trent, *R.*, Eng.; rises in N. Staffs, and flows to join the Ouse in forming the estuary of the Humber; length 170 m.
Trentino-Alto Adige, *region*, N. Italy; a. 5,252 sq. m.; p. (1951) *728,559*.
Trento, *t.*, *cap.*, Venezia Tridentina, N. Italy; on R. Adige; p. (1951) *62,128*.
Trenton, *c.*, *cap.*, N.J., U.S.A.; on Delaware R.; ironwks., pottery, rubber, and other mnfs.; p. (1950) *128,009*.
Tréport, Le, *spt.*, Seine-Maritime, France; resort, fishing; p. (1954) *5,429*.
Tres Arroyos, *t.*, E. Argentina; agr. and livestock ctr.; p. *32,173*.
Trèves, *see* **Trier**.
Treviglio, *t.*, Lombardy, Italy; E. of Milan; silk mftg.; p. *19,615*.
Treviso, *t.*, Lombardy, Italy; cath.; majolica ware, silks, woollens; p. (1951) *61,972*.
Trichinopoly, (*see* **Tiruchirapalli**).
Trier, *c.*, Rhineland–Palatinate, Germany; on R. Moselle; cath.; Roman antiquities; (Porta Nigra) wine cellars, tobacco, leather, textiles, machin., brewing; p. (estd. 1954) *79,400*.
Trieste Free Territory, *free st.*, on the Adriatic; constituted by Peace Treaty with Italy, 1947, as compromise between conflicting Jugoslav and Italian claims; a. 287 sq. m.; p. (Zone A) *350,000* (estd.), (Zone B) *75,000* (estd.) Oct. 1954. Military government terminated; Zone A handed over to Italy, Zone B to Yugoslavia.
Trieste, *spt.*, *cap.* Free Terr. of Trieste; industl. c., shipbldg., fishing; cath., cas., Roman antiquities; p. (1951) *296,096*.
Trikkala, *prefecture*, Thessaly, Greece; cap. Trikkala; p. (1951) *127,900*.
Trikkala (the ancient **Trikai**), *t.*, Thessaly, Greece; nr. Larissa; many mosques; grain tr.; p. (1951) *27,890*.
Trincomalee, *t.*, *naval sta.*, N.E. cst., Ceylon; gd. harbour; tobacco, rice, palms; p. *32,507*.
Tring, *mkt. t.*, *urb. dist.*, Herts, Eng.; in gap through Chiltern Hills, 9 m. N.W. of Hemel Hempstead; dairy farming; p. (1951) *5,018*.
Trinidad, *c.*, Col., U.S.A.; on Purgatory R.; rly. wks., coal; p. (1950) *12,204*.
Trinidad, *I.* T.W.I.; fed. cap.; oil, asphalt, sugar, rum, coconut oil; cap. Pt. of Spain; a. 1,864 sq. m.; p. (estd. 1957) *764,900*.
Trinidad, *cap.* Beni, Bolivia; p. (1957) *12,807*.
Trinidad, *t.*, Cuba, West Indies; exp. honey; p. *15,453*.
Trinity, *R.* Texas, U.S.A.; flows S.E. to Galveston Bay; length 500 m.
Tripoli, *spt.*, Lebanon; S.W. Asia; terminus of oil pipe-line from Iraq; p. *100,000*.
Tripoli, *prov.*, Libya, N. Africa; extends W. to Tunisia, E. to Cyrenaica, S. into Sahara Desert; largely composed of desert, scattered oases; cap. Tripoli; p. (1954) *746,064*.
Tripoli, *t.*, *cap.*, Tripoli prov. Libya, N. Africa, also joint cap. (with Benghazi) of Libya; expanded greatly under Italian colonial administration; exp. wool, hides; p. (1958) *172,202*.
Tripolis, *cap.*, Arcadia, Peloponnese, Greece; tapestries, leather; p. (1951) *17,675*.
Tripura, Union Terr., India; hilly; rice, jute, cotton, sugar cane; cap. Agartala; a. 4,032 sq. m.; p. (1951) *639,029*.
Tristan da Cunha, *sm. gr of Brit. Is.*, S. Atl. Oc.; ch. I. Tristan, consists of extinct volcano; impt. met. and radio sta.; breeding ground of the great shearwater; a. 38 sq. m.; p. (1952) *281*.
Trivandrum, *t.*, Kerala, S India; wood-carving; p. (1951) *186,931*.
Trnava, *t.*, Czechoslovakia; on R. Vah; cloth, sugar; p. (1957) *32,507*.
Trnovo (**Tirnovo**), *t.*, Bulgaria; copper wk.; p. *16,182*.
Troitsk, *t.*, S. Urals, R.S.F.S.R.; leather, knitwear; p. (1959) *76,000*.
Trollhättan, *t.*, Sweden; famous waterfalls, with generating-sta.; p. (1951) *24,264*.
Troms, *dist.*, Norway; a. 10,006 sq. m.; p. (1950) *117,498*.
Tromsö, *spt.*, Troms, Norway; on sm. I. of Tromsö, in Tromsö Sound; seal and walrus fishing; p. (1946) *10,785*
Tronador, *volcano*, Andes, S. America; on Argentine–Chilean bdy.; alt. 11,352 ft.
Tröndelag, N., *co.*, Norway; a. 8,659 sq. m.; p. (1950) *109,860*.
Tröndelag, S., *co.*, Norway; a. 7,241 sq. m.; p. (1950) *197,758*.
Trondheim, *spt.*, Norway; on W. cst. on S. side of Trondheim Fjord; shipbldg., exp. timber and wood-pulp, butter, fish, copper; contains ancient cath., burial place of early Norwegian kings, and place of coronation of recent sovereigns; p. (1946) *56,444*.
Troon, *burgh*, Ayr, Scot.; on Firth of Clyde, 6 m. N. of Ayr; gd. harbour and graving docks; shipbldg., hosiery; p. (1951) *10,061*.
Troppau, *t.*, Czechoslovakia; *see* **Opava**.
Troste, nr. Llanelly, Wales; steel strip mill, tin plate; newly developed 1952.
Trossachs, *mtn. defile*, Perth, Scot.; tourist resort.
Trouville, *spt.*, Calvados, France; resort, boatbldg., fishing; p. (1954) *7,040*.
Trowbridge, *mkt. t.*, *urb. dist.*, Wilts, Eng.; 3 m. S.E. of Bradford-on-Avon; cloth wks., bacon curing, dairying, engin.; p. (1951) *13,844*.
Troy, *c.*, N.Y., U.S.A.; at confluence of Rs. Hudson and Mohawk; great shirt-mftg. ctr.; p. (1950) *72,311*.
Troyes, *c.*, Aube, France; on R. Seine; former cap. Champagne; magnificent cath., hosiery, iron, looms, mnfs.; p. (1954) *58,819*.
Trujillo, *spt.*, Honduras, Central America; on Atlantic cst.; p. (1945) *7,547*.
Trujillo, *ch. t.*, La Libertad, Peru; sugar, copper; p. (estd. 1950) *47,728*.
Trujillo, *old t.*, Spain; N.E. of Badajoz; wheat, wine, fruit; birthplace of Pizarro; p. *13,753*.
Trujillo, *st.*, Venezuela, S. America; cocoa, coffee; cap. T.; p. (1947) *264,270*.

Truk Is., Caroline Is., Pac. Oc., U.S.A. Trusteeship; coral, copra, dried fish; a. 50 sq. m.; p. (1958) *19,807*.
Truro, *c., mun. bor.*, Cornwall, Eng.; at confluence of Rs. Kenwyn and Allen; cath.; tin smelting, jam wks., light engin., textiles; p. (1951) *12,851*.
Truro, *t.*, Nova Scotia, Canada; on Salmon R., nr. head of Cobequid Bay; hosiery; p. *12,250*.
Trutnov, *t.*, Czechoslovakia; at foot of Riesengebirge; coal, linen; p. *18,320*.
Tsangpo, *R.*, Tibet; one of the headstreams of the R. Brahmaputra; length 850 m.
Tschenstokov, *see* **Czestochowa**.
Tsinan, *c.*, Shantung, China; on the right bank of the Hwang Ho, 100 m. from the G. of Chihli; mnfs. glass, textiles, precious stones; p. (estd. 1946) *591,490*.
Tsining, *c.*, Shantung, China; p. (estd.) *150,000*.
Tsingtao, *c.*, Shantung, China; salt, silk; former treaty pt.; p. (estd. 1948) *850,000*.
Tsinkiang, *spt.*, Fukien, China; rice, grain, sugar cane; p. (estd. 1948) *120,655*.
Tsitsihar (Lungkiang,) *t.*, Manchuria, N. China; on the Vladivostock portion of the Trans-Siberian rly.; p. (estd. 1947) *174,675*.
Tsugaru Strait, Japan; separates Is. Hokkaido and Honshu; links Sea of Japan with Pac. Oc.; length 45 m., width 15–20 m.
Tsumeb, *t.*, S.W. Africa; rly. terminus; copper-mines, cattle; p. (white) *580*.
Tsuruga, *spt.*, Japan; on W. cst. Honshu; rayon textiles, cotton; p. (1947) *24,228*.
Tuam, *mkt. t., rural dist.*, Galway, Ireland; Roman Catholic and Protestant caths.; p. (1951) (of dist.) *28,096*, (of t.) *4,010*.
Tuamotu, *coral archipelago*, S. Pac. Oc.; belonging to France; a. of gr. 330 sq. m.; gd. harbour at Fakarava; pearl fisheries; p. *5,127*.
Tuapse, *spt.*, R.S.F.S.R., U.S.S.R.; at foot of Caucasus Mtns. on N. cst. of Black Sea; at W. end of oil pipe-line from Baku and Makhach Kala; impt. oil refineries; p. (1954) *50,000*.
Tubarao, *t.*, Santa Catarina st., S. Brazil; on E. cst., 175 m. N.W. of Porto Alegre; coal-mines.
Tübingen, *t.*, Baden-Württemberg, Germany; on R. Neckar; univ., cas.; machin., paper, textiles; p. (estd. 1954) *40,500*.
Tucson, *c.*, Arizona, U.S.A.; on Santa Cruz R.; gold-, silver-, and copper-mining; founded in 1560 by a Jesuit mission, and from 1867 to 1877 was the cap. of Arizona; seat of Univ. of Arizona; p. (1950) *45,454*.
Tucumán, *prov.*, Argentina; agr. and stock-raising; cap. Tucumán; a. 8,817 sq. m.; p. (estd. 1958) *798,000*.
Tucumán, *c.*, cap. Tucumán prov., Argentina; on R. Sali; univ.; breweries, sawmills, flour-mills, sugar; p. (estd. 1953) *235,038*.
Tugela, *R.*, Natal, S. Africa; rises in Drakensberg Mtns. and flows to Indian O.; length 300 m.
Tuggurt, *see* **Tougourt**.
Tula, *region*, R.S.F.S.R., U.S.S.R.; S. of Moscow; pasturage, stock-keeping, iron and coal; cap. Tula.
Tula, *t.*, R.S.F.S.R., U.S.S.R.; on both banks R. Upa; engin., iron ore nearby; p. (1959) *345,000*.
Tulare, *L.*, S. Cal., U.S.A.; ctr. of inland drainage 40 m. S. of Fresno; streams feeding it used for irrigation; in drought years L. dries up completely; a. 90 sq. m.
Tulbagh, *t.*, C. of Gd. Hope, Union of S. Africa; on Gr. Berg R., 65 m. N.E. of Cape Town; commands entrance to Tulbagh Kloof (pass) by which Cape Town to Johannesburg rly. approaches Hex. R. valley and thus climbs to Gr. Karroo and gains central African tableland.
Tulcea, *t.*, Dobroja, Romania; on Danube; chemicals, copper; p. (1948) *21,642*.
Tulchin, *t.*, Ukrainian S.S.R.; flour and grain tr.; p. *10,000*.
Tulenovo, Balchik dist., on Black Sea, Bulgaria; oil production.
Tulkarm, *t.*, Jordan; agr. ctr.; rly. junction; p. *5,368*.
Tullamore, *mkt. t., urb. dist.*, Offaly, Ireland; on Grand Canal; farming, distilling, brewing; p. (1951) *6,165*.
Tulle, *t.*, *cap.*, Corrèze, France; cath.; p. (1954) *19,372*.
Tulsa, *c.*, Okla., U.S.A.; 2nd lgst. c. in st.; oil-well machin., aeroplanes; p. (1950) *182,740*.
Tumbes, *dep.*, Peru, S. America; cap. Tumbes; a. 1,590 sq. m.; p. (1947) *29,471*.
Tummel, *R.*, Perth, Scot.; trib. of R. Tay; used by Perth to Inverness rly. as S. approach to Drumochter Pass.
Tunbridge Wells, *mkt. t., Royal mun. bor., inland wat. pl.*, Kent, Eng.; on border of Sussex, 5 m. S. of Tonbridge; the chalybeate waters were discovered in 1606 by Lord North; p. (1951) *38,397*.
Tung Hai or **Eastern China Sea**, name of part of the Pac. Oc. bordering S. China.
Tungshan, *see* **Suchow**.
Tungting Hu, *lge. L.*, Hunan, China; on S. margin of Yangtze-Kiang plain; receives waters of Yuan Kiang and Siang Kiang, drains N. to Yangtze-Kiang; surrounded by flat, intensively cultivated land, rice, sugar, mulberry; size varies greatly with season; maximum a. (in late summer) 2,500 sq. m.
Tunguska, Upper, Stony and Lower, *Rs.*, Siberia, U.S.S.R.; all rise in Sayan Mtns. nr. L. Baikal and flow N.W. through forested country into R. Yenesei.
Tunis, *ch. t.*, Tunisia, N. Africa; spt. on bay off G. of Tunis; bazaars, palace of the Bey; many inds., much tr.; the ruins of ancient Carthage are to the N.E.; p. (1956) *680,000*.
Tunisia, *independent state*, (March 1956), N. Africa; agr., stock-rearing, mineral and phosphate wkg., silk and carpet weaving, pottery mftg., fishing (inc. sponges), also fruit- and flower-growing and perfume distillation; cap. Tunis; a. about 48,300 sq. m.; p. (1956) *3,800,000*.
Turda, *t.*, Transylvania, Romania; salt-mines; p. *29,107*.
Turfan (Tulufan), *c.*, Sinkiang, China; below sea-level on the S. side of the Tian-Shan Mtns.; p. *20,000*.
Turgai, *dist.*, U.S.S.R.; N. of Sea of Aral, forms part of Kazakh. rep.; a. 175,219 sq. m.; agr. and cattle-breeding; antimony p. *500,000* (largely nomadic Kirghiz).
Turgai, *t.*, Kazakh; on caravan road from Tashkent to Orsk; p. *2,500*.
Turgutlu (Kassaba), *t.*, Manisa prov., Turkey; 30 m. E.N.E. of Izmir; lignite, cotton, melons; p. (1950) *25,139*.
Turin, *c.*, N. Italy; on Rs. Po and Dora; former cap. Piedmont and Sardinian sts.; cath. (Holy Shroud preserved in which body of Christ is said to have been wrapped), univ., royal palace and cas., and Palazzo Carignano; leather, textiles, engin.; extensive tr.; p. (1951) *712,596*.
Turkestan E., terr. included in Chinese prov. of Sinkiang; separated from W. or former Russian Turkestan by Pamir plateau; mainly desert.
Turkey, *rep.*, Europe and Asia; has lost much of 19th-century terrs.; evergreen trees, shrubs, livestock, cereals, tobacco, figs, fruits, copper, silver, coal, carpets, silk, wine, olive oil; cap. Ankara; lgst. t. Istanbul; a. 296,107 sq. m.; p. (1955) *24,111,778*.
Turkmenistan, *const. rep.*, U.S.S.R.; agr. based on irrigation, fruit, cotton, wool; sulphates, petroleum, mnfs., carpets; cap. Ashkhabad; a. 189,603 sq. m.; p. (1959) *1,520,000*.
Turks and Caicos, *Is.*, Caribbean Sea; West Indies Federation; about 30 sm. Is., geographically the S.E. continuation of the Bahamas; Caicos Is. separated by narrow channel from Turks Is.; ch. prod., salt, conches, sisal, sponges. Total a. 166 sq. m.; p. (1956) *6,500*.
Turku (Abo), *spt.*, S. Finland; Swedish and Finnish univs., archiepiscopal see; p. (1959) *120,987*.
Turku-Pori (Åbo-Björneborg), *dep.*, Finland; a. 8,500 sq. m.; p. (1950) *630,959*.
Turner Valley, *dist.*, Alberta, Canada; oilfield; p. *1,157*.
Turnhout, *t.*, Belgium; nr. Antwerp; textiles, lace, playing-card mnf.; p. (estd. 1957) *34,764*.
Turnu Severin, *t.*, Romania; below the Iron Gate cataracts of R. Danube; grain, salt, petroleum; p. *29,362*.
Turriff, *burgh*, Aberdeen, Scot.; nr. R. Deveron; p. (1951) *2,964*.
Turton, *t.*, *urb. dist.*, Lancs, Eng.; 4 m. N. of Bolton; mnfs.; p. (1951) *10,951*.
Tuscaloosa, *t.* Ala., U.S.A.; st. univ.; p. (1950) *46,396*.
Tuscany, *region, former grand duchy*, Italy; in-

cludes provs. Arezzo, Florence, Leghorn, Siena, Grosseto, Lucca, Pisa, and Massa and Carrara; cereals, olive oil, wine, copper, lead, mercury, marble, textiles, porcelain; a. 8,876 sq. m.; p. (1951) *3,152,535*.

Tushino, *t.*, R.S.F.S.R., 10 m. N.W. of Moscow; p. (1959) *90,800*.

Tuticorin, *spt.*, Madras, India; cotton-spinning, salt, pearls; p. (1941) *75,614*.

Tuttlingen, *t.*, Baden-Württemberg, Germany; on R. Danube; tanning, footwear, steel, textiles; p. (estd. 1954) *22,300*.

Tuva, *region*, U.S.S.R.; formerly Tannu Tuva rep., bounded on E., W., and N. by Siberia, and on S. by Mongolia; pastoral; a. about 64,000 sq. m.; p. about *65,000*.

Tuxtla Gutierrez, *t.*, Chiapas, Mexico; alt. 1,500 ft.; ctr. for sisal, tobacco, coffee, cattle; p. (1940) *15,883*.

Tuxpan, *spt.*, Mexico, on G. of Mexico; p. (1940) *13,381*.

Tuy, *t.*, Spain; cath.; mineral springs; p. *13,500*.

Tuzla, *t.*, Jugoslavia; salt-springs, coal, timber, livestock, grain, fruit; p. (1953) *31,397*.

Tver, *see* **Kalinin.**

Tweed, *R.*, S.E. Scot.; rises in Peebles, and reaches sea at Berwick; dividing Berwick from the Eng. co. Northumberland; famous for its salmon fisheries; length 97 m.

Twelve Pins, star-shaped *mtn. range*, Galway, Ireland; Benbaum, alt. 2,395 ft.

Twickenham, *mun. bor.*, Middx., Eng.; on N. bank of R. Thames, S.W. of London; Rugby Football Union ground; includes Teddington and Hampton, (*q.v.*); p. (1951) *105,645*.

Tyldesley, *t.*, *urb. dist.*, Lancs, Eng.; 4 m. S. of Bolton; mnfs.; p. (1951) *18,096*.

Tyler, *c.*, Texas, U.S.A.; fruit, livestock, cotton; p. (1950) *38,968*

Tyne, *R.*, Durham and Northumberland, Eng.; formed by junction of N. and S. Tyne at Hexham; flows E. to sea at Tynemouth and S. Shields; valley gives easy route across mtns. from Newcastle to Carlisle; forms a continuous harbour (with shipbldg. and other wks.) from Newcastle to Tynemouth; length 80 m.

Tynemouth, *t.*, *spt. co. bor.*, Northumberland, Eng.; at mouth of R. Tyne, on its N. bank; inc. in its a. the townships of Tynemouth, N Shields, Cullercoats, Chirton, Preston, Percy Main, E. Howden and New York; favourite wat. pl. with old priory and cas.; gd. harbour; fishing, ship repairing, coal bunkering, laminated plastics; p (1951) *66,544*.

Tyneside, *lge. conurbation*, S.E. Northumberland, N.E. Durham, Eng.; comprises highly industl. built-up a. astride R. Tyne for 14 m. from its mouth to Scotswood Bridge; huge exp. of coal, abroad and round Brit. csts.; shipbldg., heavy engin.; a. 90 sq. m.; p. (1951) *835,332*. *See also under* **Gateshead, Newcastle-on-Tyne, S. Shields, Tynemouth, Jarrow, Wallsend, Felling, Gosforth, Longbenton, Newburn, Whickham, Whitley Bay.**

Tyre, or Sur, *t.*, Lebanon, S.W. Asia; on W. cst.; p. *9,455*.

Tyrol, *mountainous region*, Alps, Europe; falls within Austria and Italy; between Munich and Verona, which are linked by the Brenner Pass; the Tyrol embraces all the highest peaks of the Austrian Alps, culminating in the Ortler Spitz; two-fifths forest; cap. Innsbruck; mtn. pasture, vineyards, silk inds.; a. 4,884 sq. m.; p. of Austrian T. (1951) *427,465*.

Tyrone, *inland co.*, N. Ireland; agr. and dairying; cap. Omagh; a. 1,260 sq. m.; p. (1951) *132,049*.

Tyrrhenian Sea, part of Mediterranean between Italy and Corsica, Sardinia and Sicily.

Tyumen, *t.*, R.S.F.S.R.; on R. Tura, between Molotov and Omsk; engin., textiles; p. (1959) *150,000*.

Tzuliuching, *c.*, Szechwan, China; salt, petroleum; p. (estd. 1945) *291,791*.

Tzuyang, *see* **Yenchow.**

U

Uanapú or Anapú, *R.*, Brazil; trib. of R. Pará; length 400 m.

Ubangi, *R.*, central Africa; trib. of R. Congo; with R. Congo forms W. bdy. between Fr. Equatorial Africa and Belg. Congo; length 1,400 m.

Ubangi-Shari, *see* **Central African Republic.**

Ube, *spt.*, S. Honshu, Japan; p. (1950) *128,569*.

Ubeda, *t.*, Jaen, Spain; on R. Guadalquivir; in vineyard and fruit-growing dist.; old walls; p. *31,093*.

Uberaba, *t.*, Minas Gerais, Brazil; cattle, maize, manioc, rice, sugar; p. *33,786*.

Ubol, *t.*, E. Siam; p. *10,000*.

Ucayali, *R.*, Peru, S. America; head-stream of R. Amazon; over 1,400 m. long, navigable for 1,000 m.

Uccle, *t.*, Belgium; nr. Brussels; industl.; p. (1947) *57,595*.

Ucha Reservoir, *see* **Moscow Sea.**

Uckfield, *mkt. t.*, *rural dist.*, E. Sussex, Eng.; 8 m. N.E. of Lewes; p. (rural dist. 1951) *43,132*.

Udaipur, *t.*, Rajasthan, India; on bank of lge. L. amid wooded hills, 2,469 ft. above sea-level; marble palace of the Maharajah; temple of Siva; embroidery, cotton cloth; p. (1941) *59,648*.

Uddevalla, *spt.*, S. Sweden; on fjord connected with L. Vänern; butter factories, porcelain wks.; p. (1951) *24,922*.

Udi, *t.*, S. Nigeria, Brit. W. Africa; 100 m. N. of Pt. Harcourt; impt. mining ctr. on Enugu coal-field; linked by rail to Kaduna and Pt. Harcourt.

Udine, *t.*, N.E. Italy; between Alps and G. of Venice; old cas. (now barracks); silk, velvet, and cotton inds.; p. (1951) *72,134*.

Uddingston, *t.*, Lanark, Scot.; R. Clyde; 7½ m. E.S.E. of Glasgow; collieries, jam factory; p. 8,400.

Udmurt, *autonomous Soviet Socialist Rep.*, part of R.S.F.S.R., U.S.S.R.

Uelzen, *t.*, Lower Saxony, Germany; on Lüneberger Heath; machin., chemicals, sugar; p. (estd. 1954) *24,400*.

Ufa, *t.*, R.S.F.S.R.; in W. Urals at confluence of Rs. Ural and Belaia; iron and copper foundries and machin. wks., saw-mills, textiles; p. (1959) *546,000*.

Uganda, *Brit. prot.*, E. Central Africa; ch. R. Nile; Ruwenzori Range, Mt. Elgon on Kenya border; Ls. inc. parts of Victoria, Edward, Albert, Rudolf and whole of Kioga; moderate rainfall; cotton, rubber, cocoa, coffee, ivory, hides, and skins, copper; connected by rail with Mombasa; cap. Kampala; a. 93,981 sq. m. inc. 13,680 sq. m. swamp and water; p. (estd. 1958) *5,678,900* (inc. *9,000* Europeans).

Uinta, *mtn. range*, Utah, U.S.A.; its highest points are Emmons (13,694 ft.), Gilbert Peak (13,687 ft.), and Wilson (13,300 ft.).

Uist, N., *I.*, Outer Hebrides, Inverness, Scot.; separated from I. of Skye by Little Minch; length, 17 m., width 3–13 m.

Uist, S., *I.*, Outer Hebrides, Inverness, Scot.; most S. lge. I. of Outer Hebrides gr.; length 22 m., width 8 m.

Uitenhage, *t.*, C. of Gd. Hope, S. Africa; summer resort, fruit, wool, rly. wks.; p. *28,000*.

Ujiji, *vil.*, in sm. terr. same name (a. 920 sq. m.) on E. shore L. Tanganyika, E. Africa; where Stanley found Livingstone, 1871; p. *1,000*.

Ujiyamada, *t.*, Japan; sacred c. of Shintoism; p. (1947) *63,093*.

Ujjain, *t.*, Madhya Pradesh, India; sacred c. and formerly cap. of Malwa; p. (1951) *129,817*.

Ujpest, *t.*, Hungary; nr. Budapest; p. *76,000*.

Ukerewe, *I.*, on L. Victoria, Central Africa.

Ukraine, *constituent rep.*, U.S.S.R.; fertile "black earth" region; agr., wheat, maize, barley; tobacco, sheep, pigs; minerals, coal, iron-ore, manganese; mnfs., flour, sugar, brewing, chemicals, smelting, hydro-elec. generation; cap. Kiev; a. 225,000 sq. m.; p. (1959) *41,893,000*.

Ulan Bator, *t.*, *cap.*, Independent Rep. of Outer Mongolia; formerly known as Urga; engin., textiles; p. (1951) *70,000*.

Ulan-Ude, *t.*, Siberia, R.S.F.S.R.; on L. Baikal; engin., textiles, sodium sulphate; p. (1959) *174,000*.

Ulcinj, *ancient c.*, Montenegro, Jugoslavia; tobacco, olive oil; p. *5,000*.

Uleåborg (Oulu), *spt.*, Finland; on G. of Bothnia; shipbldg., exp pitch, timber, hides, butter; p. (1946) *34,105*.

Ulhasnagar, *c.*, Bombay, India; new c. built for refugees from Pakistan; p. (1951) *80,861*.

Ullapool, *t.*, Ross and Cromarty, Scot.; on N. shore of Loch Broom.

Ullswater, *L.*, on border Cumberland and Westmorland, Eng.; 8 m. long; outlet by R. Eamont to the Eden.

Ulm, *c.*, Baden-Württemberg, W. Germany; on R. Danube; cath.; machin., textiles, cars, radios; rly. junction; p. (estd. 1954) *73,900*.
Ulster, *anc. Irish prov.*; comprised nine counties: six of these (Down, Antrim, Armagh, Fermanagh, Londonderry and Tyrone) now form Northern Ireland, a. 5,238 sq. m.; p. (1951) *1,370,709*; three counties (Cavan, Monaghan, Donegal) now form prov. of U. in Rep. of Ireland; largely agr., a. 3,123 sq. m.; p. (1956) *235,863*.
Ulva, *I.*, Argyll, Scot.; off W. cst. of Mull; 5 m. long.
Ulverston, *t.*, *urb. dist.*, N.W. Lancs, Eng.; nr. Morecambe Bay; paper-mills, hardware mftg.; iron, corn, brewing; p. (1951) *10,076*.
Ulyanovsk, *t.*, R.S.F.S.R.; on R. Volga; engin., textiles; p. (1959) *205,000*.
Uman, *t.*, Ukrainian S.S.R.; iron; p. (1954) *50,000*.
Umbria, *region*, Italy; between Tuscany and the Marches, and Rome and the Abruzzi; comprising the prov. of Perugia; mtnous., fertile valleys; a. 3,271 sq. m.; p. (1951) *802,332*.
Umeå, *R.*, Sweden; flows S.E. to the G. of Bothnia; length 250 m.
Umeå, *t.*, Sweden; at mouth of R. Umeå; timber tr.; p. *14,971*.
Umtali, *t.*, S. Rhodesia; impt. distr. ctr., timber, fruit, veg.; p. *22,500* (incl. *8,000* Europeans).
Umtata, *c.*, S. Africa; cath.; veg. dehydration, fruit canning; rly. terminus; p. *7,329*.
Una, *R.*, N. Jugoslavia; trib. of R. Sava.
Unalaska, *lge. I.*, Alaska, U.S.A.; in Aleutian gr.; mtnous., treeless; ch. pt. of Bering Strait.
Uncia, *t.*, Oruro dep., Bolivia; alt. 13,000 ft. in E. Cordillera of Andes, 60 m. S.E. of Oruro; site of impt. Patino tin-mines.
Ungava Bay, *arm of Hudson Strait*, projecting into Labrador, N.E. Canada; lge. forests in the S., minerals abundant, recent exploitation of impt. medium and low-grade iron deposits.
Union of South Africa—*see* **South Africa, Union of.**
Union of Soviet Socialist Republics, *cty.*, Europe, Asia; stretches across two continents from the Baltic Sea to the N. Pac. Oc. and from the Arctic to the Black Sea, bounded on the W. by Finland, Poland, Hungary and Romania, in the S. by Turkey, Persia, Afghanistan, China, Mongolia and Manchuria; The Union consists of 15 Union reps.; R.S.F.S.R., Ukrainian, Byelorussian, Azerbaydzhan, Georgian, Armenian, Turkmen, Uzbek, Tadzik, Kazakh, Kirghiz, Moldavian, Estonian, Lithuanian and Latvian S.S.R.'s. These reps. are divided into 126 terrs. and regions which include 18 autonomous reps., 10 autononomous regions and 10 national areas. European portion, separated in the E. from Asia by Ural Mtns., is a vast low plain with Caucasus Mtns. in the S. In Asia the ctr. and N. is occupied by the vast plain of Siberia, rising in the S. to lofty mtn. ranges, Pamirs, Tien Shan, Sayan, Yablonovy, Stanovoi, etc Rs. are impt.: Dnieper, Volga, Ural and Don in Europe flowing southwards; Ob, Yenisei and Lena in Asia flowing northwards into Arctic Ocean; and Amur into Pac. Oc. N. and central regions—long, cold winters; short, cool summers, S. regions—temperate and sub-tropical; desert and semi-desert E. of Caspian Sea. In N. tundra and immense forests with lumbering and associated inds.; agr., wheat, oats, barley, rye, flax, potatoes, sugar-beet, tobacco, cotton, silk, rubber, vines, tea, rice; rich fisheries; impt. minerals; coal, oil, lignite, iron ore, manganese, chrome ore, platinum, copper, lead, zinc, nickel, uranium, asbestos, mica, apatite, nepheline bauxite; many hydro-elect. plants inc. lgst. hydro-elect. plants in Europe, developed 2,362,000 h.p.; 2 atom-driven power stas.; highly developed inds. inc. metallurgical prods., textiles, chemicals, cellulose-paper and lumbering, leather goods, foodstuffs preparation. Ch. spts. Leningrad, Murmansk, Arkhangelsk, Vladivostok, Odessa, Sevastopol, Novorossik, Batumi; cap. Moscow; a. 8,708,070 sq. m.; p. (1959) *208,826,000*.
Union City, *t.*, N.J., U.S.A.; p. (1950) *55,537*.
Uniontown, *bor.*, Penns., U.S.A.; glasswks., iron foundries; p. (1950) *20,471*.
United Arab Republic, Union of Egypt and Syria (Feb. 1958); cap. Cairo
United Arab States, Federation of United Arab Republic and Yemen.
United Kingdom, *cty.*, N.W. Europe; separated from continent of Europe by Eng. Channel; consists of Gr. Britain (Eng., Wales, Scot.) and N. Ireland. *See under separate headings.*
United Provinces, India. *See* **Uttar Pradesh.**
United States, *federal rep.*, N. America; ch. physical features: Great Ls., lgst. freshwater a. in the world; ch. Rs.: Mississippi–Missouri, Rio Grande del Norte, Colorado, Hudson, Susquehanna, Savannah, Columbia; ch. mtns.; Rocky Mtns., Coast Range, Sierra Nevada, Appalachian Mtns.; Great Basin, great plains, Piedmont plateau, coastal plains; climate in N.E.—cool, temperate, rainfall all year round, warm summers, cold winters; in central plains and Gr. Basin—continental climate of extremes; in N.W.—cool temperate with abundant rainfall warm summers, cold winters; in S.W. on Pacific cst.—Mediterranean climate of very warm summers and drought, mild winters with rainfall, dense fogs off Pacific cst.; in S. and S.E. sub-tropical, hot summers, mild winters with abundant rainfall in the S.E. decreasing towards the W.; ch. inds.: agr., maize, wheat, oats, etc., fruit, potatoes, hay, alfalfa, cane- and beet-sugar, cotton, tobacco; pastoral farming, ranching, dairying, sheep, wool, cattle, pigs, horses; lumbering, timber, wood-pulp; fishing off Grand Bank, Newfoundland, for cod, etc., and in W. for salmon; minerals: coal, petroleum, natural gas, phosphate, iron ore, copper, lead, gold, silver, zinc, aluminium, mercury; mftg. of all kinds; commerce; comprises 50 sts. and Dist. of Columbia; cap. Washington; lgst. ts. New York, Chicago, Philadelphia; total land a. (inc. extra-territorial possessions); a. *3,608,787* sq. m.; p. estd (1958) *150,858,361*.
University City, *t.*, Mo., U.S.A.; p. (1950) *39,892*.
Unna, *t.*, N. Rhine-Westphalia, Germany; E. of Dortmund; coal-mining, machin., iron ind.; p. (estd. 1954) *27,500*
Unst, *I.*, Shetlands; most N. of gr.; length 12½ m.
Unstrut, *R.*, Saxony, Germany; trib. of R. Saale, length 110 m.
Untersee, W. portion of L. of Constance.
Unterwalden, *old can.*, Switzerland; now subdivided into Obwalden and Nidwalden; dairying, fruit and livestock; ch. ts. are Sarnen and Stans.
Unter-Yberg, *vil.*, Switzerland; medicinal springs.
Upholland, *t.*, *urb. dist.*, Lancs, Eng.; 4 m. W. of Wigan; bricks; p. (1951) *6,314*.
Upper Austria, *prov.*, Austria; cap. Linz; a. 4,625 sq. m.; p. (1948) *1,190,834*.
Upper Nile, *prov.*, Sudan, N.E. Africa; cap. Malakal; a. 92,270 sq. m.; p. (estd. 1951) *852,200*.
Upper Seal Lake, Labrador, Newfoundland, Canada.
Upper Volta, *aut. rep.* within Fr. Community, W. Africa; cap. Ouagadougou; a. 109,940 sq. m.; p. (estd. 1957) *3,226,000*.
Uppingham, *mkt. t.*, *rural dist.*, Rutland, Eng.; 4 m. S. of Oakham; famous school founded in 1584 by Archdeacon Robert Johnson (1540–1625); p. (rural dist. 1951) *5,416*.
Uppsala, *co.*, E. Sweden; N. of L. Mälar; cap. Uppsala; a. 2,056 sq. m.; p. (1950) *154,677*.
Uppsala, *t.*, cap. Uppsala, Sweden; on R. Sala; 45 m. from Stockholm; univ., cath.; p. (1951) *63,072*.
Upton-on-Severn, *mkt. t.*, *rural dist.*, Worcs, Eng.; 5 m. N.W. of Tewkesbury; p. (rural dist. 1951) *15,340*.
Ur, *ancient* Chaldean *c.* Iraq; 130 m. W.N.W. of Basra; ruins; flourished about 3,000 B.C.
Ural Mtns., R.S.F.S.R.; mtns. separating Asia from Europe; 2,050 m. long; highest summit, Tolposis Mtn., 5,430 ft.
Ural, *R.*, R.S.F.S.R.; flows S.W. and S. to the Caspian Sea; length 1,000 m.
Uralsk, *t.*, Kazakh S.S.R.; on R. Ural; grain-trading and cattle-mart. ctr.; flour, leather, woollens, iron-ware; p. (1959) *105,000*
Urambo, *t.*, Tanganyika, Brit. E Africa; a ctr. of the E. African groundnuts development by the British Overseas Food Corporation.
Uranium City, N. Saskatchewan, Canada; nr. N. shore of L. Athabasca, ctr. of Beaverlodge uranium-mining a.; founded 1951; p. (1953) approx. *500*.
Urbana, *c.*, Ill., U.S.A.; on Embarrass R.; seat of st. univ.; p. (1950) *22,834*.
Urbana, *c.*, Ohio, U.S.A.; mftg.; p. (1950) *9,335*.
Urbino, *t.*, N. Marche, Italy; cath., univ.; silk cheese, olive oil; p. *20,375*.

Ure, *R.*, N.R.; florks, Eng. Yows E. and S.E. to the Swale to form the Ouse; length 50 m.
Ures, *t.*, Lower Cal., Mexico; p. *2,981*.
Urfa, *t.*, Turkey; nr. Syrian border; gd. local tr.; p. (1945) *36,635*.
Urga, *see* **Ulan Bator.**
Uri, *can.*, Switzerland; S. of L. of Lucerne; forest and mtn.; traversed by St. Gotthard Rly. and R. Reuss; cap. Altdorf; a. 415 sq. m.; p. (1950) *28,556*.
Urmia (**Rizaieh**), *t.*, Azerbaijan, Persia; birthplace of Zoroaster; p. *64,000*.
Urmia, L. of, nr. Tabriz, N.W. Persia; 85 m. by 30 m.; salt and shallow.
Urmston, *urb. dist.*, Lancs, Eng.; p. (1951) *39,233*.
Urubamba, *R.*, Peru, S. America; rises in E. Cordillera of Andes; forms one of head streams of R. Amazon; length 350 m.
Uruguaiana, *t.*, Brazil; on R. Uruguay; cattle ctr.; jerked beef, soap, candles; p. *22,000*.
Uruguay, *rep.*, S. America; climate, temperate; moderate rainfall; vegetation temperate and sub-tropical grasslands; language, Spanish; religion, R. C.; cattle- and sheep-rearing, wheat, olives, grapes, gold, textiles; cap. Montevideo; a. 72,153 sq. m.; p. (estd. 1956) *2,668,130*.
Uruguay, *R.*, S. America; rises in S. Brazil, and flows between Argentina and Brazil and Uruguay to Rio de la Plata; length 850 m.
Urumchi, *see* **Tihwa.**
Urundi, *see* **Ruanda-Urundi.**
Urup, *I.*, Kurile gr., Pac. Oc.; 50 m. long; 12 m. wide.
Usa, *R.*, U.S.S R.; flows E. from the Urals to the Pechora; length 220 m.
Usedom (**Uznam**), *I.*, Baltic Sea; off mouth of R. Oder; since 1945 the E. part belongs to Poland, the W. (the larger part) to Germany; I. is 30 m. long and 14 m. wide.
Ushak, *t.*, Turkey; connected by rail with Izmir; noted for pile carpet-weaving.
Ushant, *I.*, off cst. of Finisterre, France; at entrance to Eng. Channel; it was off Ushant that Lord Howe gained his great naval victory on the "glorious first of June," 1794.
Ushuaia, *t.*, Argentina; most southerly t. in world; sheep farming, timber, furs; freezing plant; p. *1,200*.
Usk, *R.*, S. Wales and Monmouth, Eng.; flows S. to Bristol Channel; length 57 m.
Usküdar (**Scutari**), *t.*, Turkey; on the Bosporus, opposite Istanbul; silks, cottons, muslin; p. (1945) *55,000*.
Uspallata Pass, Andes, Argentina; used by the Mendoza–Valparaiso Transandine rly.
Ust Kamenogorsk, *t.*, Kazakhstan, U.S.S.R.; lead refining; impt H.E.P. sta. near by on R. Irtish; p. (1959) *117,000*.
Ustica, *I.*, Italy; hilly; fruit, olives, grain, osiers; fishing; a. 3 sq. m.
Usti Nad Labem, *t.*, Czechoslovakia; on the Elbe; chemicals, coal; p. (1957) *64,798*.
Ustka (**Stolpmünde**), *spt.*, Poland; on Baltic Sea; p. *2,807*.
Usumacinta, *R.*, Mexico and Guatemala, Central America; trib. of R. Tabasco; length 400 m.
Usumbura, *t.*, Ruanda-Urundi, E. Belg. Congo; cotton ginnery, soapwks.; exp. cotton, coffee, hides; p. (estd. 1949) *17,188*.
Usuri, *R.*, Manchuria, N. China; flows to R. Amur; length 340 m.
Utah, *W. st.*, U.S.A.; Mormons form about 91% of the church membership of the st.; farming, wheat maize, barley rye, livestock, sugar-beet, fruits; copper, silver, lead, gold, coal, uranium, vanadium; fruit-canning; cap. Salt Lake City; a. 84,916 sq. m.; p. (1950) *688,862*.
Utah, *L.*, U.S.A.; 23 m. long and 4,400 ft. above sea-level, discharges by R. Jordan to the Gr. Salt L.
Utakamand (**Ootacamund**), *t.*, Madras, India; summer cap. of Madras government; on a plateau 7,230 ft. above sea-level; p. (1941) *29,850*.
Utica, *c.*, N.Y., U.S.A.; on Mohawk R.; clothing and other mnfs.; p. (1950) *101,531*.
Utiel, *t.*, Spain; W. of Valencia; brandies, wines; p. *12,411*.
Utrecht, *prov.*, Neth.; between Guelderland and N. and S. Holland; fertile agr., stock-raising and horticultural dist. S. of the Zuider Zee; a. 526 sq. m.; p. (1951) *195,121*.
Utrecht, *c.*, Neth.; on Old R. Rhine; univ., cath.; chemical and cigar factories; printing, machin., woollens, silks, velvets; p. (estd. 1955) *244,000*.
Utrera, *t.*, Spain; S.E. of Seville; industl.; p. *30,440*.
Uttar Pradesh, *st.*, India; Himalayas on N. bdy., drained by Ganges and Jumna; splendid irrigation; wheat, rice, millet, barley, maize, cotton, sugar, oil-seeds; ch. ts. Allahabad, Lucknow (cap.), Varanasi, Cawnpore, Agra, Meerut; a. 113,410 sq. m.; p. (estd. 1957) *63,215,742*.
Uttoxeter, *t.*, *urb. dist.*, Staffs, Eng.; on R. Dove, 10 m. N.W. of Burton-on-Trent; machin., biscuit mftg.; p. (1951) *7,440*.
Uusimaa, *dep.*, Finland; a. 4,435 sq. m.; cap. Helsinki; p. (1950) *665,313*.
Uvira, *pt.*, Belg. Congo, Central Africa; on N.W. cst. of L. Tanganyika; exp. coffee, cotton, hides; bricks, cotton ginning.
Uxbridge, *mkt. t.*, *mun. bor.*; Middx. Eng.; on R. Colne, 14 m. W. of London; residtl.; light inds, film studio; p. (1957) *60,780*.
Uzbekistan, *constituent rep.*, U.S.S.R.; intensive farming based on irrigation; rice, cotton, fruits, silk, cattle, sheep; cap. Tashkent; a. 159,170 sq. m.; p. (1959) *8,113,000*.
Uzen, (Gr. and Little), *Rs.*, U.S.S.R., flowing 250 m. to the Caspian Sea.
Uzgen, *region*, Kirghiz, S.S.R., U.S.S.R.; coal cotton, engin.
Uzhgorod, *t.*, Ukrainian S.S.R.; engin.; p. (estd.) *25,000*.
Uzhoi Cape, *promontory*, on Ob. Bay, N. Siberia, U.S.S.R.

V

Vaal, *R.*, S. Africa; rises in Drakensberg Mtns., and flows between the Transvaal and Orange Free State to join the Orange R. nr. Kimberley; length 560 m.
Vaasa (**Vasa**), *dep.*, Finland; cap. Vaasa; a. 15,062 sq. m.; p. (1950) *608,100*.
Vaasa, *t.*, *pt.*, *cap.*, Vaasa Finland; on G. of Bothnia; oats, butter, cattle exp.; p (1950) *35,030*.
Vác, *t.*, Hungary; on R. Danube; chemicals, surveying instruments; p. *22,277*.
Vadsö, *t.*, on Varanger Fjord. N. Norway; p. *2,068*.
Vaduz, *t.*, *cap.*, Liechtenstein; p. (1950) *2 735*.
Váh, *R.*, Czechoslovakia; trib. of R. Danube; length 200 m.
Val de Chiana, *see* **Chiana, Val de.**
Valais, *can.*, Switzerland; comprising upper valley of R Rhône; surrounded by high mtns.; sparsely populated; cap. Sion; a. 2,021 sq. m.; p. (1950) *159,178*.
Valdai Hills, U.S.S.R.; N.W. of Moscow; highest summit 1,100 ft
Valdepeñas, *t.*, Central Spain; mineral springs, wine; p. *26,000*.
Valdivia, *prov.*, S. Chile; cap. Valdivia; a. 7,721 sq. m.; p. (1957) *279,215*.
Valdivia, *t.*, cap. Valdivia, S. Chile; on R. Calle-calle nr. the sea (pt. Corral); brewing and tanning; p. (1952) *45,138*.
Valdosta, *t.*, Ga., U.S.A.; rly. ctr., cotton mills, light engin.; p. (1950) *20,046*.
Valence, *t.*, cap. Drôme, France; on left bank of R. Rhône; metal-founding, silks, hosiery, vineyards; p. (1954) *41,470*.
Valencia, *prov.*, Spain; on Mediterranean; agr., vineyards, olive-, fig-, and orange-growing, stock-rearing, silk, tapestry, carpet mftg.; cap. Valencia; a. 4,239 sq. m.; p. (1950) *1,347,912*.
Valencia, *t.*, cap. Valencia, Spain; on R. Turia, 3 m. from the Mediterranean; univ., museum, cath.; mnfs., linen, leather, cigars, silks, exp. wine, fruits, corn, etc.; p (1950) *509,075*.
Valencia, *I.*, S.W. Kerry, Ireland; 6 m. by 2 m.
Valencia, *t.*, Venezuela, S. America; cattle-raising, foundries, tanning, cottons, tobacco, coffee, sugar, beans; p. (1950) *88,674*.
Valencia, *L.*, Venezuela; a. 216 sq. m.; surrounded by swampy flats used for cattle-grazing.
Valenciennes, *fortfd. t.*, Nord, France; on R. Escaut; famous for lace; metallurgical inds., starch, chemicals, etc., coal, iron; p. (1954) *43,434*.
Valetta, *see* **Valletta.**
Valladolid, *prov.*, Central Spain; agr., vineyards, livestock, mnfs.; cap. Valladolid; a. 3,155 sq. m.; p (1950) *347,768*.
Valladolid, *t.*, cap. Valladolid, Spain; on R.

Pisuerga; seat of army corps, univ., cath.; thriving inds. and tr.; p. (1950) *124,212.*

Valladolid, Mexico, *see* **Morelia.**

Vallecas, *t.*, Spain; nr. Madrid, in flat, fertile, vine-growing dist., through which flows the R. Manzanares; p. (1948) *82,386.*

Valle d'Aosta, *region*, N.W. Italy; a. 1,260 sq. m.; p. (1951) *94,758.*

Valle del Cauca, *dep.*, Colombia, S. America; cap. Cali; a. 8,083 sq. m.; p. (1947) *889,580.*

Vallejo, *c.*, Cal., U.S.A.; exp. fruit and corn, milling; p. (1950) *26,038.*

Vallenar, *t.*, Chile; agr. ctr.; dried fruit, wines; p. *8,472.*

Valletta, *ch. t.*, *spt.*, Malta; on N.E. cst of I.; strongly fortfd., fine harbour; univ.; cath.; p. (1956) *18,802.*

Valleyfield, *t.*, Quebec, Canada; textiles, glazed paper; p. *17,052.*

Valona, *see* **Vlonë.**

Valparaiso, *prov.*, Chile; cap Valparaiso; a. 1,860 sq. m.; p (1957) *597,990.*

Valparaiso, *c.*, *spt.*, cap. Valparaiso, Chile; the most impt. pt. on the Pacific cst. of S. America, and the ch. mftg., comm. and industl. ctr. of the Rep. of Chile; locomotives. rolling-stock, sugar-refining, fish-canning, cigars, etc.; p. (1952) *222,000.*

Van, *fortfd. c.*, Turkey; on E. side of L Van, S. of Erzurum; p. (1945) *14,266.*

Van, *I.*, Turkey; mountainous and pastoral, sulphur springs, petroleum wells; p. (1945) *126,919.*

Vancouver, *spt.*, B.C., Canada; terminus of trans-continental rlys.; lumbering, shipbldg., fishing; oil- and sugar-refining; p. (1956) *365,844.*

Vancouver, *t.*, Wash., U.S.A.; dairying, milling, fruit, lumbering, canning; p. (1950) *41,664.*

Vancouver, *I.*, B.C., Canada; off W. cst.; mountainous, forests; coal, fisheries; cap. Victoria; a. 12,408 sq. m.; p. (1941) *121,933.*

Van Diemen Gulf, between Darwin and Coburg Peninsula, N. Terr., Australia.

Vänern, *lge. L.*, Sweden; W.N.W. of L. Vättern, with which it is connected by canal (and thence with the Baltic); a. 2,149 sq. m.

Vänersborg, *L. pt.*, Sweden; on a tongue of land between the R. Göta and the Vasobotten (the southernmost bay of L. Vänern); p. (1948) *13,948.*

Vannes, *ch. t.*, Morbihan, France; on S. cst. Brittany; shipbldg., ironwks., breweries, ropes, leather, oysters; p. (1954) *28,403.*

Var, *R.*, Alpes-Maritimes, France; flows S. to the Mediterranean Sea; length 60 m.

Var, *dep.*, S. France; on the Mediterranean; pasture, vineyards, sericulture, wines, olives, paper; cap. Draguignan, Toulon lgst. c.; a. 2,333 sq. m.; p. (1954) *413,012.*

Varanasi (formerly Benares) *t.*, India; on Ganges, Hindu holy city; annual pilgrimage; temples, mosques, palaces; brocade, gold, silver, lacquer; p. (1951) *355,777.*

Varanger Fjord, an inlet of the Arctic Ocean into Finnmark, Norway's most N. prov

Varazdin, *t.*, Croatia, Jugoslavia; on R. Drava; woollens, coal; p. (1947) *17,176.*

Varazdinski, *t.*, Jugoslavia; on R. Drava; coal-mining, woollens; p. *15,000.*

Varberg, *spt.*, Halland, Sweden; resort; granite quarries; p. *11,874.*

Vardar, *R.*, Jugoslavia, Greece; flows S. into G. of Thessalonika; length 280 m.

Varde, *t.*, W. Jutland, Denmark; recently developed as agr. and route ctr.; food processing; p. *8,118.*

Varese, *t.*, N. Italy; silk-spinning, wine, paper, leather, aircraft; p. (1951) *52,815.*

Värmland, *co.*, Sweden; a. 7,427 sq. m.; p. (1950) *281,458.*

Varna, *see* **Stalino.**

Vasa, *see* **Vaasa.**

Vásárhely or **Hódmezö Vásárhely**, *t.*, Hungary; wine, tobacco.

Västerås, *t.*, *cap.*, Västmanland, Sweden; on N. bay of L. Malar; Gothic cath. (with episcopal library), 16th-century cas.; p. (1951) *59,990.*

Västerbotten, *co.*, Sweden; a. 22,839 sq. m.; p. (1950) *231,836.*

Västernorrland, *co.*, Sweden; a. 9,925 sq. m.; p. (1950) *283,754.*

Västmanland, *co.*, Sweden; N. of L. Malar; cap. Västeras; a. 2,611 sq. m.; p. (1950) *203,612.*

Vasto, *t.*, Italy; on Adriatic cst; olives, silks wines.

Vathéos, *spt.*, Samos I., Greece; exp. wine, olive oil, leather, tobacco, raisins.

Vatican City, the Papal St. of Italy; p. (1948) *890.*

Vatna Jökull, *mtn.*, Iceland; elevated snowfield.

Vättern, *L.*, Sweden; 25 m. S.E. L. Vänern; a. 733 sq. m.

Vaucluse, *dep.*, S.E. France; agr., wines, sericulture, linen, silks, pottery; cap. Avignon; a. 1,381 sq. m.; p. (1954) *268,318.*

Vaud, or **Pays de Vaud**, *can.*, W. Switzerland; N. of L. of Geneva; timber, forests and vineyards; cap. Lausanne; a. 1,239 sq. m.; p. (1950) *377,585.*

Växjö, *t.*, Sweden; match-mkg., iron founding; p. (1951) *20,104.*

Vecht, *R.*, Neth.; branch of Rhine, flows into Zuider Zee.

Vecses, *t.*, Hungary; p. *18,494.*

Véjer de la Frontera, *t.*, Spain; nr. C. Trafalgar; agr. and stock-rearing; p. *10,110.*

Vejle, *spt.*, Jutland, Denmark; gd. harbour and tr.; p. *27,107.*

Velbert, *t.*, N. Rhine–Westphalia, Germany; N.W. of Wuppertal; metal ind.; p. (estd. 1954) *42,600.*

Veleki Beckereck, *t.*, Jugoslavia; on R. Begej; flour, leather, timber, sugar, wine, paper, agr. machin.; p. (1947) *32,821.*

Veles, *t.*, Jugoslavia; on R. Vardar, and main rly. to Belgrade; maize, silk; p. *14,866.*

Velez Málaga, *c.*, Malaga, Spain; famous for wine raisins, sugar, olive oil; p. *28,894.*

Veliki Ustyug, *t.*, R.S.F.S.R.; on R. Sukhona; fur dressing; p. (estd.) *23,000.*

Velletri, *t.*, Italy; foot of the Alban Hills overlooking Pontine Marshes; gd. wine; at this spot Garibaldi gained a victory over the King of Naples, 1849; p. *30,145*

Vellore, *t.*, Madras, India; perfumes, etc.; p. (1951) *106,024.*

Veluwe, *dist.*, Gelderland, Neth.; located between Arnhem and Ijsselmeer (Zuiderzee); low hills of glacial sands and sand-dunes; heathland and pine-woods; relatively low population density.

Vendée or **La Vendée**, *dep.*, W. France; on Bay of Biscay; agr. pasturage, vineyards, fishery, sea-salt, coal and some mnfs.; cap. La Roche-sur-Yon; a. 2,692 sq. m.; p. (1954) *395,641.*

Vendôme, *t.*, Loir-et-Cher, France; on R. Loire; leather goods, cottons; p. (1954) *10,811.*

Venetia (Veneto or Venetia Euganea), *div.* N.E. Italy; between the Alps and the Adriatic; embraces provs. Vicenza, Verona, Venice, Udine, Treviso, Padua, Belluno and Rovigo; cap. Venice; a. 7,098 sq. m.; p. (1951) *3,909,367.*

Venetia Tridentina, *div.*, N. Italy; mountainous lying between Austrian and Swiss frontiers and L. Garda; embraces provs. Trento and Bolzano; cap. Trento; a. 5,250 sq. m.; p. (1951) *728,559.*

Venezia Giulia, *div.*, extreme N.E. Italy; embraces provs. Gorizia and Trieste; provs. Pula and Fiume (Rijeka) now part of Jugoslavia; p. (1951) *1,281,415.*

Venezuela, *rep.*, S. America; on Caribbean cst.; climate tropical, with temperate uplands, wet summers, dry winters, tropical forests, and grasslands (llanos); petroleum (one of the lgst. oil producing ctys. of the world), gold, copper, coal, asphalt; pearl fishing, coffee, cocoa, sugar, maize, cotton, indigo, rubber, balata, tobacco; cap Carácas; a. 352,143 sq. m.; p. (1950) *5,034,838.*

Venice, *maritime c.*, Italy; situated on I. in the lagoons, at head of the Adriatic; splendid architecture; rich in art treasures and historic associations; glassware, gold, silver, embroidery, lace, damask, shipbldg.; p. (1951) *316,228.*

Venlo, *t.*, Neth.; on the Maas; brewing, leather, needles, tobacco; p. (1951) *45,795.*

Vennachar, *Loch*, Perth, Scot.; expansion of R. Teith.

Ventimiglia, *t.*, *cst. resort*, Italy; on Mediterranean cst. nr. Fr. border; cath.; p. *17,081.*

Ventnor, *t.*, *urb. dist.*, I. of Wight, Eng.; on S. cst., 11 m. S. of Ryde; beautiful scenery, mild climate, tourist and health resort; p. (1951) *7,308.*

Ventolene I., Pontine Is., Italy; vineyards, fruit.

Ventspils, *spt.*, Latvian S.S.R.; textiles.

Veracruz, *c.*, *pt.*, Veracruz, Mexico; on G. of

Mexico; exp. ores, precious metals, textiles, raw cotton and petrol; p. (1950) *123,368.*
Veracruz, *prov.,* Mexico; contains volcano Orizaba; cap. Jalapa; a. 27,736 sq. m.; p. (1950) *2,030,833.*
Veraguas, *prov.,* Panama, central America; cap. Santiago; p. (1950) *106,998.*
Vercelli, *c.,* Piedmont, Italy; cath.; cottons, woollens, machin., aircraft parts; exp. rice; p. (1951) *41,951.*
Verde, C., *most W. point,* Africa, Senegambia.
Verden, *c.,* Lower Saxony, Germany; S.E. of Bremen; cath.; machin., glass, tobacco; p. (estd. 1954) *19,900.*
Verdun, *t.,* Quebec, Canada; p. (1956) *78,262.*
Verdun, *fortfd. t.,* Meuse, France; on R. Meuse; 12th-century cath.; confectionery, liqueur, hardware factories; scene of famous battle in First World War; p. (1954) *18,831.*
Vereeniging, *t.,* Transvaal, S. Africa; coal; Peace Treaty between the British and the Boers was signed here, 31 May 1902; p. (1946) *12,145.*
Verkhneudinsk, *t.,* E. Siberia, R.S.F.S.R.; nr. L. Baikal; air service established between the t. and Outer Mongolia.
Verkhneuralsk, *t.,* R.S.F.S.R.; on Upper Ural R.; tanneries, distilleries.
Verkhoyansk, *t.,* Yakutsk A.S.S.R., R.S.F.S.R.; in N.E. Siberia; coldest place in world; mean January temp. of −59° F.; p. *10,000*
Vermont, *st.,* New England, U.S.A.; adjoining Quebec prov., Canada; traversed by the Green Mtns.; farming, dairying, stock-raising, lumbering, grain, fruit, maple sugar, granite, marble, asbestos, copper, silver, gold; cap. Montpelier; a. 9,609 sq. m.; p. (1950) *377,747.*
Vernon, *t.,* B.C., Canada; fruit, farming, canning; p. *5,209.*
Verona, *fortfd. c.,* Venetia, Italy; on R. Adige; beautiful cath.; Roman antiquities; active tr. and inds.; iron goods, machin., paper, silk; p. (1951) *177,999.*
Verona, *prov.* of Venetia region, Italy; a. 1,188 sq. m.; p. (1951) *644,768.*
Verroia, *t.,* N. Greece; S.E. of Thessaloniki; ancient Berea; p. *18,898.*
Versailles, *c.,* Seine-et-Oise, France; 12 m. W.S.W. of Paris; famous royal palace; mkt. gardening, distilleries, etc.; Treaty of Versailles 1919; p. (1954) *84,445.*
Verulam, *t.,* Natal, S. Africa; sugar, tobacco, fruit plantations; p. *1,878*
Verulamium, *site of ancient Roman t.,* Herts, Eng.; on R. Ver, opposite St. Albans; impt. during Roman occupation.
Verviers, *t.,* Belgium; nr. Liége; cloth mnfs., glass; p. (estd. 1957) *37,185.*
Vesoul, *t.,* Haute-Saône, France; p. (1954) *12,038.*
Vest Fjord, *strait,* separates Lofoten Is., from mainland, Norway.
Vestfold, *co.,* Norway; a. 96,359 sq. m.; p. (1950) *154,582.*
Vesuvius, *famous active volcano,* S. Italy; on side of Bay of Naples; alt. 3,984 ft.; its eruption in A.D. 79 destroyed Pompeii and Herculaneum, and frequent eruptions have since occasioned havoc; funicular rly. from the base of the mtn. to the edge of the crater since 1880.
Veurne, *t.,* W. Flanders, Belgium; sugar-refining; warehouses.
Vevey, *t.,* Vaud, Switzerland; on N.E. shore of L. of Geneva; chocolate, watches, machin.; p. (1941) *12,598.*
Viacha, *t.,* Bolivia, S. America; rly. junction nr. La Paz; cement; p. *2,000.*
Viana do Castello, *dist.,* Portugal; cap. Viana do Castello; a. 814 sq. m.; p. (1950) *275,969.*
Viana do Castello, *t.,* Portugal; at mouth of R. Lima, nr. Oporto; p. (1940) *13,984.*
Viareggio, *spt., resort,* Italy; on Mediterranean, nr. Pisa; monument to the poet Shelley; p. *32,564.*
Viazma, *t.,* R.S.F.S.R.; N.E. of Smolensk, industl.
Viborg, *t.,* Jutland, Denmark; cath.; distilleries, cloth, iron founding; p. *20,084.*
Viborg (Viipuri), *spt.,* R.S.F.S.R., U.S.S.R.; timber exp.
Vicente Lopez, *t.,* Buenos Aires, Argentina; p. *25,600.*
Vicenza, *c.,* Italy; woollens, cottons, silks, pottery, furniture mkg.; p. (1951) *79,576.*
Vich (Vique), *c.,* Spain; nr. Barcelona; cath.; mnfs.; p. *15,516.*
Vichy, *t., wat. pl.,* Allier, France; 35 m., S. of Moulins; mineral springs, lge. exp. of waters; seat of Marshal Pétain's government during German occupation of France, Second World War; p. (1954) *30,403.*
Vicksburg, *c.,* Miss., U.S.A.; on cliffs above a "cut-off" L. on R. Mississippi; furniture, machin.; mftg. ctr. in cotton and timber region; prominent in American Civil War, Confederate surrender 1863; p. (1950) *27,948.*
Victoria, *st,* Australian Commonwealth; mixed farming, grapes, mnfs., machin., hardware, textiles, wine, gold, coal, tin; cap. Melbourne; a. 87,884 sq. m.; p. (estd. 1958) *2,726,417.*
Victoria, *c., cap.,* B.C., Canada; on Vancouver I., sawmills, cement, chemicals, fish-canning; p. (1956) *54,584.*
Victoria, *spt., cap.,* Espirito Santo st., Brazil; p. *42,873.*
Victoria, *t., cap.,* Seychelles, Indian Ocean; gd. harbour.
Victoria, *t., cap.,* Labuan I., N. Borneo; fine harbour; p. (estd. 1957) *2,526.*
Victoria, *t., cap.,* Hong Kong; p. (estd. 1948) *766,800.*
Victoria Falls, on the R. Zambesi, N. Rhodesia, Central Africa; were discovered by Dr. Livingstone in 1855; falls are 1,860 yd. wide and broken by islands and rocks.
Victoria, *L.,* Kenya, Uganda, Tanganyika, Brit. E. Africa; lgst. L. of Africa; lies on the Equator; a. 25,000–26,000 sq. m.; discharges to the N. by R. Nile; 3,705 ft. above sea; discovered by Captain Speke in 1858.
Victoria, *L.,* on Gr. Pamir, Central Asia; 13,870 ft. above sea-level; supposed to be ch. source of the R. Oxus.
Victoria Land, *terr.,* N. Canada; S.E. of Prince Albert Land.
Victoria Land, *region,* Antarctica; discovered by Ross in 1841.
Victoria Nile, *R.,* Uganda, Brit. E. Africa; name of R. Nile from its source at L. Victoria until it enters L. Albert.
Victoria Strait, separates Victoria I. from King William I., Arctic Canada.
Victoria West, *t.,* C. of Gd. Hope, S. Africa; p. *2,535.*
Victoriaville, *t.,* Quebec, Canada; woodworking; p. *8,516.*
Vidin, *fortfd. t.,* Bulgaria; on R. Danube; ruined mosque and palace; p. (1947) *18,580.*
Viedma, *t., cap.,* Rio Negro, Argentina; p. (1947) *6,000.*
Vienna (Wien), *cap.,* Austria; on branch of R. Danube; ranks also as prov.; univ., gothic cath. (St. Stephen's Church), Rathaus, Parliament bldgs., magnificent Prater park; thriving comm. and mnfs., silks, iron, steel, breweries, etc.; p. (1951) *1,766,102.*
Vienne, *R.,* France; trib. of the Loire; length 220 m.
Vienne, *dep.,* W. France; grain, wine, cutlery, arms; cap. Poitiers; a. 2,711 sq. m.; p. (1954) *319,208.*
Vienne, *t.,* Isère, France; nr. Grenoble, on R. Rhône; textile ind. and glove factories; p. (1954) *25,669.*
Vienne, Haute (Haute-Vienne), *dep.,* France; fruits, cereals, livestock, porcelain; cap. Limoges; a. 2,119 sq. m.; p. (1954) *324,429.*
Vientiane, *cap.,* Laos, Indo-China; p. (estd. 1948) *10,000.*
Viersen, *t.,* N. Rhine–Westphalia, Germany; S.W. of Krefeld; textiles, machin., furniture, paper ind.; p. (estd. 1954) *37,600.*
Vierzon, *t.,* Cher, France; nr. Bourges; mnfs.; p. (1954) *28,627.*
Viet-Nam, *rep.,* S.E. Asia; formerly within the French Union, covering 3 countries of Tongking, Annam and Cochin-China; inhabited mainly by Annamite races; rice, rubber; a. 125,000 sq. m.; p. (estd. 1956) *12,000,000.*
Vigevano, *t.,* Lombardy, Italy; on R. Ticino; cath.; silks; p. *33,719.*
Vigo, *fortfd. t.,* Galicia, Spain; on Rio de Vigo; impt. fishery and shipping inds.; flour, sugar, petroleum, leather; p. (1950) *118,154.*
Viipuri, *see* **Viborg.**
Vila de João Belo (Chai Chai), *t.,* Mozambique, Port. E. Africa; on R. Limpopo; exp. sugar, rice, timber, maize; p. *4,000.*
Vila Nova de Gaia, *t.,* Portugal; sub. of Oporto;

on R. Douro; pottery, wine-casks, tobacco and glass factories; p. (1940) *34,398*.
Vila Real, *dist.*, Portugal; a. 1,636 sq. m; p. (1950) *319,883*.
Vila Real, *t.*, Portugal; wines, wolfram; p. (1940) *7,980*.
Vilhelmina, *t.*, Sweden; nr. Angerman Alv; p. *11,136*.
Villa Ballester, *t.*, Argentina; sub. Buenos Aires; p. *31,500*.
Villa Cisneros, *spt.*, on cst. of Rio de Oro, Spanish Sahara; p. *1,000*.
Villa del Pilar, *c.*, Paraguay; oranges.
Villa Franca, *t.*, Lombardy, Italy; silk; p. *13,451*.
Villa Franca de los Barros, *t.*, Badajoz, Spain; wine and corn; p. *15,360*.
Villa Hermosa, *cap.*, Tabasco, Mexico; p. (1940) *25,114*.
Villa Maria, *t.*, Argentina; rly. junction; grain, timber, dairying; p. *23,054*.
Villach, *t.*, Austria; iron, timber, leather, beer; tourist ctr.; p. (1951) *30,061*.
Villanueva de la Serena, *t.*, prov., Badajoz, Spain; wine, wheat, hemp and fruit; p. *16,088*.
Villanueva y Geltrú, *spt.*, Spain; nr. Barcelona; p. *17,091*.
Villarrica, *t.*, Paraguay; farming, tobacco, oranges.
Villaviciosa, *spt.*, Spain; on N. cst. 10 m. E. of Gijon; p. *22,029*.
Villefranche, *t.*, Rhône, France; on R. Rhône, nr. Lyons; cottons, wines; p. (1954) *21,703*.
Villejuif, *t.*, Seine, France; p. (1954) *29,280*.
Villena, *t.*, Alicante, Spain; silk, salt, brandy; p. *19,065*.
Villeneuve St. Georges, *t.*, Seine-et-Oise, France; marshalling yards; p. (1954) *21,596*.
Villeurbanne, *t.*, Rhône, France; sub. Lyons; silk, rayon, metallurgy, chemicals, leather, glass; p. (1954) *81,769*.
Villingen, *t.*, Baden-Württemberg, Germany; in the Black Forest; clocks, elec., metals; p. (estd. 1954) *21,600*.
Vilnius (Wilno, Vilna), *cap.*, Lithuanian S.S.R.; Polish from 1919 to 1939; univ., cath.; timber, chemicals, engin.; p. (1959) *235,000*.
Vilvorde, *t.*, Brabant, Belgium; on R. Senne; oil and chemical factories; p. (estd. 1957) *30,143*.
Viña del Mar, *t.*, Chile; p. (1952) *88,000*.
Vinaroz, *spt.*, *t.*, Spain; nr. mouth of R. Ebro; shipbldg.; p. *9,235*.
Vincennes, *t.*, Ind., U.S.A.; milling, glass, steelwks.; p. (1950) *18,831*.
Vincennes, *sub.*, Paris, France; p. (1954) *50,434*.
Vindyha, *mtn. range*, India; separating the Deccan from the Ganges basin
Vindhya Pradesh, *former st.* Indian Union; now absorbed into Madhya Pradesh 1 Nov. 1956; cereals, oil seeds; coal, iron, copper bauxite.
Vinnitsa, *t.*, Ukrainian S.S.R.; on R. Bug, 120 m. S.W. of Kiev; agr. mkt. t.; engin., chemicals, textiles; p. (1959) *121,000*.
Virginia, *st.*, U.S.A.; S. of Md.; tobacco culture; famous for Natural bridge in Rockbridge County and mineral springs; "Virginia Leaf" tobacco is the finest the U.S. produces; rayon, shipbldg., iron, coal; cap. Richmond; a. 40,815 sq. m.; p. (1950) *3,318,680*. *See also* **W. Virginia**.
Virginia City, Nevada, U.S.A.; on E. slope, Mt. Davidson; a. 6,205 ft.; silver-mining dist.; p. *952*.
Virginia Water, *artificial L.*, nr. Windsor, Berks, Eng.
Virgin Is. (Brit.), part of Leeward Is. gr., W. Indies, not inc. in T.W.I.; a. 67 sq. m.; lgst. I. Tortola; fruit, vegetables, charcoal, rum, sugar, tobacco; p. (1958) *7,400*.
Virgin Isles (U.S.A.), gr. in the W. Indies; E. of Puerto Rico; purchased by U.S.A. from Denmark 1917, comprising the Is. of St. Croix, St. Thomas and St. John, and about 50 sm. Is.; total a. 133 sq. m.; p. (1950) *26,665*.
Visby, *old spt.*, Sweden; on Gottland I. in Baltic Sea; p. *14,023*.
Viscaya, *Basque prov.*, Spain; on Bay of Biscay; mineral inds., shipping, etc.; cap. Bilbao; a. 836 sq. m.; p. (1949) *581,381*.
Vistula, *R.*, Poland; rising in Silesia, and flowing past Krakow and through Poland to the Baltic nr. Gdańsk; navigable from Krakow to the sea; length 693 m.
Vitebsk, *t.*, Byelorussian S.S.R.; on R. Dvina, 354 m. W. of Moscow; farm implements, footwear, glass, gr. tr. in corn and cattle; p. (1959) *148,000*.
Viterbo, *c.*, Italy; N. of Rome; alum mines, matches; p. (1951) *44,396*.
Vitim, *R.*, E., Siberia, R.S.F.S.R.; flows to R. Lena; length 900 m.
Vitória, *spt.*, Brazil; exp. coffee, cocoa, fruit, iron ore; sugar refining, boots, shoes, textiles; p.(1947) *51,620*.
Vitoria, *cap.*, Alava, Spain; wine, hardware, mules, horses; p. (1950) *52,206*.
Vittoria, *t.*, Sicily, Italy; silk mftg.; p. *38,628*.
Vittorio Veneto, *t.*, Italy; N. of Venice; resort; mineral springs; silk; p. *24,234*.
Vizagapatam, *impt. spt.*, E. cst. India; Andhra dist.; exp. manganese and other mineral ores, tobacco oil-seed, myrabalams and coir; sm. shipyard; oil-refining; p. (1941) *70,243*.
Vizcaino Bay, Lower Cal., Mexico.
Vizcaya, *prov.*, N. Spain; cap. Bilbao; a. 836 sq. m.; p. (1950) *569,188*.
Vizeu, *dist.*, Portugal; cap. Vizeu; a. 1,955 sq. m.; p. (1940) *465,563*.
Vizianagram, *t.*, Madras, India; p. (1941) *51,749*.
Vlaardingen, *fishing t.*, S. Holland, Neth.; on R. Maas; p. (1951) *48,187*.
Vladimir, *c.*, R.S.F.S.R.; between Gorki and Moscow; cath.; farm produce, fruit, tobacco, cottons, engin.; p. (1959) *154,000*.
Vladivostok, *t.*, *ch. spt.*, Siberia, U.S.S.R.; univ., H.Q. Army of the Far East; terminus of the Trans-Siberian rly. and airline from Moscow, oil-refining; p. (1959) *283,000*.
Vlieland, *Friesian I.*, at entrance to Zuider Zee, Neth.
Vlonë, (**Valona**), *prefecture*, Albania; p. (1941) *56,607*.
Vlonë, *spt.*, Albania; on Strait of Otranto, Adriatic Sea; salt; oil pipe-line connects from Kuçovë; p. (1930) *9,100*.
Vltava, *R.*, Bohemia, Czechoslovakia; flows to R. Elbe, below Prague; length 262 m.
Voghera, *t.*, Italy; silks; p. *30,422*.
Voi, *t.*, *impt. rly. junction*, Kenya, Brit. E. Africa; 90 m. N.W. of Mombasa on rly. to Nairobi; branch connection with Tanganyika rly. system allows agr. produce from Arusha and Moshi dists. to pass through Mombasa as alternative to Tanga.
Voiron, *t.*, Isère, France; on R. Isère nr. Grenoble; p. (1954) *13,551*.
Volchansk, *t.*, Ukrainian S.S.R.; tanneries, distilleries; p. *10,000*.
Volga, *R.*, U.S.S.R.; rises on Valdai plateau, flows in a serpentine course to the Caspian at Astrakhan; frozen in winter; 2,325 m. long.
Volhynia, *dist.*, part of Ukraine S.S.R., U.S.S.R.; on Polish frontier (Polish 1919–39); a. 13,750 sq. m.; now prov. of Lutsk and Rovno.
Volkhov, *R.*, R.S.F.S.R.; flows from L. Ilmen to L. Ladoga; length 130 m.
Völklingen, *t.*, Saarland; on R. Saar; coal-mining, metallurgy; p. (estd. 1954) *40,900*.
Volksrust, *t.*, Transvaal, S. Africa; dairying; rly. wkshps.; p. *5,905*.
Vologda, *t.*, R.S.F.S.R., U.S.S.R.; engin., textiles, sawmilling; p. (1959) *138,000*.
Vólos, *spt.*, Greece; at head of G. of Vólos; p. (1951) *51,134*.
Volsk, *t.*, R.S.F.S.R.; on R. Volga; gd. tr.; iron-wks., tanneries, milling; p. (1959) *62,000*.
Volta Redonda, Rio de Janiero, Brazil; steel plants.
Volta, Upper, *see* **Upper Volta**
Volta (**White Volta**), *R.*, drains extensive terr. in Niger Bend, flows S. through Ghana to delta on Guinea cst. 70 m. E. of Accra; forms main means of communication; rapids make through navigation impossible; length 950 m. *See also* **Black Volta**.
Volterra, *t.*, Italy; saline spring, alabaster; p. *19,054*.
Voltri, *t.*, Italy; shrine, shipbldg., ironwks.; p. *10,000*.
Volzhskiy, *t.*, R.S.F.S.R.; New Town 10 m. E. of Stalingrad; p. (1959) *67,000*.
Vorarlberg, *prov.*, Austria; cap. Bregenz (*q.v.*); a. 1,004 sq. m.; p. (1951) *193,657*.
Vordingborg, **S.** *t.*, Zealand, Denmark; p. *9,681*
Vorkuta, *dist.*, Siberia, R.S.F.S.R.; about 120 m W. of mouth of R. Ob; new coal-mining ctr. which supplies entire European north U.S.S.R.; p. of Vorkuta t. (1959) *55,000*.
Voronezh, *region*, R.S.F.S.R., U.S.S.R.; agr.

stock-rearing, woodwork and domestic mnfs.; cap. Voronezh.
Voronezh, *t.*, R.S.F.S.R., U.S.S.R.; on R. Voronezh nr. its junction with R. Don; impt. comm. ctr.; synthetic rubber, engin.; p. (1959) *454,000*.
Voroshilovgrad (Lugansk), *industl. t.*, Ukraine S.S.R., U.S.S.R.; located just S. of R. Donets in heart of Donbas industl. region, 90 m. N.E. of Stalino; impt. rly. engin. factories; textiles; p. (1959) *274,000*.
Voroshilovsk, *t.*, Ukrainian S.S.R.; p. (1956) *98,000*.
Vosges, *mtn. chain*, E. France; 190 m. long; highest summit, the Ballon de Guebwiller (4,672 ft.).
Vosges, *E. frontier dep.*, France; agr., dairying, vineyards, textiles, coal, stone; cap. Epinal; a. 2,305 sq. m.; p. (1954) *372,523*.
Voskresensk, *t.*, R.S.F.S.R.; S.E. Moscow; lignite, chemicals, fertilisers; p. (1954) *50,000*.
Voyusa, *R.*, rises in Greece, flows N.W. through Albania into Strait of Otranto.
Voznesensk, *t.*, Ukrainian S.S.R.; on R. Bug; cath.; distilling, brewing; p. *10,000*.
Vranja, *t.*, Jugoslavia; flax and hemp culture and mnf.; nr. is health resort of Vranyskas Banya; p. (1947) *12,404*.
Vratca, *t.*, Bulgaria; on R. Vratcanska; jewellery, wine, silk, tanning; p. (1947) *19,448*.
Vrede, *t.*, O.F S., S. Africa; agr. ctr.; horse-breeding; p. *4,148*.
Vrsac, *t.*, Jugoslavia; milling, wine, brandy; p. (1953) *26,710*.
Vryburg, *t.*, C. of Gd. Hope, S. Africa; gold field in neighbourhood; stock-raising; p. *7,198*.
Vryheid, *t.*, Natal, S. Africa; coal, iron, copper gold, silver, lead mines; p. *7,860*.
Vulcan Pass, in the Carpathian Mtns., between Romania and Transylvania.
Vulcano, *I.*, Lipari gr., Tyrrhenian Sea; located 12 m. off N.E. cst., Sicily; active volcano; gave its name as generic title for this type of mtn.
Vyatka, *see* **Viatka**.
Vychegda, *R.*, Komi A.S.S.R., R.S.F.S.R.; flows W. to N. Dvina R.; length 700 m.
Vyrnwy, *L.*, *artificial reservoir*, Montgomery, Wales; with a dam 1,180 ft. long furnishing water for Liverpool; 5 m. long; a. 1,121 acres.
Vyshni-Volochek, *t.*, R.S.F.S.R., U.S.S.R.; flour-milling, industl.; p. (1959) *66,000*.

W

Waag, *see* **Vah**.
Waal, *R.*, Neth ; S. arm of R. Rhine
Wabana, *see* **Bell I.**
Wabash, *c.*, Ind., U.S.A.; rly. ctr.; p. (1950) *10,621*.
Wabash, *R.*, Ohio and Ind., U.S.A.; trib. of R. Ohio; length 550 m.
Wabash and Erie, *canal*, Ind., U.S.A., longest canal in U.S.A.; 476 m. long.
Waco, *c.*, Texas, U.S.A.; on Brazos R.; univ.; cotton ctr., woollens, grain, iron, leather; p. (1950) *84,706*.
Wadai, *dist.*, Fr. Equatorial Africa; nr. L. Chad; desert and oases; pastoral; ivory, ostrich feathers; a. 17,000 sq. m.; p. (1947) *1,000,000*
Wadden Zee, *G.*, between W. Frisian Is. and N. Neth.
Waddington, *mtn.*, B.C., Canada; alt. 13,260 ft.
Wadebridge, *spt.*, *rural dist.*, Cornwall; at head of Camel estuary 6 m. N W. of Bodmin; china clay; p. (rural dist. 1951) *16,146*.
Wädenswil, *t.*, Zürich, Switzerland; on L. Zürich; silk, wool, textiles; wine, fruit; p. *10,000*.
Wadi Halfa, *t.*, Sudan, N.E. Africa; on R. Nile; at 2nd cataract; rly. terminus of Sudan rlys.; p. *15,650*.
Wad Medani, *t.*, *cap.*, Blue Nile Prov., Sudan, Africa; grain, oil, soap; p. (1947) *56,600*.
Wadsworth, *t.*, Ohio, U S.A.; matches, valves, engin.; p. (1950) *7,966*.
Wagadugu, *see* **Ouagadougou**.
Wager Bay, *inlet*, of Hudson Bay, N W Terr., Canada.
Wagga Wagga, *t.*, N.S.W., Australia; on R. Murrumbidgee; gold, pastoral ctr., wines tobacco; p. (1958) *20,900*.
Wahiawa, *t.*, Oahu I., Hawaii; pineapples; p. (1950) *8,341*.
Waigeu, *I.*, off N. cst., Dutch New Guinea, Indonesia.
Waihi, *t.*, N.I., N.Z.; gold-mining; p. (1951) *3,889*.
Waikaremoana, *L.*, N.I., N.Z.; hydro-elec. power plant.
Waikato, *R.*, N.I., N.Z.; the longest in N.Z.; length 220 m.
Waikerie, *t.*, S. Australia; on R. Murray; fruit, vines.
Waimate, *t.*, S.I., N.Z.; agr ctr., soft fruits; p. (1951) *2,907*.
Wairakei, *t.*, N.I., N.Z.; on L. Taupo; health resort; geothermal power sta. opened Nov. 1958.
Wairoa, *t.*, N.I., N.Z.; on R. Wairoa; p. (1951) *3,341*.
Waitzen, *t.* Hungary; on R. Danube.
Wakamatsu, *t.*, Honshu, Japan; silk reeling; p. (1947) *56,275*.
Wakamatsu, *t.*, Kyushu, Japan; lacquer ware, mnfs.; p. (1947) *75,196*.
Wakatipu, *L.*, Otago, S.I., N.Z.; 52 m. long, 3 m. wide; 1,200 ft deep; 1,070 ft. above sea-level.
Wakayama, *spt.*, Honshu, Japan; cotton; p. (1950) *191,337*.
Wake I., Pac. Oc.; between Marianas and Hawaii; calling-place on trans-Pacific air-routes; belongs to U.S.A.
Wakefield, *c.*, *co. bor.* W.R. Yorks, Eng.; on R. Calder; 8 m. S. of Leeds; cath.; woollens, brewing, coal, iron, boiler mkg., chemicals, glass, engin.; p. (1951) *60,380*.
Wakefield, *t.*, Va., U.S.A.; George Washington's birthplace; p. *687*.
Walachia, *dist.*, S. Romania; cereals, fruits; ch. t. Bucharest; a. 29,561 sq. m.; p. *5,029,212*.
Walbrzych (Waldenburg), *t.*, Silesia, Poland; German before 1945; textiles, coal, porcelain, iron ware; p. (1957) *111,000*.
Walcheren, *I.*, Neth.; 12 m. long, low-lying, agr.; was flooded to stop German advance in Second World War.
Waldeck, *see* **Hessen-Nassau**.
Waldenburg, *see* **Walbrzych**.
Wales, *principality*, S.W. of Gr. Britain; flanked by Irish Sea, St. George's Channel and Bristol Channel; mtns.; coal, slate, oats, barley, good pasturage, smelting tin, copper, iron; cap. Cardiff; a. 7,388 sq. m.; p. (1951) *1,706,787* (excluding Monmouthshire).
Walhalla, *t.*, Victoria, Australia; gold-mining; p. *2,000*.
Walker, *t.*, Northumberland, Eng.; on R. Tyne; industl. sub. of Newcastle.
Wallaceburg, *t.*, Ontario, Canada; glass, brass, iron; sugar, flour; p. (1947) *4,986*.
Wallaroo, *spt.*, S. Australia; copper-mining; p. *2,140*.
Wallasey, *co. bor.*, on Mersey estuary, adjoining Birkenhead, Cheshire, Eng.; residtl., seaside resort (New Brighton); p. (1951) *101,331*.
Walla Walla, *t.*, Wash., U.S.A.; on Mill Creek; cereal and fruit ctr., agr. tools, flour, leather; p. (1950) *24,102*.
Wallensee, *L.*, Switzerland; 11 m. long.
Wallingford, *t.*, *mun. bor.*, Berks, Eng.; on R. Thames, to N. of its gap between Chiltern Hills and Lambourn Downs; old cas.; malting; p. (1951) *3,514*.
Wallingford, *t.*, Conn., U.S.A.; steel, brass, silver and nickel ware; tools, wire; p. (1950) *11,994*.
Wallington, *t.*, N.J., U.S.A.; curtains, paints; p. (1950) *8,910*.
Wallis Archipelago, *I. gr.*, S. Pacific; a. 40 sq. m.; dependency of Fr. New Caledonia; p. (1946) *4 243*.
Wallsend, *t.*, *mun. bor.*, Northumberland, Eng.; on N. bank of R. Tyne; 4 m. below Newcastle; coal-mining, shipbldg., engin., iron, plywood, plastics and quartz glass; p. (1951) *48,645*.
Walmer, *t.*, Kent, Eng.; 2 m. S. of Deal; holiday resort; cas., residence of Warden of Cinque Ports; p. *5,335*.
Walney, *I.*, off cst. of Lancs, Eng.; opposite Barrow.
Walpole, *t.*, Mass., U.S.A.; nr. Boston; p. (1950) *9,109*.
Walpole, *I.*, dep. of New Caledonia; Pac. Oc.; Fr possession, lies S.E. of Maré (Loyalty Is.).
Walsall, *t.*, *co. bor.*, Staffs, Eng.; 5 m. E. of Wolverhampton; leather and iron goods, engin.; p. (1951) *114,514*.
Walsham, N., *see* **North Walsham**.
Walsingham, *C.*, on Cumberland Peninsula, Baffin I., Canada.
Walsum, *t.*, N. Rhine–Westphalia, Germany; at

confluence of Emscher and Rhine; coal-mining paper, cellulose; p. (estd. 1954) *29,600*.
Waltershausen, *t.*, Germany; mnfs.
Waltham, *c.*, Mass., U.S.A.; nr. Boston; watch-mkg., textiles, motors, furniture, shoes, paper; p. (1950) *47,187*.
Waltham, Holy Cross, *t.*, *urb. dist.*, Essex, Eng.; on R. Lea, 11 m. N. of London; abbey; mkt. gardening, cordite, light inds.; p. (1951) *8,197*.
Walthamstow, *mun. bor.*, S.W. Essex, Eng.; industl. and residtl. sub. of London; clothing, furniture, plastics; p. (1951) *121,069*.
Walton and Weybridge, *urb. dist.*, Surrey, Eng.; on R. Thames, 17 m. S.W. of London; engin.; anglers' resort; p. (1951) *38,091*.
Walton-le-Dale, *t.*, *urb. dist.*, N.E. Lancs, Eng.; on R. Ribble, 2 m. E. of Preston; mkt. gardening, cottons, timber; p. (1951) *14,711*.
Walvis Bay, *dist.* and *spt.*, administered by S.W. Africa; a. 374 sq. m.; fishing, whaling; p. *2,263*.
Wanchuan (**Kalgan**), *fortfd. t.*, Chahar, China; nr. the Great Wall of China 110 m. N.W. of Peking; terminus of caravan routes from Central Asia; lge. tr. in tea, wool, hides; p. (estd. 1936) *70,000*.
Wandsbeck, *t.*, Germany; sub. of Hamburg; beer, brandy, tobacco; p. *40,000*.
Wandsworth, *met. bor.*, S W London, Eng.; on R. Wandle and R. Thames; oil-mills, metal-wks., paper, brewing; p. (1951) *330,328*.
Wanganui, *c.*, N.I., N.Z.; on R. Wanganui; wool, grain, meat, dairy produce; p. (estd. 1958) *33,000*.
Wanganui, *R.*, N.I., N.Z.; length 160 m.
Wangaratta, *t.*, Victoria, Australia; 145 m. from Melbourne; agr. dist.; p. (1957) *11,810*.
Wankie, *t.*, S. Rhodesia; site of coalmng. ind. of Fed.: 215 m. N.W. Bulawayo; p. *14,500* (incl. *2,500* Europeans).
Wanlockhead, *vil.*, Dumfries, Scot.; in Lowther Hills; lead-mines.
Wanne-Eickel, *t.*, N. Rhine–Westphalia, Germany; N.W. of Bochum; coal-mining, chemicals; p. (estd. 1954) *89,900*.
Wansbeck, *R.*, Northumberland, Eng.; flows E. from Pennines into N. Sea 3 m. N. of Blyth; length 23 m.
Wanstead and Woodford, *mun. bor.*, Essex, Eng.; residtl. sub. of London; p. (1951) *61,620*.
Wantage, *mkt. t.*, *urb. dist.*, Berks, Eng.; in Vale of the White Horse; hempen cloth, brass; p. (1951) *5,089*.
Wapakoneta, *t.*, Ohio, U.S.A.; nr. Pique; p. (1950) *5,797*.
Wapping, *Thames-side dist.*, London, Eng.; contains the London Docks; industl.; p. *3,200*.
Warangal, *t.*, Hyderabad, India; p. (1951) *133,130*.
Waratah, *t.*, N.S.W., Australia; sub. of Newcastle; coal, copper-mines; p. (1947) *20,313*.
Waratah, *t.*, N. Tasmania, Australia; tin-mining ctr; p. *1,009*.
Warburg, *t.*, Germany; on R. Diemel; industl.
Wardha, *R.*, Madhya Pradesh, India; trib. of R. Wainganga; length 254 m.
Ware, *mkt. t.*, *urb. dist.*, Herts, Eng.; on R. Lea; 2 m. N.E. of Hertford; malting, bricks; p. (1951) *8,253*.
Wareham, *mkt. t.*, *mun. bor.*, Dorset, Eng.; on R. Frome, on N. of I. of Purbeck, 8 m S.W. of Poole; agr. engin., pipes; p. (1951) *2,750*.
Waremme (**Borgworm**), *t.*, Belgium; p. (1947) *4,859*.
Waren, *t.*, Mecklenburg, Germany; on the Müritzsee; timber, dairying, iron; p. (estd. 1954) *20,300*.
Warkworth, *sm. spt.*, Northumberland, Eng.; nr. mouth of R. Coquet; cas.; agr., fishing; p. *713*.
Warminster, *t.*, *urb. dist.*, Wilts, Eng.; on Wylye watershed at edge of Salisbury Plain; agr. mkt., gloves, silk; p. (1951) *8,236*.
Warnemünde, *spt.*, Germany; ferry pt. for rail traffic between Berlin and Copenhagen; resort; p. *6,374*.
Warrego, *R.*, Queensland, N.S.W., Australia; trib. of R. Darling; length 400 m.
Warren, *c.*, Ohio, U.S.A.; on Mahoning R.; coal-and iron-mining, iron and steel mftg.; p. (1950) *49,856*.
Warren, *bor.*, Penns., U.S.A.; on Allegheny R.; natural gas, petroleum, oil-refining; furniture, tools; p. (1950) *14,849*.
Warrenpoint, *spt.*, *urb. dist.*, Down, N. Ireland; at head of Carlingford Lough; holiday resort; p. (1951) *2,798*.
Warrenton, *t.*, C. of Gd. Hope, S. Africa; cheese-mkg.; p. *2,655*.
Warrington, *t.*, *co. bor.*, Lancs, Eng.; on R. Mersey, 18 m. E. of Liverpool; aluminium rolling and drawing, soap, chemicals iron and steel; p. (1951) *80,681*.
Warrnambool, *spt.*, Victoria, Australia; mkt., agr., dairying; p. (1957) *13,500*.
Warsaw or **Warszawa**, *prov.*, Poland; on Vistula and Bug Rs.; a. 10,900 sq. m.; p. (1957) *2,293,000*.
Warsaw or **Warszawa**, *cap.*, Poland; on R. Vistula; cath., univ.; rly. ctr.; iron and steel, engin., textiles, chemicals; p. (1957) *1,069,000*.
Warsaw, *c.*, Ind., U.S.A.; on Tippecanoe R.; p. (1950) *6,625*.
Warsop, *t.*, *urb. dist.*, Notts, Eng.; 4 m. N.E. of Mansfield; limestone, gravel; p. (1951) *10,888*.
Warta, *R.*, Poland; trib. of R. Oder; length 450 m.
Warwick, *t.*, Queensland, Australia; coal, agr., sawmilling; p. (1957) *9,800*.
Warwick, *co.*, Eng.; coal, iron, limestone, fruit, livestock, motors, metal goods; co. t. Warwick; a. 976 sq. m.; p. (1951) *1,860,874*.
Warwick, *co. t.*, *mun. bor.*, Warwick, Eng.; on R. Avon, 8 m. S.W. of Coventry; cas.; agr. implements, brewing, malting, rope, iron; p. (1951) *15,350*.
Warwick, *t.*, R.I., U.S.A.; on Narragansett Bay; cotton mnfs.; p. (1950) *43,028*.
Wasatch Mtns., *range*, Utah and Idaho, U.S.A.
Wash, The, *bay*, N. Sea between Lincs and Norfolk, Eng.; 22 m. long, 15 m. wide; partly reclaimed.
Washa, *L.*, La., U.S.A.; 14 m. long.
Washburne, *mtn range*, Yellowstone National Park, U.S.A.; highest summit 10,345 ft.
Washington, *t.*, *urb. dist.*, Durham, Eng.; 5 m. S.E. of Gateshead; coal, iron and steel, stone quarrying, chemicals; p. (1951) *17,795*.
Washington, *st.*, U S.A.; coal, iron, minerals, forests, agr.; cap. Olympia; ch. ts. Seattle and Tacoma; a. 68,192 sq. m.; p. (1950) *2,378,963*.
Washington, *c.*, *cap.*, U.S.A.; in Dist. of Columbia, on Potomac R.; White House, Capitol, 4 univs., etc.; printing and engraving; p. (1950) *802,178*.
Washington, *t.*, Penns., U.S.A.; coal, petroleum, steel, glass, chemicals; p (1950) *26,280*.
Washington I., Pac. Oc. (Gilbert and Ellice Is. col.); a. 6 sq. m., coral atolls; copra; p. *86*.
Washita, *R.*, Ark. and La., U.S.A.; trib. of Red R.; length 400 m.
Wasmes, *t.*, Belgium; nr. Mons; coal-mining.
Wasquehal, *t.*, Nord, France; textiles, chemicals, oil-refineries; p. (1954) *12,363*.
Wast Water, *L.*, Cumberland, Eng.; nr. Keswick; 3 m. long.
Watchet, *t.*, *urb. dist.*, Somerset, Eng.; on cst. of Bristol Channel; 5 m. E. of Minehead; paper mkg., fishing; p. (1951) *2,592*.
Waterbury, *c.*, Conn., U.S.A.; on Naugatuck R.; watches, pins, brass goods, elec. and photographic goods, chemicals; p. (1950) *104,477*.
Waterford, *co.*, Munster, Ireland; agr., livestock, fisheries; co. t., Waterford; a. 721 sq. m.; p. (1956) *45,144*.
Waterford, *co. t.*, *spt.*, Waterford, Ireland; on R. Suir; cath.; brewing, fishing; p. (1956) *28,858*.
Waterloo, *vil.*, Belgium; battle, 1815; p. *7,362*.
Waterloo, *c.*, Iowa, U.S.A.; on Cedar R.; agr. produce and tools; p. (1950) *65,198*.
Waterloo, *t.*, N.Y., U.S.A.; on L. Seneca; p. (1950) *4,438*.
Waterloo-(with-Seaforth), *urb. dist.*, Lancs, Eng.; at mouth of R. Mersey; N. sub. of Liverpool; residtl.; p. *15,447*.
Waterpoort, *t.*, Transvaal, S. Africa; on R. Sand; cattle; agr. ctr
Watertown, *t.*, Conn., U.S.A.; plastics, textiles, hardware, wire prods.; p. (1950) *10,699*.
Watertown, *t.*, Mass., U.S.A.; on Charles R.; arsenal; p. (1950) *37,329*.
Watertown, *c.*, N Y. U.S.A.; on Black R.; carriage wks., steam-engines, silk, agr. tools; p. (1950) *34,350*.
Watertown, *t.*, S.D., U.S.A.; machin., meat-packing; p. (1950) *12,699*
Watertown, *c.*, Wis., U.S.A.; on Rock R.; univ.; mnfs.; p. (1950) *12,417*.
Waterville, *c.*, Me., U.S.A.; on Kennebec R; univ; cotton mnfs., rly. wks.; p. (1950) *18,287*.
Watervliet, *c.*, N.Y., U.S.A.; on Hudson R.;

arsenal; iron goods, woollens, asbestos goods; p. (1950) *15,197*.

Watford, *t., mun. bor.*, Herts, Eng.; on R. Colne, 16 m. N.W. of London; mkt.; many varied inds., inc. light and elec. engin., paper, printing; p. (1951) *73,032*.

Wath, *t., urb. dist.*, W.R. Yorks, Eng.; 4 m. N. of Rotherham; coal, quarrying; p. (1951) *13,927*.

Watling, *Brit. I.*, Bahamas, W. Indies; reputed landing place of Columbus.

Watlington, *t.*, Oxford, Eng.; at N. foot of Chiltern Hills, 5 m. S.W. of Princes Risborough; lace; p. *1,386*.

Watson's Bay, N.S.W., Australia; nr. Sydney; holiday resort.

Wattenscheid, *t.*, N. Rhine–Westphalia, Germany; E. of Essen; coal, metals, footwear; p. (estd. 1954) *68,900*.

Watton, *t.*, Norfolk, Eng.; on R. Wissey; mkt.; p. *1,413*.

Wattrelos, *t.*, Nord, France; nr. Lille; textiles, mnfs.; p. (1954) *31,993*.

Watu Bella Is., Moluccas, Indonesia; coconuts, sago.

Wau, *cap.*, Bahr-el-Ghazal, Sudan, N.E. Africa; p. *6,000*.

Waukegan, *c.*, Ill., U.S.A.; on L. Michigan; summer resort; steel, brass, motors, sugar refining; livestock, agr. ctr.; p. (1950) *38,946*.

Waukesha, *t.*, Wis., U.S.A.; health resort; p. (1950) *21,233*.

Wausau, *c.*, Wis., U.S.A.; on Wisconsin R.; timber, paper, machin., leather, silver-fox farms; p. (1950) *30,414*.

Wauwatosa, *c.*, Wis., U.S.A.; sub. of Milwaukee; p. (1950) *33,324*.

Waveney, *R.*, Norfolk and Suffolk, Eng.; length 50 m.

Waverly, *t.*, Iowa, U.S.A.; on Cedar R.; p. (1950) *5,124*.

Waverly, *t.*, N.Y., U.S.A.; dairying, tr. ctr.; p. (1950) *6,037*.

Waxahachie, *t.*, Texas, U.S.A.; rly. ctr.; p. (1950) *11,204*.

Waycross, *t.*, Ga., U.S.A.; rly. wks., timber, naval stores, machin., agr. prods.; p. (1950) *18,899*.

Waynesboro, *t.*, Penns., U.S.A.; industl.; p. (1950) *10,334*.

Wazan or Ouezzan, *sacred c.*, Morocco; p. *23,590*.

Waziristan, *dist.*, N.W. frontier, Pakistan; mtns.; a. 5,000 sq. m.; p. (1951) *264,000*.

Weald, The, wooded and pastoral tracts S.E. Eng., extending from Folkestone, Kent, through Surrey, Hants and Sussex to the sea about Beachy Head.

Wear, *R.*, Durham, Eng.; rises in the Pennines, flows through Durham to N. Sea at Sunderland; length 60 m.

Weaver, *R.*, Cheshire, Eng.; trib. of R. Mersey; length 45 m.

Weaver Hills, Staffs, Eng.; alt. 1,300 ft.

Webb City, *c.*, Mo., U.S.A.; lead, zinc mining; p. (1950) *6,919*.

Webster, *t.*, Mass., U.S.A.; on French R.; textiles, footwear; p. (1950) *12,160*.

Webster Grove, *t.*, Mo., U.S.A.; p. (1950) *23,390*.

Weddell Sea, arm of S. Atl. Oc., Antarctica; whaling and sealing.

Wednesbury, *t., mun. bor.*, Staffs, Eng.; 8 m. N.W. of Birmingham; iron, aluminium, metal inds.; rly. carriages, elec. goods; p. (1951) *34,758*.

Wednesfield, *urb. dist.*, Staffs, Eng.; nr. Wolverhampton; locks and keys, metal refining, engin.; p. (1951) *17,422*.

Wed Zem, *t.*, Morocco; impt. production of phosphate; p. *12,223*.

Weehawken, *t.*, N.J., U.S.A.; coal depot, rly. ctr.; mnfs.; p. (1950) *14,830*.

Weerdt, *t.*, Neth.; industl.; p. *20,241*.

Wei Ho, *R.*, Shensi, China; rises in highlands of Kansu, flows E. between highlands of Shansi and Tsinling Shan to join Hwang Ho nr. Tungkwan; valley contains very fertile loess soils; formed cradle of Chinese civilisation; length approx. 500 m.

Weiden, *t.*, Bavaria, Germany; porcelain, glass, textiles; p. (estd. 1954) *38,500*.

Weidenau, *t.*, N. Rhine–Westphalia, Germany; mining; iron, steel, copper; p. *10,913*.

Weihaiwei, *spt.*, Shantung, China; formerly Brit.; coaling sta.; summer resort; p. (estd. 1946) *222,247*.

Weimar, *t.*, Thuringia, Germany; on R. Ilm; 2 cas., Goethe and Schiller houses; cultural institutes; elec., metal, footwear, textiles, machin.; p. (estd. 1954) *66,800*.

Weinheim, *t.*, Baden–Württemberg, Germany; cas.; leather, machin., rubber; p. (estd. 1954) *25,600*.

Weissenfels, *t.*, Saxony-Anhalt, Germany; on R. Saale; cas.; footwear, paper, metals; p. (estd. 1954) *51,100*.

Weisshorn, *mtn. peak*, Switzerland; alt. 14,770 ft.

Weisskirchen, *see* **Bela Crkva.**

Wejh, *spt.*, Hejaz, Saudi Arabia.

Welland, *t.*, Ont., Canada; on Welland Canal; p. *12,500*.

Welland, *R.*, Northants and Lincs, Eng.; rises in Northampton Heights, flows N.E., enters The Wash 10 m. below Spalding; length 70 m.

Welland, *canal*, Ontario, Canada; connects Ls. Erie and Ontario; length 27 m.

Wellesley, *t.*, Mass., U.S.A.; residtl.; p. (1950) *20,549*.

Wellesley Is., *gr.*, in the Gulf of Carpentaria, belonging to Queensland, Australia.

Wellingborough, *t., urb. dist.*, Northants, Eng.; on R. Nene, 9 m. N.E. of Northampton; mkt., footwear, iron smelting, brewing; p. (1951) *28,220*.

Wellington, *mkt. t., urb. dist.*, Shropshire, Eng.; 12 m. E. of Shrewsbury; steel wks., brewing, toys, storage tanks, timber yds., agr.; its ancient name was Watling Town, because it stood on the line of Watling Street; p. (1951) *11,412*.

Wellington, *mkt. t.*, Somerset, Eng.; 6 m. S.W. Taunton, anc. woollen ind. still survives; dairy prod.; p. (1951) *13,300*.

Wellington, *t.*, *spt.*, N.I., cap. N.Z.; univ.; foundries, cold storage, soap, candles, footwear; p. (1951) *133,416*.

Wellington, *prov.*, N.I., N.Z.; a. 10,870 sq. m.; p. (1951) *391,533*.

Wellington, *t.*, C. of Gd. Hope, S. Africa; tanning, dried fruits, wine, jam; p. *9,000*.

Wellington, *L.*, Gippsland, Victoria, Australia; shallow; fishing.

Wells, *c., mun. bor.*, Somerset, Eng.; at W. foot of Mendip Hills; cath., bishop's palace; paper, brushes, textiles, scientific inst.; p. (1951) *5,835*.

Wells-next-the-Sea, *t., urb. dist.*, Norfolk, Eng.; ancient pt. on N. cst. of E. Anglia, 14 m. W. of Sheringham; whelks, cockles and mussels; p. (1951) *2,592*.

Wellsborough, *t.*, Penns., U.S.A.; p. (1950) *4,215*.

Wellston, *c.*, Ohio, U.S.A.; rly. ctr.; furniture; p. (1950) *5,691*.

Wellsville, *c.*, Ohio, U.S.A.; on Ohio R.; coal-mining, agr.; p. (1950) *7,854*.

Wels, *t.*, Austria; machin., leather, paper; natural gas; p. (1951) *3878,0*.

Welshpool, *mkt. t., mun. bor.*, Montgomery, Wales; on R. Severn, 7 m. N. of Montgomery; nr. is Powis Castle; lt. inds. based on agr., hoisery; p. (1951) *6,034*.

Welwyn Garden City, *urb. dist.*, Herts, Eng.; 21 m. N. of London. Founded by Sir Ebenezer Howard in 1920 as the first of the satellite ts. of London; one of the "New Towns" designated 1948, inc. Hatfield, Hertford, and Welwyn rural dist.; pharmaceutics, plastics, radio, and electronics, light inds.; p. (estd. 1959) *31,256*.

Wem, *t., urb. dist.*, Salop, Eng.; nr. Shrewsbury; mkt., flour, tanning, malting; p. (1951) *2,410*.

Wembley, *mun. bor.*, Middx, Eng.; N.W. sub. of London; light ind., sports ctr.; p. (1951) *131,369*.

Wemyss, *par.*, Fife, Scot.; fishing pt., coal-mining; p. *26,619*.

Wemyss Bay, *t.*, Renfrew, Scot.; holiday resort, residtl.; impt. ctr. for Clyde steamers.

Wenatchee, *t.*, Wash., U.S.A.; fruit (apple) ctr. and inds.; p. (1950) *13,072*.

Wenchow (Yungchia), *c.*, *spt.*, Chekiang, China; nr. mouth of Wu Kiang 230 m. S.W. of Shanghai; textile, silk inds.; exp. wood, tea, agr. prod.; fishing; coastal tr.; p. (estd. 1946) *153,395*.

Wendover, *t.*, Bucks, Eng.; at N. foot of Chiltern Hills, 4 m. S.E. of Aylesbury, at entrance to wind gap; agr. mkt.; p. *2,500*.

Wengen, *vil.*, Bernese Oberland, Switzerland; alt. 4,200 ft.; resort; p. *1,230*.

Wenlock or **Much Wenlock,** *t., mun. bor.*, Salop, Eng.; on N.E. end of Wenlock Edge, 11 m.

S.E. of Shrewsbury; iron and coal; p. (1951) *15,093*.
Wenlock Edge, *narrow ridge*, Shropshire, Eng.; extends 18 m. S.W from Much Wenlock to Craven Arms; limestone; moorland, woodland on margins, particularly steep N.W. flank; width 1–1½ m., mainly above 950 ft. alt.
Wensleydale, N.R. Yorks, Eng.; valley in N. Pennines drained E. by R. Ure; cattle reared for fattening on lowland farms; some dairying (cheese); length 35 m.
Wensum, *R.*, Norfolk, Eng.; flows to R. Yare at Norwich; length 30 m.
Wentworth, *t.*, *R. pt.*, N.S.W., Australia; at confluence of Rs. Murray and Darling; ships wool downstream to Morgan and round to Adelaide.
Wepener, *t.*, O.F.S., S. Africa; battle 1900; p. *2,199*.
Werdau, *t.*, Saxony, Germany; on R. Pleisse; textiles, machin., tools; p. (estd. 1954) *23,100*.
Werdohl, *t.*, N. Rhine-Westphalia, Germany; metal goods, glass; p. (estd. 1954) *19,100*.
Wermelskirchen, *t.*, N. Rhine-Westphalia, Germany; S.E. of Remscheid; footwear, iron, textiles; p. (estd. 1954) *21,200*.
Wernigerode, *t.*, Saxony-Anhalt, Germany; cas.; elec., glass, wood, metals, sugar; p. (estd. 1954) *33,900*.
Wervicq, *t.*, Belgium; nr. Ypres; tobacco factories; p. *11,288*.
Wesel, *c.*, N. Rhine-Westphalia, Germany; at confluence of Rs. Lippe and Rhine; cath.; machin., potteries; p. (estd. 1954) *19,900*.
Weser, *R.*, Germany; flows N. to N. Sea at Bremerhaven; navigable for 270 m.; total length 440 m.
Wesermünde, *t.*, Bremen, Germany; nr. mouth of R. Weser; adjoins Bremerhaven; brewing, bricks; p. (1946) *77,491*.
Wessex, *ancient kingdom*, S. Eng.; included Berks, Hants, Wilts, Dorset, Somerset and Devon.
West Allis, *t.*, Wis., U.S.A.; iron and steel goods; p. (1950) *42,959*.
West Bengal, *st.*, India; delta of Ganges; rice, jute, oilseeds; cap. Calcutta; a. 33,945 sq. m.; p. (estd. 1957) *26,302,386*.
West Bridgford, *t.*, *urb. dist.*, Notts, Eng.; at junction of Grantham canal with R. Trent; p. (1951) *24,838*.
West Bromwich, *t.*, *co. bor.*, Staffs, Eng.; on R. Thame, 5 m. N.W. of Birmingham; heavy engin. and allied inds., chemicals, springs, oil ref.; p. (1951) *87,985*.
West Calder, *see* **Calder, W.**
West Chester, *bor.*, Penns., U.S.A.; residtl. sub. Philadelphia; mkt gardening, dairying, agr. tools; p. (1950) *15,168*.
West Dean, *rural dist.*, Gloucester, Eng.; coal-mining, forestry; p. (estd. 1956) *18,250*.
West Flanders, *prov.*, Belgium; a. 1,249 sq. m.; *see also* **Flanders.**
West Ham, *co. bor.*, Essex, Eng.; sub. to E. to London; bordered by Rs. Thames and Lea; residtl.; extensive docks, rubber, soap, jute-wks., engin., smelting, chemicals; p. (1951) *170,987*.
West Hartford, *t.*, Conn., U.S.A.; residtl. sub. of Hartford; metal goods, ctr. for dairying, tobacco-growing dist.; p. (1950) *44,402*.
West Hartlepool, *see* **Hartlepool, W.**
West Haven, *bor.*, Conn., U.S.A.; sub. of New Haven; p. (1950) *32,010*.
West Indies or **Antilles**, *I. grs.*, Atl. Oc.; extend between the csts of Florida and Venezuela, separating the Caribbean Sea and the G. of Mexico from the Atlantic; sugar, tobacco, fruits, cotton, coffee, cocoa; p. *16,494,000*.
West Indies Federation, *see* **The West Indies.**
West Lothian, *co.* Scot.; agr., coal, iron, bricks, engin., hosiery; co. t. Linlithgow; a. 120 sq. m.; p. (1951) *88,576*.
West Monroe, *t.*, La. U.S.A.; sub. of Monroe; paper, cotton-seed oil, wood prod.; p. (1950) *10,302*.
West New York, *t.*, N.J., U.S.A.; on Hudson R.; grain elevators, silks rubber goods, cotton-seed oil; p. (1950) *37,683*.
West Orange, *t.*, N.J., U.S.A.; industl.; p. (1950) *28,605*.
West Pittston, *bor.*, Penns., U.S.A.; coal-mining; p. (1950) *7,230*.
West Point, *military sta.*, N.Y., U.S.A.; on Hudson R.; Military Academy; p. *1,350*.
West Riding, **Yorkshire**, *see* **Yorkshire, West Riding.**
West Springfield, *t.*, Mass., U.S.A.; industl.; p. (1950) *20,438*
West Virginia, *st.*, U.S.A.; coal, salt, petroleum, agr. (cereals, tobacco), pastoral; cap. Charleston; a. 24,181 sq. m.; p. (1950) *2,005,552*.
West Warwick, *t.*, R.I., U.S.A.; p. (1950) *19,096*.
Westbrook, *c.*, Me., U.S.A.; paper, cottons, silks; p. (1950) *12,284*.
Westbury, *t.*, *urb. dist.*, Wilts, Eng.; at N. foot of Salisbury Plain; rly. junction; woollens, bricks, glove mnfs.; p. (1951) *5,264*.
Westerham, *t.*, Kent, Eng.; nr. Sevenoaks; mkt.; p. *3,168*.
Western Australia, *see* **Australia, W.**
Westerwald, *plateau of old and volcanic rocks*, W. Germany; terminates in steep slope immediately E. of R. Rhine between Koblenz and Bonn; drained to Rhine by R. Lahn and R. Sieg; fertile soil; pastureland or deciduous woodland; sm quantities of iron ore in Siegerland.
Westfield, *t.*, Mass., U.S.A.; cigars, paper, machin., bicycles, radiators; p. (1950) *20,962*.
Westfield, *t.*, N.J., U.S.A.; p. (1950) *21,243*.
Westgate-on-Sea, *t.*, Kent, Eng.; nr. Margate; agr., seaside resort; p. *4,554*.
Westhoughton, *urb. dist.*, S.E. Lancs, Eng.; coal-mining, cottons; p. (1951) *15,002*.
Westland, *prov.*, S.I., N.Z.; coal, timber, gold; cap. Hokitika; a. 4,880 sq. m.; p. (estd. 1958) *15,700*.
Westmanland, *see* **Västmanland.**
Westmeath, *co.*, Leinster, Ireland; pasture, agr., dairying; with much bog; co. t. Mullingar; a. 708 sq. m.; p. (1956) *54,128*.
Westminster, *c.*, *metropolitan bor.*, London, Eng.; on N. bank of R. Thames; W. of City of London; contains Houses of Parliament, Westminster Abbey, Government offices, Royal Palaces (Buckingham Palace and St. James's); p. (1951) *98,895*
Westmorland, *co.*, N.W. Eng.; covering part of the Lake Dist. (Windermere, Ullswater, Grasmere, etc.); sheep, oats, bldg.-stone, tourist ind.; cap. Appleby; most populous t., Kendal; a. 789 sq. m.; p. (1951) *67,383*.
Weston-super-Mare, *t.*, *mun. bor.*, Somerset, Eng.; on Bristol Channel, 20 m. S.W. of Bristol; holiday resort; p. (1951) *40,165*.
Westphalia, *see* **N. Rhine-Westphalia.**
Westport, *spt.*, *urb. dist.*, Mayo, Ireland; on Westport Bay; mkt., cereals; p. (1951) *3,104*.
Westport, *spt.*, S.I., N.Z.; on R. Buller; cst. shipping; coal; p. (1951) *5,509*.
Westport, *t.*, Conn., U.S.A.; residtl.; woollens, twine, soap, disinfectants; p. (1950) *11,667*.
Westray, *I.*, Orkney Is., Scot.; 10 m. long; p. *1,270*.
Westward Ho!, *vil.*, N. Devon, Eng.; on Bideford Bay; seaside resort.
Westwood, *t.*, Queensland, Australia; coal-mining.
Wetherby, *t.*, W.R. Yorks, Eng.; on R. Wharfe; mkt., malting, brewing; p. *2,126*.
Wethersfield, *t.*, Conn., U.S.A.; oldest regular settlement in C.; lge. st. prison; agr. implements, seeds; p. (1950) *12,533*.
Wetter or **Wettern**, *L.*, Sweden, *see* **Vättern.**
Wetteren, *t.*, Belgium; on R. Schelde; textiles; p. *17,857*.
Wetterhorn, *mtn.*, Switzerland; alt. 12,165 ft.
Wetzlar, *c.*, Hessen, Germany; on R. Lahn; cath.; optical instruments, metals, radios, textiles, footwear; p. (estd. 1954) *27,800*.
Wewoka, *t.*, Okla., U.S.A.; oil wells; agr., bricks, petrol; p. (1950) *6,747*.
Wexford, *maritime co.*, Leinster, S.E. Ireland; pasture, agr., dairying, fishing; cap. Wexford; a. 901 sq. m.; p. (1956) *87,236*.
Wexford, *t.*, *cap.*, Wexford; Leinster, S.E. Ireland; on R. Slaney; p. (1951) *11,979*.
Wey, *R.*, Hants, Surrey, Eng.; rises in W. Weald, flows N. into R. Thames nr. Weybridge; cuts impt. gap through N. Downs at Guildford; length 35 m.
Weybridge, *see* **Walton and Weybridge.**
Weyburn, *t.*, S. Saskatchewan, Canada; p. (estd. 1957) *8,500*.
Weymouth and Melcombe Regis, *t.*, *mun. bor.*, Dorset, Eng.; on Weymouth Bay, 8 m. S. of Dorchester; torpedo and boatbldg., bricks, tiles, engin.; holiday resort; p. (1951) *37,097*.

Weymouth, *t.*, Mass., U.S.A.; footwear mnf.; p. (1950) *32,690*.
Whales, Bay of, *inlet* in Ross Dep., Antarctica; exploration base.
Whangarei, *t.*, N.Z.; agr., fruit; p. (1951) *11,847*.
Whangpoo, *R.*, Kiangsu, China; tidal creek upon which Shanghai is situated; runs 14 m. inland from Yangtze-Kiang estuary nr. Woosung.
Wharfe, *R.*, W.R. Yorks, Eng.; trib. of R. Ouse; length 60 m.
Wheeling, *c.*, W. Va., U.S.A.; on Ohio R.; rly. and comm. ctr., iron and steel, pottery; p. (1950) *58,891*.
Whernside, *mtn.*, W.R. Yorks, Eng.; alt. 2,414 ft.
Whickham, *t.*, *urb. dist.*, Durham, Eng.; nr. Gateshead; coal-mining, iron and steel, chemicals, rope mnf.; p. (1951) *23,116*.
Whitburn, *burgh*, W. Lothian, Scot.; 20 m. S.W. of Edinburgh; coal, limestone; p. (1951) *5,232*.
Whitby, *spt.*, *urb. dist.*, N.R. Yorks, Eng.; at mouth of R. Esk, 17 m. N.W. of Scarborough; abbey; holiday resort; fisheries, bricks and quarrying, p. (1951) *11,668*.
Whitby (formerly Windsor), *t.*, Canada; on L. Ontario; p. (1941) *5,046*
Whitchurch, *t.*, *urb. dist.*, Salop, Eng.; 13 m. S.W. of Crewe; mkt., malting, cheese; p. (1951) *6,856*.
White, *R.*, Ark., U.S.A.; trib. of Mississippi R.; length 350 m.
White, *R.*, Ind., U.S.A.; trib. of Wabash R.; length 330 m.
White, *R.*, Ark., Mo., U.S.A.; trib. of Mississippi R.; 300 m. navigable; length 800 m.
White Mtns., part of Appalachian system, N.H., U.S.A.; highest summit, Mt. Washington, 5,805 ft.
White Nile (Bahr-el-Abiad), *R.*, Sudan, N.E. Africa; strictly, name applied to stretch of R. Nile between L. No and Khartoum; distance over 500 m.
White Plains, *t.*, N.Y., U.S.A.; on Bronx R.; residtl.; battle 1776; p. (1950) *43,466*.
White Russia, *see* **Byelorussia.**
White Sea or G. of Arkangelsk, *inlet* of the Arctic Ocean, R.S.F.S.R.; a. 47,346 sq. m.
Whiteadder, *R.*, Berwick, Scot.; trib. of R. Tweed; length 34 m.
Whitefield, *urb. dist.*, Lancs, Eng.; cotton mnf.; p. (1951) *12,912*.
Whitehall, *t.*, N.Y., U.S.A.; at head of L. Champlain; timber tr.; p. (1950) *4,457*.
Whitehaven, *spt.*, *mun. bor.*, Cumberland, Eng.; on Solway Firth, 3 m. N. of St. Bees Head; coal, methane gas, tanning, chemicals, flour and silk mills; p. (1951) *24,624*.
Whitehead, *t.*, *urb. dist.*, Antrim, N. Ireland; at entrance to Belfast Lough; seaside resort; p. (1951) *1,862*.
Whithorn, *royal burgh*, Wigtown, Scot.; 9 m. S. of Wigtown; cath.; p. (1951) *1,068*.
Whitehorse, *c.*, cap. Yukon Terr., Canada; ctr. coal and copper mining, hunting and fur trapping; once a gold "boom town"; H.Q. Royal Canadian Mounted Police; p. (1951) *2,594*.
Whitley Bay, *t.*, *urb. dist.*, Northumberland, Eng.; 3 m. N. of Tynemouth; seaside resort; plastics; p. (1951) *32,257*.
Whitney, *mtn.*, Sierra Nevada, Cal., U.S.A.; alt. 14,898 ft.
Whitstable, *spt.*, *urb. dist.*, Kent, Eng.; on Thames estuary, 6 m. N. of Canterbury; holiday resort, oysters; p. (1951) *17,467*
Whittington or Whittington Moor, *par.*, Derby, Eng.; nr. Chesterfield; coal-mining, iron, steel; p. *8,317*.
Whittlesey, *t.*, *urb. dist.*, I. of Ely, Eng.; in The Fens, 8 m. W. of March; bricks, mkt. gardening; p. (1951) *8,609*.
Whitworth, *urb. dist.*, S.E. Lancs, Eng.; cottons, coal, slate; p. (1951) *7,442*.
Whyalla, *spt.*, S. Australia; impt. steel and shipbldg. inds.; exp ironstone and pig-iron; p. *8,000*.
Wichita, *t.*, Kan., U.S.A.; in Arkansas valley; rly. wks.; oil refineries and equipment; meat-packing ctr. in agr. and stock-raising region; p. (1950) *168,279*.
Wichita, *R.*, Texas, U.S.A.; trib. of Red R.; length 225 m.
Wichita Falls, *t.*, Texas, U.S.A.; oil-refining; p. (1950) *68,042*.
Wick, *spt.*, *burgh*, Caithness, Scot.; on E. cst., 14 m. S. of John O'Groats; herring-fisheries ctr.; p. (1951) *7,161*.
Wicklow, *maritime co.*, Leinster, Ireland; pastoral and agr.; cap. Wicklow; a. 781 sq. m.; p. (1956) *59,818*.
Wicklow, *t.*, *cap.*, Wicklow, Leinster, Ireland; on S.E. cst., 35 m. S. of Dublin; mkt.; sm. seaside resort; p. (1951) *3,326*.
Wicklow, *mtns.*, Wicklow, Ireland; highest summit, Lugnaquillia, 3,039 ft.
Widnes, *t.*, *mun. bor.*, Lancs, Eng.; on R. Mersey, 12 m. E. of Liverpool; anhydrite acid, asbestos, cement, wire cables, chemicals, explosives, fertilisers, copper and zinc; p. (1951) *48,775*.
Wiener Neustadt, *t.*, Lower Austria; 20 m. S. of Vienna; machin., pottery; p. (1951) *30,509*.
Wieringermeer Polder, *reclaimed a.*, N. Holland, Neth.; located in N.W. of Zuider Zee; reclaimed in 1930, flooded by Germans and drained again 1945; largely meadowland; a. 78 sq. m.
Wiesbaden, *cap.*, Hessen, Germany; at S. edge of the Taunus; spa; cas.; wine, machin., textiles, chemicals, elec.; p. (estd. 1954) *239,900*.
Wigan, *t.*, *co. bor.*, S.W. Lancs, Eng.; 16 m. N.E. of Liverpool; coal, cotton, engin., chemicals, cement; p. (1951) *84,546*.
Wight, I. of, Eng. Channel; separated from Hants by Spithead and The Solent; wheat, sheep, cement; holiday resort; ch. ts.: Newport, Cowes, Ryde; a. 147 sq. m.; p. (1951) *95,594*.
Wigston, *t.*, *urb. dist.*, Leic., Eng.; 4 m. S. of Leicester; rly. wks., engin., hosiery; p. (1951) *15,452*.
Wigton, *t.*, Cumberland, Eng.; mkt., textiles, malting; p. *3,521*.
Wigtown, *maritime co.*, S.W. Scot.; agr. mainly dairying, creameries; agr. implements; cap. W.; a. 485 sq. m.; p. (1951) *31,625*.
Wigtown, *burgh*, Wigtown, Scot.; on Wigtown Bay, Solway Firth; fishery; p. (1951) *1,376*.
Wilcannia, *t.*, *R. pt.*, N.S.W., Australia; on R. Darling, 350 m. upstream from Wentworth; sends wool and minerals downstream to Morgan, Murray Bridge, Echuca for transhipment by rail to Adelaide or Melbourne.
Wilhelmsburg, *t.*, Germany; S. of Hamburg; p. *25,403*.
Wilhelmshaven, *spt.*, Lower Saxony, Germany; 40 m. N.W. of Bremen; shipbldg., machin., textiles, furniture, elec. goods, wood, leather; good harbour; p. (estd. 1954) *101,100*.
Wilkes-Barre, *c.*, Penns., U.S.A.; on Susquehanna R.; anthracite-mining, machin., locomotives, iron and steel, textiles; p. (1950) *76,826*.
Wilkes Land, Antarctica; featureless plateau, alt. 9,500 ft.; immense glaciers; claimed by Australia; Scientific sta. 1958 maintained jointly by Australia and U.S.A.
Wilkinsburg, *bor.*, Penns., U.S.A.; Pittsburgh sub.; residtl.; timber wks.; p. (1950) *31,418*.
Willamette, *R.*, Ore., U.S.A.; rises in Cascade Mtns., flows N. into Columbia R. below Portland; valley gives rich agr. land, wheat, root-crops, dairy produce, hard and soft fruits; ch. ts. Portland, Salem; length approx. 300 m.
Willemstad, *t.*, *cap.*, Neth. Antilles; on Curaçao I.; p. (1948) *40,597*.
Willenhall, *urb. dist.*, Staffs, Eng.; 4 m. E. of Wolverhampton; lock and key drop forgings, castings, car accessories; p. (1951) *30,695*.
Willesden, *mun. bor.*, Middx, Eng.; impt. rly. junction; residtl. and industl.; p. (1951) *179,647*.
Williamsburg, *c.*, Va., U.S.A.; oldest incorporated c. in America; p. (1950) *6,375*.
Williamsport, *c.*, Penns., U.S.A.; on Susquehanna R.; rly. ctr., timber, machin., silks; summer resort; p. (1950) *45,047*.
Williamstown, *spt.*, *sub.*, Melbourne, Victoria, Australia; at mouth of Yarra R.; naval dock-yds., shipbldg., railway wks., rifle range; p. (1958) *30,388*.
Williamstown, *c.*, Mass., U.S.A.; p. (1950) *5,015*.
Willimantic, *c.*, Conn., U.S.A.; on Willimantic R.; textiles, thread; p. (1950) *13,586*.
Wilmette, *t.*, Ill., U.S.A.; residtl. sub. Chicago; p. (1950) *18,162*.
Wilmington, *c.*, *spt.*, Del., U.S.A.; on Delaware R.; shipbldg., gunpowder, machin., iron- and steel-wks.; p. (1950) *110,356*.
Wilmington, *spt.*, N.C., U.S.A.; exp. cotton, tobacco, timber, fertilizers; shipbldg., textiles, chemicals; p. (1950) *45,043*.

Wilmslow, *t., urb. dist.*, Cheshire, Eng.; on R. Bollen, 6 m. S.W. of Stockport; residtl., cotton mnfs.; p. (1951) *19,531*.
Wilno, *see* **Vilnius.**
Wilsden, W.R. Yorks, Eng.; nr. Bradford; worsted mnfs.; p. *2,500*.
Wilson, *t.*, N.C., U.S.A.; tobacco, cotton, timber; p. (1950) *23,010*.
Wilson's Promontory, juts into Bass Strait, Victoria, Australia.
Wilton, *t., mun. bor.*, Wilts, Eng.; on R. Wylye, 3 m. W. of Salisbury; agr. mkt., carpets, felt; p. (1951) *2,857*.
Wiltshire, *S.W. inland co.*, Eng.; agr. and pastoral; cap. Salisbury; a. 1,345 sq. m.; p. (1951) *387,379*.
Wimbledon, *mun. bor.*, Surrey, Eng.; S.W. sub. of London; residtl.; famous common and internationally famous tennis tournament; p. (1951) *58,158*.
Wimborne Minster, *t.*, Dorset, Eng.; on R. Stour; agr. machin., car body bldg.; p. *4,935*.
Wimmera, *N.W. dist.*, Victoria, Australia: a. 24,000 sq. m.; pastoral areas of fruit-growing under irrigation.
Winburg, *t.*, O.F.S., S. Africa; was the first cap. of O.F.S.; tr. ctr.; p. *3,795*.
Wincanton, *t.*, Somerset, Eng.; at N.W. foot of Salisbury Plain; mkt., agr., brewing, cheese; p. *2,047*.
Winchcomb, *t.*, Gloucester, Eng.; nr. Cheltenham; silk, flour, tanning; cas.; p. *2,546*.
Winchelsea, *ancient t.*, Sussex, Eng.; 2 m. S.W. of Rye; formerly an impt. walled spt., now 2 m. inland; p. *693*.
Winchester, *c., mun. bor.*, Hants, Eng.; on R. Itchen, 12 m. N. of Southampton; ancient cap. of the Saxons; cath., famous Public School, barracks; brewing, malting, agr. produce; p. (1951) *25,710*.
Winchester, *t.*, Ky., U.S.A.; agr., livestock; p. (1950) *9,226*.
Winchester, *t.*, Mass., U.S.A.; sub. of Boston; p. (1950) *15,509*.
Winchester, *c.*, Va., U.S.A.; in Shenandoah valley; p. (1950) *13,841*.
Windau, *see* **Ventspils.**
Windermere, *lgst. Eng. L.*, in Westmorland and Lancs; outlet to Morecambe Bay; 10 m. long, 1 m. wide.
Windermere, *urb. dist.*, Westmorland, Eng.; on E. shore of L.; tourist ctr.; p. (1951) *6,306*.
Windorah, *t.*, Queensland, Australia; pastoral, sheep and cattle.
Windhoek, *cap.*, S.W. Africa; fruit, silver, copper, lead; p. (1951) *20,490*.
Wind River Mtns., Wyo., U.S.A.; range of Rockies; highest point, Fremont's Peak, alt. 13,576 ft.
Windrush, *R.*, Oxford, Gloucester, Eng.; trib. of R. Thames.
Windsor, *t.*, N.S.W., Australia; farming ctr.
Windsor, *c., pt.*, Ontario, Canada; on Detroit R., opposite Detroit; fruit, flour, canning, machin.; p. (1956) *121,980*.
Windsor, *t.*, Quebec, Canada; pulp, paper; p. *3,368*.
Windsor, *t.*, Conn., U.S.A., on Connecticut R.; p. (1950) *11,833*.
Windsor, New, *t., mun. bor.*, Berks, Eng.; on R. Thames, 20 m. W. of London; famous royal cas. (founded by William the Conqueror) and park, St. George's Chapel and the Royal Mausoleum; p. (1951) *23,181*.
Windward Is., T.W.I.; consisting of Grenada, St. Vincent, St. Lucia and Dominica; a. 826 sq. m.; p. *290,000*.
Windward Is., (Neth.), part of Neth. Antilles, W. Indies; consisting of 3 Is.; Curaçao (a. 447 sq. m.; p. (1948) *91,450*), Aruba (a. 181 sq. m.; p. (1948) *47,932*), Bonaire (a. 290 sq. m.; p. (1948) *5,356*).
Windward Passage, *channel*, 60 m. wide, between Cuba and Haiti.
Winfield, *c.*, Kan., U.S.A.; on Walnut R.; educational and comm. ctr., agr.; p. (1950) *10,264*.
Winfrith Heath, Dorset, Eng.; Thermo-nuclear research plant (projected 1958).
Winneba, *t.*, Ghana, W. Africa; p. (1948) *15,920*.
Winnebago, *L.*, Wis. U.S.A.; 27 m. long.
Winnipeg, *c., cap.*, Manitoba, Canada; at junction of Red and Assiniboine Rs.; caths., univ.; rly. ctr.; ch. world wheat mkt.; flour, brewing, cottons, agr. implements, machin.; p. (1956) *255,093*.
Winnipeg, *L.*, Manitoba, Canada; 40 m. N. of Winnipeg; 260 m. long, 25–60 m. wide; contains several lge. Is. (Reindeer, 70 sq. m.; Big I., 60 sq. m.).
Winnipegosis, *L.*, Manitoba and Saskatchewan, Canada; a. (exclusive of Is.) 2,000 sq. m.; 50 m. W. of L. Winnipeg, into which it drains.
Winnispesaukee, *L.*, N.H., U.S.A.; 24 m. long.
Winona, *c.*, Minn., U.S.A.; on R. Mississippi; rly. ctr., timber, grain tr., medicines, shoes, furs; p. (1950) *25,031*.
Winooski or **Onion,** *R.*, Vt., U.S.A.; length 90 m.
Winschoten, *t.*, Neth.; nr. German frontier; p *13,342*.
Winsford, *urb. dist.*, Cheshire, Eng.; on R. Weaver; 4 m. S. of Northwich; only rock salt mine still working in Brit. Is.; p. (1951) *12,745*.
Winslow, *t.*, Bucks, Eng.; mkt., agr. ctr.; p. *1,539*.
Winston-Salem, *ts.*, N.C., U.S.A.; tobacco and cotton mnfs.; p. (1950) *87,811*.
Winterswijk, *t.*, Neth.; industl.; p. (1951) *22,381*.
Winterthur, *t.*, Zurich, Switzerland; on Eulach R.; rly. ctr., locomotives, machines, cottons, wine; p. (1950) *66,925*.
Winthrop, *cst. t.*, Mass., U.S.A.; residtl. sub. of Boston, summer resort; p. (1950) *19,496*.
Wipper, *R.*, Germany, trib. of R. Rhine; length 50 m.
Wirksworth, *t., urb. dist.*, Derby, Eng.; in Pennines, 5 m. S. of Matlock; lead-mng., limestone, fluorspar wks.; p. (1951) *4,886*.
Wirral, *urb. dist.*, W. Cheshire, Eng.; between estuaries of Dee and Mersey; residtl.; p. (1951) *17,362*.
Wisbech, *t., mun. bor.*, of Ely, Cambs, Eng.; on R. Nene, 11 m. from its mouth in the Wash; mkt. gardening, fruit growing and canning, agr. implements; p. (1951) *17,430*.
Wisconsin, *st.*, U.S.A.; leading dairy st. of Union; timber, iron ore, lead, zinc, stone, sand, and gravel; cap. Madison; ch. t. Milwaukee; a. 56,154 sq. m.; p. (1950) *3,434,575*.
Wisconsin, *R.*, Wis., U.S.A.; trib. of R. Mississippi; length 600 m.
Wishaw, *burgh*, Lanark, Scot., joined with Motherwell; rly. wks., engin., coal, iron, steel.
Wiske, *R.*, N.R. Yorks, Eng.; trib. of R. Swale; length 24 m.
Wismar, *spt.*, Mecklenburg, Germany; on Baltic Sea, N. of Schwerin; metals, sugar, canning; p. (estd. 1954) *42,100*.
Witbank, *t.*, Transvaal, S. Africa; power sta.; coal-mining; carbide, cyanide; p. (1946) *14,237*.
Witham, *R.*, Rutland and Lincs, Eng.; flows into The Wash; length 80 m.
Witham, *t., urb. dist.*, Essex, Eng.; 9 m. N.E. of Chelmsford; agr., mkt. gardening; malting, metal windows; p. (1951) *8,598*.
Withernsea, *t., urb. dist.*, E.R. Yorks, Eng.; on E. cst. 15 m. E. of Hull; holiday resort; agr., fishing; p. (1951) *5,101*.
Withnell, *t., urb. dist.*, Lancs, Eng.; at N. foot of Rossendale Fells, 3 m. S.W. of Blackburn; textiles, stone, paper; p. (1951) *2,923*.
Witney, *t.*, Oxford, Eng.; on R. Windrush, 10 m. W. of Oxford; woollens, blankets, gloves; p. *6,710*.
Witten, *t.*, N. Rhine–Westphalia, Germany; on R. Ruhr; glass, machin., metals, chemicals, optical inds.; p. (estd. 1954) *79,200*.
Wittenberg, *t.*, Saxony-Anhalt, Germany; on R. Elbe; cas.; ctr. of Reformation and burial place of Luther; he burnt Papal bull against him here in 1520; iron, machin., textiles; p. (estd. 1954) *42,100*.
Wittenberge, *t.*, Brandenburg, Germany; on R. Elbe; woollens, machin., rly. junction; p. (estd. 1954) *32,100*.
Witwatersrand, *dist.*, Transvaal, S. Africa; gold-mining; p. (1946) *421,929*.
Wivenhoe, *t., urb. dist.*, Essex, Eng.; on R. Colne; shipbldg., oysters, lt. inds.; p. (1951) *2,381*.
Wloclawek, *t., pt.*, N. Poland; on R. Vistula; brewing, iron-wks., pottery; p. *48,126*.
Woburn, *t.*, Bedford, Eng.; 5 m. N.E. of Leighton Buzzard; mkt.; lace; p. *1,062*.
Woburn, *c.*, Mass., U.S.A.; chemicals, footwear; p. (1950) *20,492*.
Woking, *t., urb. dist.*, Surrey, Eng.; 4 m. N. of

Guildford; wireless parts, aeroplane equipment; mkt., residtl.; p. (1951) *47,612*.
Wokingham, *t.*, *mun. bor.*, Berks, Eng.; 5 m. S.E. of Reading; mkt., agr. and agr. machin., bricks; p. (1951) *8,716*.
Wolds, The, *chalk hill range*, Lincoln, E.R. Yorks, Eng.; pastoral; 45 m. long.
Wolf Rock, *isolated rock, lighthouse*; at approach to Eng. Channel from Bay of Biscay; 9 m. S.W. of Lands End, Cornwall.
Wolfe, *I.*, in L. of 1,000 Is., St. Lawrence R., Canada.
Wolfenbüttel, *t.*, Lower-Saxony Germany; S. of Brunswick; cas., Lessing museum; textiles, machin., canning; p. (estd. 1954) *34,100*.
Wolfsberg, *t.*, Austria; holiday resort; p. *6,165*.
Wolfsburg, *t.*, Lower Saxony, Germany; on R. Aller, N.E. of Brunswick; Volkswagen wks.; p. (estd. 1954) *27,900*.
Wollaston, *L.*, N.W. Terr., Canada; 50 m. long.
Wollongong, Greater, *t.*, N.S.W., Australia; coal-mining, iron- and steel-wks., dairying; p. (1958) *112,390*.
Wolmaransstad, *t.*, Transvaal, S. Africa; diamonds; p. *3,567*.
Wolsingham, *t.*, Durham, Eng.; on R. Wear; woollens, coal, agr. tools, marble; p. *3,535*.
Wolverhampton, *t.*, *co. bor.*, Staffs, Eng.; 15 m. N.W. of Birmingham; ironwks., coal, metal goods, elec. engin., elec. apparatus, car and cycle components, rayon, nylon, rubber goods; p. (1951) *162,669*.
Wolverton, *t.*, *urb. dist.*, Bucks, Eng.; on R. Ouse, 15 m. S.W. of Bedford; rly.-carriage wks.; p. (1951) *13,421*.
Wolyn (*former* **Wollin**), *I.*, Baltic Sea; off mouth of R. Oder; Polish; a. 133 sq. m.; p. *21,000*.
Wombwell, *urb. dist.*, W.R. Yorks, Eng.; at E. foot of Pennines, 7 m. N. of Sheffield; coal-mining, bricks; p. (1951) *18,837*.
Wonsan, *spt.*, N. Korea; exp. rice, cattle, hides, fish; p. (estd. 1942) *122,185*.
Wonthaggi, *t.*, Victoria, Australia; coal; p. (1957) *4,530*.
Woodbridge, *t.*, *urb. dist.*, E. Suffolk, Eng.; on R. Deben; engin., brush mkg.; p. (1951) *5,310*.
Woodbridge, *t.*, N.J., U.S.A.; tiles, bricks, terra-cotta; p. (1950) *35,758*.
Woodbury, *t.*, N.J., U.S.A.; nr. Philadelphia; (1950) *10,931*.
Wood Green, *mun. bor.*, Middx, Eng.; N sub., London; p. (1951) *52,224*.
Woodhall Spa, *t.*, *urb. dist.*, Lindsey, Lincs, Eng.; 4 m. S.W. of Horncastle; health resort; p. (1951) *1,671*.
Woodside, *burgh* Aberdeen, Scot.; on R. Don; paper; p. *7,698*.
Woodstock, *t.*, Ontario, Canada; on R. Thames; dairying, woollens, agr. tools; p. *12,461*.
Woodstock, *t.*, *mun. bor.*, Oxford, Eng.; on Glynne R. 7 m. N.W. of Oxford; glove mnfs.; Blenheim Palace; p. (1951) *1,713*.
Wookey Hole, *cave*, Mendip Hills, Somerset, Eng.; at foot of limestone hills, 2 m. N.W. of Wells; R. Axe emerges from the cave.
Wooler, *t.*, Northumberland, Eng.; on R. Till; cattle, sheep mkts.; p. *1,577*.
Woolgar, *t.*, Queensland, Australia; gold.
Woolwich, *metropolitan bor.*, London, Eng.; on S. bank of R. Thames; dockyard and arsenal; former Royal Military Academy; p. (1951) *147,824*.
Woomera, S. Australia; about 270 m. N.W. of Adelaide; base for joint U.K.–Australian guided-weapon testing range extending N.W. across the continent; established 1947.
Woonsocket, *c.*, R.I., U.S.A.; on Blackstone R.; textiles, rubber goods; p. (1950) *50,211*.
Wooster, *c*, Ohio, U.S.A.; univ.; agr. ctr.; p. (1950) *14,005*.
Wootton Basset, *see* **Cricklade and Wootton Bassett**.
Worcestershire, *midland co.*, Eng.; W. of Warwick; agr, pasturage, hops, orchards, minerals, mnfs.; co. t. Worcester; a. 699 sq. m.; p. (1951) *522,974*.
Worcester, *c.*, *co. bor.*, Worcester, Eng.; on R. Severn, 24 m. N. of Gloucester; cath.; porcelain wks., glove mkg.; p. (1951) *59,700*.
Worcester, *t.*, C. Prov., S. Africa; wines, raisins, ostrich-farming, tanning; p. *18,899*.
Worcester, *c.*, Mass. U.S.A.; univ.; iron, footwear, tools; p. (1950) *203 486*.
Workington, *spt.*, *mun. bor.*, Cumberland, Eng.; on Solway Firth, at mouth of Derwent R.; coal, iron, steel, shipbldg., cycles, motors; p. (1951) *28,882*.
Worksop, *t.*, *mun. bor.*, Notts, Eng.; 15 m. S.E. of Sheffield; coal-mining, timber, glasswks., brewing, malting, quarrying; p. (1951) *31,038*.
Worms, *c.*, Rhineland-Palatinate, Germany; on R. Rhine, cath.; "Nibelungen city"; wine ctr.; chemicals, leather, textiles, machin., metals; p. (estd. 1954) *54,500*.
Worms Head, *promontory*, on Glamorgan cst., Gower Peninsula, Wales.
Worsborough, *urb. dist.*, W.R. Yorks, Eng.; coal-mining, timber-wks., gunpowder; p. (1951) *14,155*.
Worsley, *urb. dist*, S.E Lancs, Eng.; cottons, iron, coal; p. (1951) *27,363*.
Worthing, *t.*, *mun. bor.*, W. Sussex, Eng.; on S. cst., 10 m. W. of Brighton; holiday resort, mkt. gardening, horticulture; p. (1951) *69,375*.
Wotton-under-Edge, *t.*, Gloucester, Eng., nr. Stroud; mkt., agr. ctr., woollens; p. *3,121*
Wowoni I., Celebes, Indonesia.
Wrangel, *I.*, Arctic Ocean; off N. cst., R.S.F.S.R.
Wrangel, *t.*, Alaska, U.S.A.; p. (1950) *1,227*.
Wrangell, *mtn.*, Alaska, U.S.A.; alt. 17,500 ft.
Wrath, *C.*, N.W. Sutherland, Scot.
Wrekin, *hill*, Salop, Eng.; alt. 1,320 ft.
Wrexham, *t.*, *mun. bor.*, Denbigh, Wales; 11 m. S.W. of Chester; engin., textiles, brick wks., chemicals, tanning; p. (1951) *30,962*.
Wroclaw (Breslau), *prov.*, Poland–Lower Silesia; industl., coal, ironwks., agr.; cap. Wroclaw; a. 9,552 sq. m.; p. (estd. 1950) *1,751,697*.
Wroclaw (Breslau), *c.*, Silesia, Poland; German before 1945; on R Oder; univ., cath.; textiles, metals, machin., foodstuffs; p. (1957) *396,000*.
Wrotham, *t.*, Kent, Eng.; nr. Sevenoaks; hops, fruit; p. *4,510*.
Wuchang, *c.*, Hupeh, China; on R. Yangtze-Kiang, opposite Hankow; cottons, tea; comm. ctr.; p. (estd. 1946) *174,367*. *See* **Wuhan**.
Wuchin, *see* **Changchow**.
Wuchow, *R. pt.*, Kwangsi, China; on Si-Kiang R.; tr. ctr.; exp. tung oil, hides, aniseed; p. *90,000*.
Wuhan, *industl. c.*, Hupeh, China; at head of navigation by ocean-going steamers of Yangtze-Kiang; formed by amalgamation of Hankow, Hanyang, Wuchang; combined p. (estd. 1956) *1,800,000*. *See also under separate headings.*
Wuhsien, *see* **Soochow**.
Wuhu, *treaty pt.*, Anhwei, China; on R. Yangtze-Kiang; tea, silk, coal; p. (estd. 1947) *203,550*.
Wupper, *R.*, Germany; trib. of R. Rhine; length 40 m.
Wuppertal, *t.*, N. Rhine–Westphalia, Germany; formed by amalgamation of Barmen and Elberfeld; textiles, rubber goods, paper, metals, pharmaceuticals; p. (estd. 1954) *392,900*.
Württemberg-Hohenzollern, *Land*, Germany; formed in 1947 from portion of Württemberg and former Prussian dist. of Hohenzollern; cap. Tübingen; a. 4,017 sq. m.; p. (1950) *1,242,204*.
Würzburg, *c.*, Bavaria, Germany; on R. Main; univ.; machin., metals, chemicals, route ctr.; p. (estd. 1954) *94,300*.
Wurzen, *c.*, Saxony, Germany; on R. Mulde; cath., cas.; machin., furniture, leather, foodstuffs; p. (estd. 1954) *22,300*.
Wusih, *c.*, Kiangsu, China; on N. shore of Tai Hu, 75 m. W. of Shanghai; silk, cotton-weaving; p. (estd. 1936) *272,209*.
Wyalong, N.S.W., *see* **West Wyalong**.
Wyandotte, *c.*, Mich., U.S.A.; on Detroit R.; chemicals; p. (1950) *36,846*.
Wycombe, *see* **High Wycombe**.
Wye, *R.*, Bucks, Eng.; rises in Chiltern Hills above High Wycombe, flows S.E. to R. Thames at Cookham.
Wye, *R.*, Derby, Eng.; trib. of R. Derwent; length 20 m.
Wye, *R.*, Eng. and Wales; rises in Plynlimmon, flows S.E. into R. Severn at Chepstow; length 130 m.
Wyndham, *t.*, W. Australia; on Cambridge G.; p. *390*.
Wymondham, *t.*, Norfolk, Eng.; 9 m. S.W. of Norwich; mkt.; brush-making; Benedictine abbey, founded 1107; p. *5,576*.

Wyoming, *st.*, U.S.A.; livestock agr., coal-mining, minerals, petroleum; cap. Cheyenne. a. 97,914 sq. m.; p. (1950) *290,529*.
Wyoming, *valley*, N.E. Penns., U.S.A., on Susquehanna R.; coal; length 30 m.
Wyre, *R.*, Lancs, Eng.; rises in Pennines, flows W. into Lancaster Bay at Fleetwood; length 28 m.
Wyvis, Ben, *mtn.*, Scot., *see* **Ben Wyvis**.

X

Xaltocán, *L.*, Central Mexico.
Xanten, *t.*, Rhine prov., Germany; cath.; p. *5,057*.
Xanthi, *t.*, Thrace, Greece; on R. Mesta; tobacco; p. (1951) *27,302*.
Xanthus, *ruined c.*, Turkey; on R. Xanthus.
Xanxere, *t.*, Brazil; nr. R. Peixe.
Xauen, *t.*, Spanish Morocco, N. Africa; p. *14,473*.
Xenia, *c.*, Ohio, U.S.A.; in Miami valley; twine, footwear, agr. ctr.; p. (1950) *12,877*.
Xeres, *see* **Jerez de la Frontera**.
Xilitla, *t.*, Mexico; p. *2,092*.
Xingu, *R.*, Brazil; trib. of the Amazon; navigable for steamers 110 m.; length 1,300 m.
Xochicalco, *ruins*, Mexico.
Xochimilco, *L.*, Mexico; formerly contiguous with L. Tezcuco.
Xochimilco, *t.*, Mexico; on L. Xochimilco; p. *14,370*.
Xois, *ancient c.*, Lower Egypt; cap. in 17th century B.C.
Xucar or Juvar, *R.*, Spain; length 200 m.

Y

Y or Ij, *inlet* Zuider Zee, now separated by locks, forming part of canal system of Amsterdam.
Yablonovy, *mtns.* Siberia R.S.F.S.R.; E. of L. Baikal; highest peak, Chokondo, alt. 8,048 ft.
Yaila Mtns., Ukrainian S.S.R., U.S.S.R.; form S.E. margin of Crimea Peninsula, extend from Sevastopol to Kerch; forested on middle slopes, pasture on upper slopes; forms marked climate barrier between mild winters of Mediterranean cst. to the S. and cold winters to the N.
Yakima, *t.*, Wash., U.S.A.; agr., livestock; p. (1950) *38,486*.
Yakima, *R.*, Wash., U S.A.; trib. of Columbia R; length 208 m.
Yakova, *t.*, Albania; nr. Scutari.
Yakushima, *I.*, Osumi Gr., Japan; S. of Kyushu; mtns., forest.
Yakut., A.S.S.R., U.S.S.R.; gold-mining; a. 1,530,253 sq. m.; p. (1959) *247,000*.
Yakutsk, *t.*, R.S.F.S.R.; on R. Lena; p. (1959) *74,000*.
Yala, *t.*, S. Siam; tin-mining.
Yalta, *spt.*, Ukrainian S.S.R.; on Black Sea; p. *15,000*.
Yalu, *R.*, forms bdy. between Manchuria and N. Korea; flows into Yellow Sea.
Yamagata, *t.*, Honshu, Japan; mnfs.; p. (1950) *104,891*.
Yamaguchi, *t.*, Honshu, Japan; p. (1947) *38,326*.
Yamal, *peninsula*, R.S.F.S.R.; jutting into Arctic Ocean.
Yambol, *t.*, Bulgaria; on R. Tunja; ruined mosque; corn tr.; p. (1956) *42,038*.
Yamethin, *dist.*, Upper Burma; teak forests, rice; ch. t. Yamethin; p. *9,291*.
Yamina, *t.*, Gambia, W. Africa; p. *6,700*.
Yamina or Nyamina, *t.*, Nigeria, W. Africa; on R. Niger; tr. ctr.
Yana, *R.*, Siberia U.S.S.R.; length 1,000 m.
Yanago, *t.*, Japan; business ctr.; cotton textiles; p. (1947) *50,027*.
Yanaon or Yanam, *prov.*, *t.* formerly Fr. Orissa, united with India 1954; p. (of prov.) (1948) *5,853*, (of t.) (1941) *5,711*.
Yanbu, *spt.*, Arabia; on E. cst. of Red Sea; pt. for Medina.
Yanco, *t.*, N.S.W., Australia; fruit, rice, dairying.
Yangchow (Chiangtu), *c.*, Kiangsu, China; on Grand Canal; comm. ctr.; p. (estd 1938) *127,392*.
Yangchu, *see* **Taiyuan**.
Yangtze-Kiang, *R.*, China; rises in plateau of Tibet, flows E. to E. China Sea, Pac. Oc. nr. Shanghai; traverses "Red Basin" of Szechwan, a deep gorge above Ichang, and finally a broad, level plain; many lge. cs. on its banks, Chungking, Ichang, Wuhan (Hankow, Hanyang, Wuchang), Nanking, Chinkiang; navigable by ocean-going vessels 1,800 m. to Ichang; total length 3,500 m.
Yannina, *see* **Ioánnina**.
Yaochow, *c.*, Kiangsi, China; nr. L. Po-Yang; local tr.; p. *56,500*.
Yao-Nan, *c.*, Yunnan, China; salt tr., musk, etc.; p. *65 000*.
Yaoundé, *cap.*, Cameroon Rep., W. Africa; p. (1955) *38,000*.
Yap, *I.*, Carolines, Pac. Oc., U.S.A. trusteeship; a. 79 sq. m.; cable sta.; p. (1958) *5,459*.
Yapura, *R.*, Brazil and Colombia, S. America; trib. of R. Amazon; navigable for 600 m.; length 1,500 m.
Yaracuy, *st.*, Venezuela; cap. San Felipe; p. (1941) *127,030*.
Yare, *R.*, Norfolk, Eng.; flows E. to N. Sea at Gorleston; length 50 m.
Yaritagua, *t.*, Venezuela; tobacco, coffee, cocoa, sugar; p. *5,399*.
Yarkand (Soche), *c.*, Turkestan (Sinkiang), China; tr. ctr.; wheat, rice, beans, fruit, carpets, textiles; p. (estd.) *60,000*.
Yarkand, *R.*, Turkestan (Sinkiang), China; trib. of Tarim R.; length 500 m.
Yarmouth, *spt.*, Nova Scotia, Canada; shipbldg., fisheries; p. (1956) *8,095*.
Yarmouth, *par.*, I. of Wight, Eng.; on N.W. cst., 8 m. W. of Newport; holiday resort; p. *893*.
Yarmouth, Great, *spt.*, *co. bor.*, Norfolk, Eng.; at mouth of R. Yare; holiday resort; fisheries, herrings, timber, shipyds.; p. (1951) *51,105*.
Yaroslavl, *t.*, R.S.F.S.R.; on R. Volga; cath.; synthetic rubber, engin., textiles, chemicals, sawmilling p. (1959) *406,000*.
Yarra, *R.*, Victoria, Australia; length 100 m.
Yartsevo, *t.*, R.S.F.S.R.; nr. Smolensk; cotton mills; p. *10,000*.
Yatschushiro, *t.*, Kyushu, Japan; p. (1947) *41,281*.
Yavary, *R.*, S. America; on Brazilian–Peruvian frontier; trib. of R. Marañon; length 450 m.
Yawata, *t.* Kyushu, Japan; iron and steel; p. (1947) *154,646*.
Yazoo, *c.*, Miss., U.S.A.; on Yazoo R; agr. tr.; p (1950) *9,746*
Yazoo, *R.*, Miss., U.S.A.; trib. of R. Mississippi; length 280 m.
Yazoo, *dist.*, Miss., U.S.A.; very flat, low-lying flood plain of R. Mississippi and R. Yazoo, extends 220 m. along R. from Memphis to Vicksburg; very fertile alluvial soil, but subject to disastrous floods; one of ch. cotton-growing dists. in U.S.A.
Yecla, *t.*, Spain; mkt.; p. *19,020*.
Yeddo, old name of Tokyo, Japan.
Yekabpils, *t.*, Kurland, Latvian S.S.R.; on R. Dvina.
Yeletz, *t.*, R.S.F.S.R.; on R. Sosna; grain and cattle tr.; p. (1959) *78,000*.
Yell, *I.*, Shetlands, Scot.; 17 m. long; p. *1,883*.
Yellow R., *see* **Hwang Ho**.
Yellow Sea, *arm* of Pac. Oc. between China and Korea; length 600 m., greatest width 400 m.
Yellowhead Pass, B.C., Alberta, Canada; most N. and lowest of main passes across Rocky Mtns.; carries Canadian National Rly. on route from Edmonton to Vancouver and Prince Rupert; summit alt. 3,700 ft.
Yellowknife, *t.*, N.W. Terr., Canada; on N. shore of Gr. Slave L.; ctr. of impt. gold-mining dist.; linked by air to Edmonton, Alberta.
Yellowstone, *L.*, Wyo., U.S.A.; 20 m. long, 15 m. wide; alt. 7,740 ft.; in Y. National Park.
Yemen, *kingdom*, Arabia; federated with United Arab Republic to form United Arab States, March 1958; barley, wheat, millet, coffee, hides; cap. Sana; a. 75,000 sq. m.; p. (estd. 1958) *8,000,000*
Yenakievo, *t.*, Ukrainian S.S.R.; coal, iron and steel; p. (1959) *92,000*.
Yenangyaung, *t.*, *R. pt.*, Burma; on left bank of R. Irrawaddy, 280 m. N. of Rangoon; ctr. of Burma oilfields.
Yenchow (Tzuyang), *t.*, Chekiang, China; S. of Hangchow.
Yenesei, *R.*, Siberia, R.S.F.S.R.; rises in Sayan Mtns., flows N. into Arctic Ocean; ch. tribs. Upper, Stony and Lower Tunguska Rs.; length 3,300 m.
Yentai, *see* **Chefoo**.

Yeo or Ivel, *R.*, Dorset, Somerset, Eng.; trib. of R. Parrett; length 24 m.
Yeovil, *t., mun. bor.*, Somerset, Eng.; on R. Yeo; 22 m. S.E. of Taunton; glove mnf., aeroplane wks. engin.; dairying; p. (1951) *23,337*.
Yerevan, *cap.*, Armenian S.S.R.; engin., chemicals, synthetic rubber, textiles, aluminium; p. (1959) *509,000*.
Yeshil-Irmak, *R.*, Turkey; flows N. to Black Sea; length 200 m.
Yeshil Kul, *L.*, Chinese Turkestan (Sinkiang).
Yeste, *t.*, Spain; mnfs.; p. *10,000*.
Yes Tor, *2nd highest summit*, Dartmoor, Devon, Eng.; alt. 2,028 ft.
Yevpatoriya (Eupatoria), *spt.* Ukrainian S.S.R.; chemicals, leather, locks, dried fish; p. (1959), *57,000*
Yezd, *t., prov. cap.*, Persia; caravan ctr.; p. (estd. 1949) *56,000*.
Yezo, *see* **Hokkaido.**
Yibna, *t.*, Israel; S.E. of Er Ramle; p. *5,000*.
Yiewsley and West Drayton, *urb. dist.*, Middx., Eng.; W. sub. of London; varied light inds.; p. (1951) *20 488*.
Yochow, *c.*, Hunan, China; at outlet of Tungting L. on the bank of the R. Yangtze; p. *4,800*.
Yokkaichi, *industl. c., spt.*, S. Honshu, Japan; on W. cst. of Ise Bay, 23 m. S.W. of Nagoya; mnfs. silk, cotton and woollen goods; exp. canned salmon, cheap pottery, textiles; imports raw wool and cotton; p. (1950) *123,870*.
Yokohama, *ch. spt.*, Honshu, Japan; on W. side of Tokyo Bay; silks, tea tr.; p. (1955) *1,143,287*.
Yokosuka, *spt.*, Honshu, Japan; S. of Tokyo; holiday resort; p. (1950) *250,533*
Yola, *t.*, N. Nigeria, Africa; nr. R. Benue; agr. tr.; p. *5,310*.
Yonkers, *c.*, N.Y., U.S.A.; on Hudson R.; carpets, sugar, hats; p. (1950) *153,798*.
Yonne, *dep.*, France; agr., wines, minerals; cap. Auxerre; a. 2,894 sq. m.; p. (1954) *266,410*.
York, *c., co. bor., co. t.*, Yorks, Eng.; on R. Ouse; in central position in Vale of York; cath., cas.; mkt., rly. wks., confectionery; p. (1951) *105,336*.
York, *I. gr.*, Torres Strait (between New Guinea and Australia).
York, *R.*, tidal estuary of Chesapeake Bay, U.S.A.
York, *c.*, Nebraska, U.S.A.; rly. ctr.; p. (1950) *6,178*.
York, *bor.*, Penns., U.S.A.; agr. tools, confectionery, tobacco; p. (1950) *59,953*.
York, *C.*, Hayes Peninsula, Greenland.
York, *C.*, Queensland, Australia; most N. point on mainland of Australia.
York Factory, *t.*, on Nelson R., Hudson Bay, Manitoba, Canada.
York, Vale of, *broad lowland*, Yorks, Eng.; extends N. to S. between Pennines to W. and N. Yorks Moors and Yorks Wolds to E.; drained to Humber by R. Ouse and tribs. from N. by Rs. Don and Trent from S.; flar apart from low transverse ridge Stamford Bridge to Harrogate; glacial and alluvial soils have required draining; crop farming, wheat, barley, root-crops, associated with fattening of beef cattle; settlement mainly marginal; ch. t. York; length 60 m.; width varies from 10 m. in N. to 30 m. in S.
Yorke, *peninsula*, S. Australia; separates Spencer G. and G. of St. Vincent; 100 m. long, 30 m. wide.
Yorkshire, *lgst. co.*, Eng.; divided into 3 Ridings, N., E. and W.; cap. York; a. 6,081 sq. m.; p. (1951) *4,516,362*.
Yorkshire, East Riding, *administrative co.*, Yorks, Eng.; chiefly farming, pastoral on Wolds, arable elsewhere; ch. t. Hull; a. 1,172 sq. m.; p. (1951) *510,800*.
Yorkshire, North Riding, *administrative co.*, Yorks, Eng.; chiefly farming, pastoral on Moors, mixed elsewhere; iron-ore mining in Cleveland Hills; heavy inds. around Middlesbrough; ch. t. Middlesbrough; a. 2,128 sq. m.; p. (1951) *525,496*.
Yorkshire, West Riding, *administrative co.*, Yorks, Eng.; pastoral farming on Pennines, but highly industl. on coalfield at foot of Pennines; woollens, steel, engin., etc.; ch. ts. Leeds (in N.), Sheffield (in S.); a. 2,780 sq. m.; p. (1951) *3,480,066*.
Yorkshire Moors, *hills*, N.R. Yorks, Eng.; inc. North Yorks Moors, Cleveland Hills and Hambleton Hills; bounded to N. by Tees Valley, S. by Vale of Pickering, W. by Swale Valley, E. by sea; composed of oolitic limestone; good sheep pastures; impt. iron-ore deposits worked in Cleveland Hills; maximum alt. 1,489 ft.
Yorkshire Wolds, *hills*, E.R., Yorks, Eng.; extend N.E. from Humber and terminate in Flamborough Head; composed of chalk; smooth slopes and short grass give gd. sheep pasture; average alt. 600 ft.
Yorkton, *t.*, Saskatchewan, Canada; agr. ctr.; p. (estd. 1957) *8,184*.
Yoruba, *dist.*, Nigeria; ch. ts., Oyo, Ibadan, Abeokuta and Ilorin.
Yosemite Falls, 3 cataracts, of Yosemite Creek, Cal., U.S.A.
Youghal, *spt., urb. dist.*, Cork, Ireland; on estuary of the Blackwater, Cork, Ireland; fisheries; p. (1951) *4,752*.
Young, *t.*, N.S.W., Australia; p. *4,010*.
Youngstown, *industl. t.*, Ohio, U.S.A.; on Beaver R., 60 m. N.W. of Pittsburgh; iron- and steel-mkg., heavy engin.; p. (1950) *168,330*.
Yozgat, *t.*, Turkey; p. (1945) *11,576*.
Ypacarai, *t.*, Central Paraguay; p. *8,214*.
Ypres (Ieper), *t.*, Belgium; linen, lace, mnfs.; 2 battles, First World War; p. *16,488*.
Ypsilanti, *c.*, Mich., U.S.A.; on Huron R.; agr. mkt., mnfs.; p. (1950) *18,302*.
Yssel (Zuider Zee), *L.*, Neth.; *see* **Ijsselmeer.**
Yssingeaux, *t.*, Haute-Loire, France; nr. Le Puy; mnfs.; p. (1954) *5,653*.
Ystad, *spt.*, S. Sweden; on Baltic Sea; sawmills, flour, sugar-mnfs.; p. *12,343*.
Yuba, *R.*, Cal., U.S.A.; trib. of Feather-Sacramento R.
Yucatan, *st.*, Mexico; cereals, cotton; cap. Merida; a. 23,926 sq. m.; p. (1950) *516,857*.
Yucatan, *strait*, connects G. of Mexico with Caribbean Sea.
Yudanamutana, *dist.*, S. Australia; copper-mining.
Yuen Kiang, *R.*, Hunan, China; length 400 m.
Yugoslavia, *see* **Jugoslavia.**
Yukon, *R.*, Canada–Alaska; flows N.W. and W. into Bering Strait; navigable for 1,200 m.; length 2,000 m.
Yukon, *terr.*, Canada; mountainous; coal, minerals; chief ts. Dawson, and Whitehorse (cap.); a. 207,076 sq. m.; p. (1956) *12,190*.
Yuma, *t.*, Arizona, U.S.A.; at confluence of Rs. Gila and Colorado nr. Mexican–U.S.A. bdy.; ctr. of irrigated agr., obtaining water from Laguna and Imperial Dams; cotton, citrus fruits, alfalfa; p. (1950) *9,145*.
Yungchia, *see* **Wenchow.**
Yunnan, *S.W. prov.*, China; adjoining Burma; mountainous; agr., minerals; cap. Kunming; a. 162,342 sq. m.; p. (1953) *17,472,737*.
Yverdon, *t.*, Switzerland; cas.; tourist ctr.; p. *10,865*.
Yvetot, *t.*, Seine-Maritime, France; nr. Rouen; p. (1954) *6,885*.

Z

Zaandam, *t.*, N. Holland, Neth.; paper, oil, timber, cement; p. (1951) *43,748*.
Zabid, *t.*, Yemen, Arabia; old ctr. of learning; mkt.
Zabrze (Hindenburg), *t.*, Upper Silesia, Poland; German before 1945; steel, coal, engin., chemicals; p. (1957) *185,000*.
Zacapa, *t.*, Guatemala, Central America; p. (1940) *18,094*.
Zacatecas, *st.*, Mexico; silver-mines; cereals, fruit, sugar; a. 28,122 sq. m.; p. (1940) *565,437*.
Zacatecas, *t., cap.*, Zacatecas, Mexico; silver, pottery, comm. ctr.; p. (1950) *664,275*.
Zacatula, *t.*, Mexico; nr mouth of R. Balsas; mnfs.; p. *9,000*.
Zadar (Zara), *spt.*, Jugoslavia; formerly Italian; cath.; maraschino, flour, glass; p. (1947) *14,847*.
Zagan (Sagan), *t.*, Silesia, Poland; German before 1945; on R. Bober; cas.; textiles, paper, lignite; p. (estd. 1939) *23,000*.
Zagazig, *t.*, Egypt; on Nile Delta; cotton, grain tr.; p. (1947) *82,912*.
Zagreb, *t.*, Jugoslavia; on R. Sava; cath., univ.; engin., textiles, chemicals, paper, asbestos; p. (1953) *350,452*.

Zagros, *mtns.*, Persia; highest, Zardeh Kuh, 14,921 ft.
Zahle, *t.*, Lebanon, S.W. Asia; on slopes of L. mtn.; p. (estd 1950) *78,031.*
Zakopane, *t.*, Poland; in High Tatra mtns.; tourist resort; p. *20,000.*
Zakynthos, *see* Zante.
Zambesi, *R.*, S.E. Africa; flows E. to Mozambique Channel, Indian Ocean; navigable for 1,700 m.; length 2,200 m.
Zambesia, *prov.*, Mozambique; ch. t., Quelimane.
Zamboanga, *t.*, Mindanao, Philippines; rice, sugar, tobacco, timber; p. (1948) *103,317.*
Zamora, *prov.*, Spain; cap. Zamora; a. 40,825 sq. m.; p. (1950) *315,885.*
Zamora, *t.*, *cap.*, Zamora, Spain; on R. Duero; olive oil, wines; p. (1949) *42,859.*
Zamosc, *old t.*, Poland; bentwood furniture mnf.; p. *20,889.*
Zanesville, *t.*, Ohio, U.S.A.; textiles, pottery, machin.; p. (1950) *40,517.*
Zante, *Ionian I.*, Greece; cap. Zakynthos; fruit (currants); devastated by severe earthquake, 1953; a. 277 sq. m.; p. (1951) *37,870.*
Zanzibar, *I.*, *Brit. Prot.*, E. Africa; cloves, coconuts, copra; cap. Zanzibar; a. 640 sq. m.; p. (1958) *299,111.*
Zapala, *t.*, W. Argentina; in Andes; rly. term.; oilfield.
Zaporozhe (Dneprostroy), *industl. t.*, Ukrainian S.S.R.; on R. Dnieper, 45 m. S.E. of Dnieperpetrovsk; nr. Lenin (Dnieper) Dam and hydro-elec. power-sta. (558,000 kW.); iron- and steel-wks., ferro-alloys, engin., aluminium, chemicals; p. (1959) *435,000.*
Zapotitlán, *t.*, Mexico; local tr. ctr.; p. *2,218.*
Zara, *see* Zadar.
Zaragoza, *prov.*, Spain; cap. Zaragoza; a. 6,611 sq. m.; p. (1950) *621,768.*
Zaragoza, *t.*, Spain; on R. Ebro; 2 caths. univ., citadel; captured by Moors 8th century, once cap. of Aragon; beer, spirits, woollens, iron ware; p. (1950) *264,256.*
Zaria, *t.*, N. Nigeria Africa; cotton ctr.; p. (1953) *54,000.*
Zaruma, *t.*, Ecuador; mnfs.; p. *12,975.*
Zary (Sorau), *t.*, Brandenburg, Poland; German before 1945; textiles, pottery; p. (estd. 1939) *26,000.*
Zastron, *t.*, O.F.S., S. Africa; alt. 5,507 ft.; agr. ctr.; p. *4,083.*
Zawiercie, *t.*, Poland; coal, iron, textiles, glass; p. *21,225.*
Zdunska, *t.*, Poland; nr. Lodz; p. *25,000.*
Zealand (Sjaellan), *I.*, Denmark; between Kattegat and Baltic; a. (with Is. attached) 2,840 sq. m.; ch. t. Copenhagen; p. *1,251,661.*
Zeebrugge, *spt.*, Belgium; connected with Bruges by ship canal; p. (1947) *8,450.*
Zeeland, *prov.*, Neth.; fishing; cap. Middelburg; a. 690 sq. m.; p. (1948) *262,589.*
Zeeland, *vil.*, Mich., U.S.A.; nr. Grand Rapids; p. (1950) *3,075.*
Zeerust, *dist.*, W Transvaal, S. Africa; goldfield.
Zeilah, *t.*, Brit. Somaliland, E. Africa; on G. of Aden; p. *1,000.*
Zeist, *t.*, Neth.; p. (1951) *43,265.*
Zeitz, *t.*, Saxony-Anhalt, Germany; S.W. of Leipzig; cas., cath.; machin., sugar, wood, leather, chemicals; p. (estd. 1954) *40,100*
Zemun, *t.*, Jugoslavia; p. (1947) *28,083.*
Zenica, *t.*, Jugoslavia; lge. iron and steel wks.
Zenjan or Zanian, *t.*, cap. Khamseh, Persia; comm. ctr., carpets; p. *30,109.*
Zerbst, *t.*, Saxony-Anhalt, Germany; on R. Nuthe, S.E. of Magdeburg; cas.; machin.; p. (estd. 1954) *19,300.*
Zermatt, *vil.*, Valais, Switzerland; at foot of Matterhorn; tourist ctr.; p. *1,000.*
Zgierz, *t.*, Poland; nr. Lodz; linens; p. *21,690.*
Zgorzelec, *see* Görlitz.
Zhdanov (Mariupol), *spt.*, Ukrainian S.S.R.; on Azov Sea; iron and steel, zirconium, chemicals; p. (1959) *284,000.*
Zhitomir, *t.*, Ukrainian S.S.R.; engin.; p. (1959) *105,000.*
Zielona Gora (Grünberg), *t.*, Silesia, Poland; German before 1945; lignite mining, viticulture; p. (estd. 1939) *26,100.*
Zile, *t.*, Turkey; cereals, fruit, wool, rugs; p. (1945) *16,290.*
Zilgra, *t.*, Turkestan (Sinkiang), China; tr. ctr.
Zillertal, *valley*, Tyrol, Austria; drained by R. Ziller, trib. of R. Inn; length 50 m.
Zillertal Alps, *mtns.*, Austria; in Tyrol.
Zinder, *t.*, Niger, Fr. W. Africa; terminus of Trans-Sahara motor route; tr. ctr.; p. *12,000.*
Zittau, *t.*, Saxony, Germany; on R. Mandau; woollens, linens, machin., cars, chemicals; p (estd. 1954) *45,200.*
Žižkov, *t.*, Czechoslovakia; sub. of Prague; p. *91,082.*
Zlatoust, *t.*, R.S.F.S.R.; in the Ural Mtns.; steel, chemicals, sawmilling; p. (1959) *161,000.*
Zlin, *industl. t.*, Moravia, Czechoslovakia; 40 m. E. of Brno; impt. leather ind.; p. (1957) *57,974.*
Znojmo or Znaim, *t.*, Czechoslovakia; pottery, textiles, mkt. gardening; p. *25,832.*
Zomba, *t.*, *cap.* Nyasaland; 2,900 ft. above sea level on slopes of Zomba mtn., 42 m. N.E. Blantyre; p. *7,800* (incl. *800* Europeans).
Zombor, *t.*, Hungary; cattle, grain; p. *33,000.*
Zona Militar de Comodoro Rivadavia, *terr.*, Argentina, separated from Chubut terr. in 1946.
Zonguldak, *t.*, Turkey; p. (1945) *33,480.*
Zorritos, *t.*, Tumbes dep., Peru, S. America; on cst., 10 m. from Ecuador bdy.; oilfield.
Zoutpansberg, *dist.*, N.E. Transvaal, S. Africa; goldfields, mtns.
Zrenjanin, *t.*, Vojvodina, Jugoslavia; p. (1953) *44,199.*
Zug, *can.*, Switzerland; cap. Zug; a. 93 sq. m.; p. (1950) *42,239.*
Zugspilze, *mtn.*, Bavarian Alps, highest peak in Germany, 9,722 ft.
Zuider Zee, Neth.; shallow a. of water, now separated from N. Sea; partly reclaimed land.
Zulia, *st.*, Venezuela, S. America; cap. Maracaibo; p. (1941) *345,667.*
Zululand, *prov.*, Natal; livestock, cereals, fruit, sugar, coffee, tea, gold, coal; a. 10,427 sq. m.
Zungeru, *t.*, Nigeria, Africa; on Lagos–Kano rly.; p. *1,000.*
Zurich, *can.*, Switzerland; cottons, silks; a. 668 sq. m.; p. (1950) *777,002.*
Zurich (Zürich), *c.*, Switzerland; on L. Zurich and R. Limmat, lgst. t.; cap. of Z. prov.; cath., univ.; paper, silks, cottons, machin.; p. (1950) *390,020.*
Zutphen, *t.*, Neth.; on R. Yssel; paper, tanning; p. (1951) *23,082.*
Zwartebergen, *mtns.*, C. of Gd. Hope, Union of S. Africa; extending 200 m. E. to W, flanked by Gr. Karroo to N., Little Karroo to S.; form impenetrable barrier except where broken across by headstreams of R. Gouritz; rise to over 7,000 ft.
Zwartsluis, *t.*, Neth.; nr. Zwolle; p. *3,348.*
Zweibrücken, *t.*, Rhineland-Palatinate, Germany; nr. Saarbrücken; cas.; machin., footwear, textiles; p. (estd. 1954) *27,200.*
Zwickau, *t.*, Saxony, Germany; on R. Zwickhauser Mulde; cas.; coal, motors, machin.; p. (estd. 1954) *128,100.*
Zwolle, *c.*, Neth.; canal ctr.; cattle mkt., cottons, ironwks.; p. (1951) *49,957.*
Zyrardow, *t.*, Poland; nr. Warsaw; mnfs.; p. *20,186.*

THE BRITISH COMMONWEALTH

The British Commonwealth of Nations comprises (a) the Sovereign States of the United Kingdom Canada, Australia, New Zealand, South Africa, India, Pakistan, Ceylon, Ghana, Malaya and Nigeria (including their dependent territories). (b) the Federation of Rhodesia and Nyasaland. (c) the Colonies, Protectorates, Protected States, Trust Territories, Condominiums and leased territories.

See also the chapter on the British Commonwealth in Section C which contains definitions of the status of the various countries of the Commonwealth.

I.—MEMBERS OF THE COMMONWEALTH, AND THE FEDERATION OF RHODESIA AND NYASALAND (including territories for which members other than the U.K. are responsible).

Country	Land Area (sq. miles)	Recent Population Estimates
United Kingdom	94,205	51,455,000
Canada (incl. Newfoundland and Labrador)	3,845,774	16,745,000
Australia (Commonwealth of)	2,974,581	9,533,334
Cocos Islands	5	652
Christmas Island	64	2,201
Norfolk Island—*Colony*	13⅓	942
Papua—*Colony*	90,540	464,709
New Guinea—*Trusteeship*	93,000	1,206,749
Nauru—*Trusteeship with Australia, New Zealand and the U.K.*	8¼	3,473
Antarctic territory	2,472,000	—
New Zealand	103,736	2,243,000
Island Territories	203	23,044
Ross Dependency	175,000 (estimated)	—
Western Samoa—*Trusteeship*	1,133	97,732
South Africa (Union of)	472,685	14,167,000
Prince Edward and Marion Islands	135	—
South-West Africa—*Mandate*	317,725	414,601
India (Republic of)	1,139,000	376,750,000 *
Sikkim	2,745	137,725
Pakistan (Republic of)	360,780	83,603,000
Ceylon	25,332	8,929,000
Ghana (incl. Togoland)	91,843	4,691,000
Malaya (Federation of)	50,690	6,277,000
Nigeria (Federation of)	339,169	32,932,010
Rhodesia and Nyasaland (Federation of)	487,640	7,450,000

* Excluding Jammu and Kashmir.

II.—TERRITORIES FOR WHICH THE U.K. IS RESPONSIBLE AND WHICH ARE ADMINISTERED THROUGH THE COLONIAL OFFICE.

(Some of the very small, or practically uninhabited, islands have been omitted.)

Region and Territory	Status	Land Area (sq. miles)	Recent Population Estimates
East Africa:			
Somaliland Protectorate	Protectorate	68,000	650,000
Kenya	Colony and Protectorate	224,960	6,261,000
Tanganyika	Trusteeship	362,688	8,832,000
Uganda	Protectorate	93,981	5,680,000
Zanzibar and Pemba	Protectorate	1,020	280,000
Central Africa:			
*Northern Rhodesia	Protectorate	288,130	2,180,000
*Nyasaland	Protectorate	49,177	2,648,000
West Africa:			
Gambia	Colony and Protectorate	4,003	274,800
†Northern Cameroons	Trusteeship	34,081	1,440,509
Sierra Leone	Colony and Protectorate	27,925	2,100,000

* Included in the Federation of Rhodesia and Nyasaland. Federal and Southern Rhodesian territorial matters dealt with through the Commonwealth Relations Office.

† Formerly administered as part of Nigeria under U.K. Trusteeship; future status to be decided by plebiscite.

Region and Territory	Status	Land Area (sq. miles)	Recent Population Estimates
Far East:			
Singapore	Internally self-governing state	224	1,262,000
Brunei	Protected State	2,226	65,900
North Borneo	Colony	29,387	383,000
Sarawak	Colony	47,500	626,000
Hong Kong	Colony	391	2,583,000
Mediterranean:			
Cyprus	Colony (proposed independence 1960)	3,572	536,000
Gibraltar	Colony	2¼	25,000
Malta and Gozo	Internally self-governing colony	122	319,000
British Caribbean:			
The West Indies Federation:			
Antigua (including dependencies)	Colony	171	53,000
Barbados	Colony	166	228,000
Dominica	Colony	305	63,800
Grenada	Colony	133	89,100
Jamaica	Internally self-governing colony	4,411	1,564,000
Cayman Islands	Colony	100	8,160
Turks and Caicos Islands	Colony	166	5,250
Montserrat	Colony	32	14,400
St. Christopher (St. Kitts) and Nevis, with Anguilla	Colony	153	54,800
St. Lucia	Colony	238	89,000
St. Vincent	Colony	150	77,700
Trinidad and Tobago	Colony	1,980	743,000
Other Caribbean Dependencies:			
British Guiana	Colony	83,000	499,000
British Honduras	Colony	8,867	82,000
Virgin Islands	Colony	67	7,680
Western Pacific:			
Fiji	Colony	7,040	346,000
Pitcairn	Colony	2	140
Tonga	Protected State	269	56,800
Western Pacific High Commission Territories:			
British Solomon Islands Protectorate	Protectorate	11,500	99,200
Gilbert and Ellice Islands Colony	Colony	369	39,000
New Hebrides	Anglo-French Condominium	5,700	52,900
Central and Southern Line Islands	—	—	Uninhabited
Atlantic Ocean:			
Falkland Islands	Colony	4,618	2,280
Dependencies: S. Georgia,	Dependencies of Falkland Islands	—	1,330
S. Sandwich Islands, S. Shetland Islands, Graham Land		—	Uninhabited
Bahamas	Colony	4,400	108,000
Bermuda	Colony	21	41,600
St. Helena	Colony	47	4,700
Ascension	Dependency of St. Helena	34	390
Tristan da Cunha	Dependency of St. Helena	38	280
Indian Ocean:			
Aden	Colony and Protectorates	112,080	800,000
Mauritius (including dependencies)	Colony	809	603,000
Seychelles	Colony	156	40,400

III.—TERRITORIES FOR WHICH THE U.K. IS RESPONSIBLE AND WHICH ARE DEALT WITH BY THE COMMONWEALTH RELATIONS OFFICE.

Country	Status	Land Area (sq. miles)	Recent Population Estimates
Basutoland	Colony	11,716	641,674
Bechuanaland	Protectorate	275,000	296,310
Swaziland	Protectorate	6,704	241,865
Maldive Islands	Protected State	115	90,000

General Information

Some 4,000 entries on subjects of general interest, alphabetically arranged

General Information

A

Aard-Vark, the name given by the Boers to a genus of ant-eating mammals peculiar to Africa; also known as antbears. They live in burrows, where they stay until after dark, when they attack the nests of termites; much esteemed as food by the natives.

Abacus, a device for making arithmetical calculations, consisting of bars with perforated beads. The earliest form of this instrument was used in Mesopotamia about 3000 B.C., and its use spread westwards throughout the Græco-Roman world and eastwards to China. An efficient form of the abacus is still used today in parts of Asia and Russia. As an architectural term, an abacus is the uppermost portion of the capital of a column, supporting the architrave.

Abattis, a military term signifying an entrenchment of trees placed side by side, with the branches outwards.

Abbeys, monastic or conventual establishments governed by an abbot or an abbess were among the earliest Christian institutions. Monasticism owes its extension in the west to the Benedictines who founded many abbeys in the 6th and 7th centuries; by 1415 no fewer than 15,070 had been established by this order alone. The buildings of a Benedictine abbey (and later of the Cistercian abbeys) were usually built according to one plan. Remains of Benedictine abbeys may still be seen at York and Westminster. Fountains Abbey is the largest and best preserved Cistercian house in England. From the dissolution of the monasteries by Henry VIII. monasticism practically ceased in this country. There are a few modern monasteries.

Abdication. The term usually refers to the act of a sovereign who relinquishes the supreme power in a State. There have been only two instances since the Conquest of the abdication of an English monarch; that of James II., in 1688, and that of Edward VIII. in 1936. Defeat in the first and second world wars caused the abdication of many Continental rulers.

Abecedarians, a small sect of Anabaptists of the 16th century, opposed to learning of every kind.

Aberdeen University, founded in 1494 and now constituted by the Union of King's College (1505) and Marischal College (1593) in 1860.

Aberration, in astronomy, is the apparent displacement of a star due to the motion of the observer with the earth. In optics (i) spherical aberration, causing blurring of an image, is due to failure of lens to bring light to a single focus, (ii) chromatic aberration, causing coloured fringes to an image, is due to the refractive index of glass being different for light of different colours. For instance, violet light is bent more than red.

Abiogenesis, or spontaneous generation; the origination of living from non-living matter. The term is applied to such discredited ideas as that frogs could be generated spontaneously by the action of sunlight on mud, or maggots arise spontaneously in dead meat without any eggs from which the maggots hatch being present. Spallanzani (1729–99) upset the hypothesis of spontaneous generation; Pasteur dealt it a death-blow. *See* **F21** (1).

Aborigines, a term first applied to an ancient mythical people of central Italy, derives from the Latin *ab origine* = from the beginning. It now signifies the original inhabitants of any country, in particular the aboriginal tribes of Australia. In contrast to their highly complex social and religious customs, the material culture of Australian aborigines is very low and ill adapted to stand up to contact with European civilisation. Originally estimated at 300,000, their number has dropped in the last 200 years to some 50,000, concentrated on reservations in the northern part of the continent.

Absinthe, an aromatic spirit formerly much consumed in France, and made from a distillation of wormwood and other roots macarated in alcohol. The manufacture is prohibited in France and Switzerland. Zola's novel *L'Assommoir* was a scathing indictment of the absinthe habit.

Absolution, an ecclesiastical term denoting the liberation of a person guilty of sin from its consequences by the act or intercession of religious authority. Now confined in its strict form chiefly to the Roman Catholic and Greek Churches, although used to some extent in the Anglican communion.

Academy is a Greek term originally applied to the groves where Plato taught, but subsequently adopted to indicate higher educational institutions of a special kind. Academies of Science are numerous in all parts of the world, and in addition there are what may be called Literary Academies, of which the French Academy, established in 1635, is a notable example. There are also Academies of History, of Medicine, of Music, and of Art. The London Royal Academy of Arts was founded in 1768, Sir Joshua Reynolds being its first President. The British Academy, for the promotion of historical, philosophical, and philological studies, was founded in 1902, and is incorporated by Royal Charter.

Acetic Acid, an organic acid produced when ordinary (ethyl) alcohol is fermented by the organism called *Acetobacter aceti*. The same oxidation process yields vinegar; this is a weak and crude solution of acetic acid obtained by trickling dilute alcoholic liquor over beechwood shavings at 35° C. The souring of wine is due to the same process. Acetic acid is used as a food preservative and flavouring material, and in the manufacture of cellulose acetate and white lead.

Acetylene, a powerful illuminating gas (compounded of hydrogen and carbon), readily soluble in acetone, will inflame spontaneously when brought in contact with chlorine. Used as an illuminant in bicycle lamps, also to a small extent for house lighting. The flame it gives when burnt with oxygen in the oxy-acetylene blow-lamp is very hot and is used for welding.

Acids are compound substances which combine chemically with an alkali or base and result in a new body that has neither acid nor alkaline properties. These resultant bodies are termed salts. All acids contain hydrogen which is replaceable by metals, salts being formed as the hydrogen is liberated. The range of acids is very great. The chief mineral acids are sulphuric, hydrochloric, and nitric, and are capable of being utilised for an immense variety of commercial purposes.

Acolyte, one who assists the priest at Mass by saying the responses and by waiting on him.

Acrostic, a kind of verse which has afforded amusement to ingenious triflers from very ancient times, and consists of a composition so arranged that the initial letters of the lines, read consecutively, form certain names or words.

Acts of Parliament. *See* **C7, D5** (2).

"**Addled Parliament.**" James I.'s second Parliament, called together in 1614, and dissolved without legislating, on its refusal to grant supplies.

Advent, a period devoted to religious preparation for the coming celebration of the Nativity (Christmas). It comprises four Sundays, and commences on the one preceding or following St. Andrew's Day (Nov. 30), or on St. Andrew's Day itself. Advent was not observed before the 4th century.

Advocatus Diaboli ("the devil's advocate"), a Roman Catholic functionary who presents opposing evidence in regard to the life of any deceased person it may be proposed to canonise.

Advowson is the right of presentation to a vacant church benefice, and the person exercising the right is called the patron. Advowsons originated from the right of feudal lords who had

built or endowed churches to nominate the incumbent, and this right came to be regarded as a right of real property. The buying and selling of advowsons has been greatly restricted since the passing of the Benefices Act, 1898 (Amendment) Measure, 1923.

Adytum, the innermost sanctuary or secret chamber of ancient temples, access to which was forbidden to all but the priests. The most famous is the temple of Apollo at Delphi.

Aeolian Harp, a musical instrument once very popular. It consists of catgut stretched over a wooden sound-box which, when placed out of doors in the wind, can be made to emit many pleasing harmonies.

Aerenchyma. Plant tissue which is spongy because there are large air spaces between the cells in which gases can circulate. This aerating tissue is characteristic of marsh and water-plants.

Aerodynamics, the science of gases (especially air) in motion, particularly in relation to aircraft (aeronautics). The idea of imitating the birds by the use of wings is of ancient origin. It was Leonardo da Vinci, however, who first carried out experiments in a scientific manner. The invention of the balloon in 1783 and the researches of scientists and engineers in the 19th century ultimately led to the development of the aeroplane.

Aerolites, the name given to the class of meteorites composed chiefly of heavy silicates. The other two main classes are *siderolites* (nickel–iron and silicates) and *siderites* (nickel–iron).

Affirmation is a declaration made in lieu of an oath by persons objecting to be sworn because of religious or other scruples. Perjury applies to affirmations the same as to oaths.

Afrikander, type of cattle bred in South Africa.

Afrikaner, an Afrikaans-speaking South African, usually of Dutch descent.

After-damp is a mixture of carbon dioxide and nitrogen that occurs in a mine after an explosion and causes suffocation to human beings. It is also called "choke damp" and "black damp."

Agape, a "love-feast" held by the early Christians in commemoration of the Lord's Supper.

Agar-agar, a vegetable jelly obtained from seaweeds, and largely employed in the Orient in the composition of soups and jellies. Used by bacteriologists to render solid culture media such as broth and blood upon which bacteria are cultivated. Before the second world war Japan had a virtual monopoly in agar-agar; U.S.A. and British Commonwealth now make it in quantity.

Agaric, large fungi of the family *Agaricaceae*, which includes the mushroom and what are popularly called "toadstools," though the idea that these two lay terms sharply differentiate between edible and poisonous fungi is an incorrect one. Characteristic of the agarics is the presence of a cap or *pileus* (bearing underneath the spore-shedding gills) and a stalk or *stipe*.

Agate, a variegated stone composed of nearly pure silica (silicon dioxide). Parallel bands of colour are often characteristic. Germany, Brazil, and India furnish the main supplies, and Scotland has a species of agate called Scotch pebble.

Agave, the American aloe or Century Plant which sometimes does not attain to flowering maturity under sixty or seventy years, and then dies. The flower spray may reach a height of 20 feet and in its development the rush of sap is so great that the Mexicans collect for brewing the strong spirit called mescal. 1,000 litres of sap can be obtained from a single plant. One species of agave yields sisal used for making cord and rope.

Agnostic, a word used by T. H. Huxley in 1869 to describe a person who says he does not know whether or not there is a Supreme Power behind the universe. He neither affirms nor denies the existence of God but suspends judgment. The rise of agnosticism was a characteristic of the 19th century.

Agnus Dei (Lamb of God), a short anthem said or sung at a certain point of the Roman Catholic Mass or Anglican communion service. (John i. 29.)

Air is a mixture of gases forming the atmosphere we breathe. Nitrogen, oxygen, and argon are always present in air; a typical sample of dry air might contain these gases in the following proportions (by volume): nitrogen, 78·06%; oxygen, 21%; argon, 0·94%. A small quantity of carbon dioxide is present, about 3 parts in 10,000 parts of air. This carbon dioxide is the source of carbon compounds built up by green plants in photosynthesis; in the process carbon dioxide is absorbed from the air and oxygen returned, the reverse of the respiratory process of animals. Air also contains a quantity of water vapour, and traces of ammonia, nitrogen oxides, hydrogen, sulphur dioxide, hydrogen sulphide, ozone, and of the rare gases helium, krypton, neon, and xenon. In a city smoke and dust particles may be as abundant as 100,000 particles per cubic centimetre. A litre of air at 0° centigrade and 700 millimetres pressure weighs 1·2932 grams.

Alabama Claims were claims for compensation made by the United States against Great Britain for damage done to American shipping during the Civil War by the *Alabama* privateer, which was finally sunk by the *Kearsage*, of the U.S. Navy. The claim was decided by arbitration at Geneva in 1872, the Court giving a verdict for the claimants for over £3,160,000.

Alabaster, a soft crystalline form of sulphate of lime, or granulated gypsum, easily worked for statuary and other ornamental articles, and capable of being highly polished. Volterra, in Tuscany, yields the finest; that in highest ancient repute came from Alabastron in Egypt, near to the modern Antinoë.

Alb, white vestment reaching to the feet, worn by priests.

Albatross, a large sea-bird of almost pure white, black and white, or brown plumage. It nests in colonies on remote islands, but at other times rarely approaches land. Of the thirteen species, nine are found in the southern oceans, one in the tropics, and the three others in the North Pacific.

Albert Memorial, a large Gothic monument designed by Sir Giles Gilbert Scott, and embellished with sculptures by eminent artists. Erected in memory of Prince Albert in Kensington Gardens at a cost of £120,000.

Albigenses, the name given to an heretical religious sect who were active in the South of France in the 12th and 13th centuries. They protested against attempts at suppresson by the Roman Church, acting principally through the inquisition. The heresy was finally crushed, and during the struggle the brilliant Provencal civilisation was destroyed.

Albino, a term first applied to designate certain negroes mottled with white spots whom the Portuguese navigators met with in Africa. It is now used in regard to all persons of white skin and hair and pink eyes. Albinos cannot see well in the sunlight; it is only in semi-darkness that they discern objects clearly. The albino peculiarity is also found in other living creatures besides man.

Albumen, white of egg. It coagulates under heat, or by the action of acid or alcohol, and is further capable of soluble or insoluble modifications. It provides an anti-toxin in corrosive sublimate poisoning.

Alcalde, a Spanish mayor, judge or magistrate, or in Portugal a justice of the peace; not to be confounded with the similar word "alcaide," which signifies the keeper of a castle or prison along both shores of the Mediterranean. The latter is a military term, the former signifies always a civil functionary, but both are from the same Arabic root.

Alcázar, the famous palace at Seville, in ancient days the residence of the Moorish kings. *See* **G32** (1).

Alchemy was from the 12th to the 17th centuries regarded by many philosophers and enthusiasts as a science capable of demonstration in the production of one or other of three supposed chemical combinations—the philosopher's stone, which was to transmute the baser metals into gold; the elixir of life, that was to prolong existence indefinitely; and the alkahest, or universal solvent. Men of great attainments, monarchs, ecclesiastics, and all classes of people dabbled in alchemy; lives were given up entirely to it, fortunes were wasted upon it. Geber, Roger Bacon, Albertus Magnus, Paracelsus, and many other men of note were devoted alchemists. The experiments of the al-

chemists, however, in spite of their being directed towards an impossible end, resulted in many discoveries that were of value to the real science of chemistry.

Alcohols are chemical compounds, containing carbon, hydrogen, and oxygen. Unless otherwise specified "alcohol" in the singular means "ethyl alcohol" (ethanol); this is produced by distilling fermented liquors. Industrially ethyl alcohol is used in the manufacture of chloroform, ether, perfumes, etc. Diluted with wood alcohol or other denaturants ethyl alcohol becomes "methylated spirits": the denaturants are varied according to the industrial purposes for which it is required, the methylated spirits then being largely exempt from duty. Wood alcohol (methyl alcohol or methanol) can be obtained by distilling wood, or synthetically from water gas.

Alcoholic Strength. In Great Britain the standard is the proof gallon which is an imperial gallon of spirits containing 49·28 per cent. of alcohol by weight or 57·1 per cent. by volume at 60° F. In Europe the strength of spirits is usually measured by the Guy-Lussac hydrometer. In the U.S.A., because of the smaller gallon, 1·37 U.S. proof gallons = 1 British proof gallon. In Britain the alcoholic content of spirits and liqueurs appears on the bottle in degrees proof. Whisky, for example, at 70° proof (or 30° under proof) contains $70/100 \times 57{\cdot}1$ alcohol, or about 40 per cent. The alcoholic content of wines is not shown on the label.

Aldehyde, the generic term for a class of chemical bodies. Except for formaldehyde, which is a gas, aldehydes are volatile liquids. They are produced by oxidation of primary alcohols. Most important aldehyde is formaldehyde used in making the plastics described as formaldehyde resins. Formalin (formaldehyde solution in water) is much used for preserving zoological specimens.

Alder, a river-side, broad-leaved tree of the genus *Alnus*, including some 30 species and found in north temperate regions and the Andes. The only species native to Britain is *A. glutinosa*, which has been described as "guardian of river-banks" because of the way its roots bind together the sand and stones, and so slow down erosion.

Alderman (Anglo-Saxon *Ealdorman*), a title given by the Saxons to persons of high and hereditary distinction, such as princes, earls, and governors. Afterwards adopted to designate the members of municipal corporations, next in dignity to the Mayor.

Aldine Editions are the beautiful books printed in Venice by the Renaissance printer Aldo Pio Manuzio and his family between 1490 and 1597. Italics were first introduced in these books.

Alexandrine, a twelve-syllable metre, the leading measure in French poetry, derived from the romantic tales collected in the 12th century around the name of Alexander the Great. *See* **M5** (2).

Algae, flowerless plants living mostly in water. Seaweeds and the green pond scums are the best known algae. The green powder found on trees is composed of a microscopic alga (*Protococcus*).

Algebra, a branch of mathematics in which symbols are used in place of numbers. Sir Isaac Newton styled it the "universal arithmetic." The Chinese were able to solve the quadratic equation before the Christian era but it was Al-Khowarizmi, an Arab mathematician of the early 9th century, who introduced algebra to Europe.

Alhambra, the ancient palace of the Moorish kings at Granada in Spain, built in the 13th and 14th centuries. Though part of the castle was turned into a modern palace under Charles V., the most beautiful parts of the interior are still preserved—the graceful halls and dwelling-rooms grouped round the Court of Alberca and the Court of Lions, with their fountains, arcades, and lovely gardens. *See* **G32** (1).

Alibi, signifying "elsewhere", is the plea of a person who desires to prove presence elsewhere at the time the alleged act took place.

Alimony. *See* **D30**.

Alkali, the general name given to a number of substances, including soda, potash, and ammonia, which in some ways are the opposite to acids in their chemical action. They are used commercially in the manufacture of paper, glass, soap, and artificial silk. The word comes from the Arabic *al-kali* meaning calcined wood ashes. Alkalis are extremely soluble in water and neutralise acids to form salts and water.

Allegiance is the tie which binds the subject to his sovereign for the protection that the sovereign affords to the subject.

Allegory, a narrative or discourse couched in figurative language and intended to point a moral. A leading example is Bunyan's *Pilgrim's Progress*.

Alligator, the crocodile of America, common in the lower Mississippi and adjacent lakes and marshes, varying in length from two to twenty feet.

Alloys are combinations of metals. Silver coins contained pre-war about 7 per cent. of copper. The alloys best known are brass, composed of copper and zinc; German silver, of copper, zinc, and nickel; pewter, of tin and lead; bell-metal, of copper and tin. When mercury forms part of an alloy, it is termed an amalgam.

All Saints' Day (Nov. 1), is common to both the English and Roman Catholic Churches, and is in commemoration of the saints generally, or such as have no special day set apart for them. Instituted by Pope Boniface IV, early in the 7th century, this ecclesiastical festival was formerly called "All Hallows."

All Souls' Day (Nov. 2) is a festival of the Roman Church, intended for the mitigation by prayer of the sufferings of souls in purgatory. The commemoration was enjoined by Abbot Odilo of Cluny during the 11th century upon the monastic order over which he presided, and was afterwards adopted generally throughout the Roman Communion.

Allspice, a flavouring obtained from a West Indian tree of the myrtle order, *Pimenta officinalis*. The essential oil of its unripe fruit is a powerful irritant, and the bruised berries are carminative.

All the Talents Administration was a coalition of the best men of the two political parties, formed on the death of Pitt, in the year 1806 by Lord Grenville. It abolished the slave trade.

Alluvium, accumulations of sand, mud, gravel, etc., washed down by rivers and forming distinct deposits.

Almanac, a calendar of the year, with particulars of days, weeks, and months, the position of the sun and moon, tidal information, records of festivals, etc. The earliest mention of a calendar is in 1150. The earliest almanac printed in England was *The Kalendar of Shephardes*, printed by Rice and Pynson about 1497. *Old Moore's Almanac*, a popular penny issue, had a huge circulation for many years. *Whitaker's Almanac* was first published in 1868.

Almond, the fruit of the *Amygdalus communis*, originally indigenous to Persia, Asia Minor, and N. Africa; now cultivated in Italy, Spain, and France. It yields both bitter and sweet oil. Bitter almond oil is obtained by macerating and distilling the ripe seeds; it is used for flavouring and scenting purposes, its fragrant odour being due to the presence of benzaldehyde. When the seeds are pressed, sweet almond oil results: this is used in perfumery, and also as a lubricant for very delicate machinery.

Almoner was a monastery official charged with the distribution of alms. There was also the King's Almoner and the title of Hereditary Grand Almoner still survives, though the office is now a sinecure. The Lord High Almoner is usually a bishop who, in the absence of the sovereign, distributes the royal bounty once a year on Maundy Thursday. Since 1895 the name almoner has been given to the skilled medical social workers on the staffs of hospitals.

Almuce, a fur stole worn by certain canons.

Aloe, large plants of the lily family. There are about eighty-five species, most of them in Cape Colony, especially in the Karroo desert. The bitter purgative drug (aloes) is prepared by evaporating the plants' sap. (*See* **Agave.**)

Alpaca, a South American ruminant allied to the llama whose long, fine wool is woven into a soft dress fabric known by the same name. Sir Titus Salt first manufactured alpaca cloth (1836). Saltaire, near Bradford, remains to evidence the success which for many years attended the enterprise.

Alpha Particle, helium nucleus, composed of 2 neutrons and 2 protons: identified and used by Rutherford as a projectile to bombard other atoms. *See* **F11** (**1**), **62** (1).

Alphabet (so called from the first two letters of the Greek alphabet—alpha, beta) is the term applied to the collection of letters from which the words of a language are made up. It grew out of the knowledge that all words can be expressed by a limited number of sounds arranged in various combinations. The Phœnicians were the first to make use of an alphabetic script derived from an earlier Semitic alphabet (earliest known inscriptions *c.* 1500–950 B.C.) from which all other alphabets have sprung. The stages in the development of the alphabet were mnemonic (memory aids), pictorial (actual pictures), ideographic (symbols), and lastly phonetic. All the ideographic systems died out, with the exception of that of the Chinese.

Alsatia, a district of Whitefriars, London, which was for a long period a recognised sanctuary for debtors and criminals, where they could not be captured. It was abolished in 1697.

Altar, originally a table or elevated place upon which sacrifices were offered up, and in the Christian Church applied to the table on which the eucharist is celebrated. In some Protestant denominations the communion table takes the place of the altar.

Altimeter, an instrument used in aircraft to estimate altitude; its essential feature is an aneroid barometer which registers the decrease of pressure with height. Roughly 1 millibar corresponds to 30 ft. To read an aircraft altimeter correct for its destination, the zero setting must be adjusted for difference of ground height and difference of surface pressure, especially when pressure is falling or when flying towards low pressure.

Altitude, an astronomical term used to signify the angular elevation of a heavenly body; this is measured with a quadrant or sextant. In aeronautics it is the height (in feet or metres) above sea-level.

Alto, the second voice of a male-voice church choir, *i.e.*, below treble and above tenor. The term may also be applied to an instrument to distinguish it from others of similar design but different register: *e.g.*, alto saxophone.

Alto-Relievo, a term applied to sculptured designs which are depicted in prominent relief on a flat surface, technically signifying that the projection exceeds one-half the true proportions of the objects represented. Basso-relievo is carving kept lower than one-half such proportionate projection.

Altruism, a term invented by Comte to denote devotion to the welfare of others, the opposite of Egoism.

Alum is a compound salt used in various industrial processes, especially dyeing, its constituents being the sulphate of one univalent metal or radical (*e.g.*, potassium, sodium, ammonium, rubidium, caesium, silver, thallium) and the sulphate of a tervalent metal (*e.g.*, aluminium, iron, chromium, manganese), and water of crystallisation.

Alumina is the oxide of aluminium. The ruby is almost 100 per cent. alumina; so also are the emerald, oriental amethyst, etc. Hydrated aluminium oxide is bauxite, chief ore of aluminium, from which the metal is extracted electrolytically.

Aluminium is a light metal which conducts electricity well. Its specific gravity at 20° C. is 2·705. Melting point of aluminium is 660·2° C. It is made commercially by electrolysing bauxite dissolved in cryolite (double fluoride of aluminium and sodium). Aluminium alloys because of their strength and lightness are being increasingly used for the construction of railway coaches, automobiles, aeroplanes, etc.

Amadavat, a popular cage bird of the weaver family, mainly crimson with white spots, so named because the first specimens came from Ahmadabad in India about 1700.

Amalgam is the term applied to any alloy of which mercury forms a part.

Amber, a brittle resinous substance; in origin, fossilised resin. Obtained mostly from the Baltic coasts, and used for ornaments, pipe mouth-pieces, etc.

Ambergris is a waxy substance produced in the intestines of the sperm whale, and generally found floating on the sea. Is a valuable perfumery material.

Amblycephalus, a genus of homoptera including the froth-fly, which is destructive in many hop gardens in July and August, sucking the sap from the vine.

Amblyopsis, a species of fish, practically sightless, and with inoperative organs of hearing and feeling, that inhabit the Mammoth Cave of Kentucky. A remarkable illustration of the failure of senses not brought into use.

America's Cup, a prize trophy first offered in 1851 by the Royal Yacht Squadron and open to yachts of all nations. It was won in the first year by the "America," a New York yacht, and has remained on that side of the ocean ever since, despite attempts to recapture it by Lord Dunraven, Sir Thomas Lipton, Mr. T. O. M. Sopwith, and others. Until Sept. 1957, when *Sceptre* of the Royal Yacht Squadron was beaten by *Columbia* of the New York Yacht Club, there had been no race since 1937.

Amethyst, the violet variety of quartz, used as a precious stone, containing traces of manganese, titanium, and iron. The finest coloured specimens come from Brazil and the Urals.

Amice, a linen vestment worn about the neck by Roman and many Anglican priests under the alb when officiating at Mass or Holy Eucharist. Formerly worn on the head by priests and pilgrims.

Amiens, Treaty of, signed by England, France, Spain, and Holland in 1802, brought the War of the French Revolution to an end. Fresh cause of quarrel was soon found, however, and Napoleon resumed the warfare, which only ended with Waterloo.

Amir (**Ameer** or **Emir**), is a title signifying head or chief, applied in Mahommedan countries to princes, chiefs, or rulers. The direct descendants of Mahomet's daughter Fatima were called Emirs. Chiefs of various tribes in Africa and the East have also assumed the title.

Ammeter, an instrument for measuring the current flowing in an electric circuit. A contraction of ampere-meter. (*See* **Ampere.**)

Ammonia, a colourless gaseous compound comprising three atoms of hydrogen to one of nitrogen. Formerly it was made by heating the horns and hoofs of deer, acquiring the name of spirits of hartshorn. The ammonia of commerce is now procured by coal decomposition in the course of gas-making and by direct synthesis. In the very important Haber process of ammonia production by fixation of atmospheric nitrogen, the nitrogen is made to combine with hydrogen and the ammonia so prepared is converted into nitric acid, ammonium nitrate or ammonium sulphate. The Haber process made Germany self-sufficient in nitrates in the first world war, and was afterwards exploited all over the world.

Ammonites, extinct animals related to the squid and the octopus. Many had beautiful coiled shells, and these fossils are found in the Mesozoic rocks, particularly the Lias.

Ammonium, the basic radical of ammonium salts. Composed of one atom of nitrogen and four of hydrogen, it behaves chemically like an atom of a monovalent alkali metal. Ammonium chloride is known as "sal ammoniac." "Sal volatile" is ammonium carbonate.

Amnesty, an act of grace by which a ruler or governing power pardons any body or political offenders. It is usually absolute; but it may be partial, as when it excepts certain specified persons from its operation.

Amœba, a microscopic unicellular animal, *see* **F23** (2).

Amorphous, a term used to indicate the absence of crystalline form in any body or substance.

Ampere, the most commonly used unit of electric current; often abbreviated to "amp." The international ampere is defined as that current which deposits silver at the rate of 0·001118 gram a second when passed through silver nitrate solution. *See* **N13** (**1**).

Amphibia, a class of vertebrate animals divided into four orders: *Caudata*, newts and salamanders; *Salientia*, frogs and toads; *Apoda*, the cæcilians which superficially resemble blue-

grey earthworms; *Stegocephalia*, fossil amphibians whose skeletons occur chiefly in the Carboniferous and Permian rocks. Most amphibians begin life as aquatic tadpoles breathing by gills, later metamorphose into four-legged lung-breathing animals living on land. Other characteristics of amphibia are: cold blood, skin without visible scales, skull articulates with the backbone by two knobs. In evolution the amphibia are intermediate between fish and reptiles. *See* **F24** (2).

Amphioxus *or* **Lancelet**, a primitive vertebrate occurring in sand-banks around British shores and elsewhere.

Amphitheatre, a term first used by the Romans to denote the buildings set apart for gladiatorial and wild beast exhibitions. The most notable was the Colosseum at Rome, part of the remains of which is still standing. There were numerous other amphitheatres in different parts of the Roman Empire, including two or three in Britain. *See* **G26** (1).

Amphora was a large clay vessel used by the Romans for preserving wine, fruit, oil, etc.

Ana, a collection of criticisms, observations, or opinions about a particular person, place or subject. Used as a suffix especially applies to a person's memorable sayings, anecdotes about or publications bearing on, as in *Johnsoniana, Alexandriana, Victoriana.*

Anabaptists, the name given to various Christian sects that came into prominence in Germany, Switzerland, and Holland during the Reformation. They rejected the baptism of infants as unscriptural and insisted on baptising afresh. They practised a primitive communism and regarded true religious reform as involving social reform. Their chief prophet, Thomas Münzer, was executed in 1525, and many of his followers were burnt at the stake. The later Anabaptists, persecuted by both Roman Catholics and Protestants, committed many acts of violence under the cloak of religious zeal, bringing discredit on the whole movement, which was gradually suppressed. The Mennonites (*q.v.*) were an offshoot of the Anabaptists.

Anabasis, Xenophon's narrative of the exploits of Cyrus the Younger against his brother Artaxerxes of Persia, 401 B.C. The title also of Arrian's history of Alexander the Great's expedition to Asia.

Anachronism, an erroneous reference to an event in respect of time, *e.g.*, the description of a railway train journey, say, in the 17th century.

Anagram is a literary exercise which consists in using the letters in a given word or phrase to form a different word or phrase.

Analogy, a method of argument whereby an inference is drawn from one set of facts and applied to another to which it has some resemblance.

Analysis is the process by which a complex thing is reduced or broken up into its original elements. Qualitative analysis reveals the presence of certain substances, quantitative analysis shows those substances in their respective proportions. Analysis as applied to Grammar, Mathematics, and Logic resolves phrases, propositions, and arguments into their separate parts.

Analysts, Public, are chemists appointed by local authorities under the Public Health Acts to analyse all such food and drugs as are submitted to them by inspectors within their own area. Every town of importance has its public analyst, whose work is to protect the public against food adulteration.

Anarchism is a revolutionary doctrine in opposition to all law and order as enforced by a government. The Greek word anarchy means no government, but in modern times it is regarded as a movement towards destroying the tyranny of the State and giving fuller play to natural economic forces and the principle of mutual aid. Proudhon (French) and Bakunin (Russian) were exponents of the philosophy.

Anathema was the Greek term for things dedicated to the gods, and in its modern religious use indicates unreserved offerings to God and sacrifice. The idea of destruction and perdition is a secondary meaning, and anathematisation in the Roman Church is the extreme form of excommunication.

Anchor, an instrument used for keeping ships stationary. Great improvements have been introduced in recent years, stockless anchors being now chiefly used, consisting of a shank and a loose fluke. Lloyds' rules prescribe the number and weight of anchors which must be carried by merchant ships.

Anchorite is a religious person who retires into solitude to employ himself with holy thoughts. Among the early Christians, anchorites were numerous, but in the Western Church they have been few. Their reputation for wisdom and prescience was high, and kings and rulers in old days would visit their cells for counsel. An anchorite or "ankret" was in mediæval times a source of fame and profit to the monastic house within which he was voluntarily immured.

Anchovy, a fish of the herring family, distinguished by its large mouth and projecting snout, plentiful in the Mediterranean and much esteemed when cured.

Ancient Lights are rights of light enjoyed by a property owner over adjoining land. Such a right is obtained either by uninterrupted enjoyment for twenty years, or by written authority, and once legally established cannot be upset, no building being permissible that would seriously interfere with the privilege.

Anemometer, an instrument for measuring the strength of the wind. In the most widely used pattern the rotation, about a vertical axis, of a group of hemispherical or conical cups gives a measure of the total flow of air past the cups, various registering devices being employed. The Dines anemograph provides a continuous record of the variation in both velocity and direction; changes of pressure produced in a horizontal tube, kept pointing into the wind by a vane, cause a float, to which a pen is attached, to rise and fall in sympathy with the gusts and lulls. The recently devised hot-wire anemometer, depending upon the change of electrical resistance experienced by a heated wire when cooled, enables very gentle air currents to be investigated.

Aneroid is the kind of barometer which does not depend upon atmospheric support of a mercury (or other liquid) column. It consists of a metallic box, partially exhausted of air, with a corrugated lid which moves with atmospheric changes. A lever system magnifies the lid movements about 200 times and atmospheric pressure is read from a dial. The construction of the vacuum chamber provides automatic compensation for temperature changes. An aneroid barometer is the basic component of an altimeter.

Angel, or **angel-noble**, an English gold coin which bore a representation of the archangel Michael in conflict with a dragon. The last English noble was coined in the reign of Charles I.

Angelica, an aromatic plant of the Umbelliferæ order, *Angelica officinalis*, valuable as a flavouring and possessing medicinal properties. In olden times supposed to ward off evil fortune.

Angels, divine messengers or agents communicating with or guarding human beings, a conception which is included in the Christian and other doctrines; and in former times, particularly in Western Christendom, special functions were accorded to certain angels and archangels, and their intercession was constantly appealed to.

Angelus, a church bell rung in Roman Catholic countries, at morn, noon, and sunset, to remind the faithful to say their Angelic Salutation.

Angevin Dynasty includes the Plantagenet kings from Henry II. to Richard II. The name was derived from Henry II.'s father, Geoffrey, Count of Anjou.

Angiosperms are plants whose seeds are contained in an ovary, as distinct from Gymnosperms, the seeds of which are naked. These two divisions make up the Phanerogams or Spermaphytes ("seed-bearing plants"). The Angiosperms are the true flowering plants, which number over 200,000 species. *See* **F29** (2).

Angle, a term used to denote the inclination to each other of two straight or curvilinear lines. Angles are measured by the degrees of the circumference of a circle, which is divided into 360 equal parts, the angles formed by the lines radiating from the centre being proportioned to the area of the circumference which the lines intercept. A right angle is one of 90°.

Angles, a northern tribe originally settled in

Schleswig, who with the Saxons and Jutes invaded Britain in the 5th century.

Anglican Communion comprises all the Churches in communion with the Church of England (*i.e.*, the ecclesiastical Provinces of Canterbury and York), including the Protestant Episcopal Church in the United States of America (8 Provinces). The Anglican Communion includes also the Church of Ireland (2 Provinces); the Church in Wales; the Episcopal Church in Scotland; the Church of India, Pakistan, Burma, and Ceylon; the Church of the Province of South Africa; the Church of England in Canada (4 Provinces); the Church of England in Australia and Tasmania (4 Provinces and 3 extra-Provincial Dioceses); the Church of the Province of New Zealand; the Church of the Province of the West Indies; the Chung Hua Sheng Kung Hui (Holy Catholic Church in China); the Nippon Sei Ko Kwai (Japan Holy Catholic Church); and the Church of the Prov. of W. Africa. All these Churches are completely autonomous save for the special provisions of the Establishment in England. In addition, there are some 21 separate dioceses scattered through the world, which are directly under the Archbishop of Canterbury. All the bishops of the Anglican Communion meet every ten years in the Lambeth Conference (last held in 1958), over which the Archbishop of Canterbury by custom presides as *primus inter pares*. The Conference has no legislative power, but in practice exercises enormous influence. In between these Conferences it is proposed to hold an Anglican Congress (including clergy and laity as well as bishops) and the first of these met in Minneapolis, Minnesota, in Aug. 1954.

Angstrom, a unit of length (formerly Angstrom unit) equal to one-hundredth of a millionth of a centimetre (10^{-8} cm.), used in measuring the wavelength of light, X-rays, etc.

Aniline, a well-known product derived from coal-tar. The name recalls the fact that it was first prepared by distilling indigo (*anil* is Portuguese for indigo). In 1856 W. H. Perkin (1838–1907) discovered the first aniline or coal-tar dye, mauve, and thus founded the modern dyestuff industry.

Animal Kingdom. The realm of living things is divided into the plant and animal kingdoms, whose members obtain energy by fundamentally different methods, although it is often difficult to say to which kingdom certain lowly organisms belong. The animal kingdom is itself divided into a number of major groups (phyla), the largest of which are: *Protozoa*, minute organisms with cellular organisation such as amœba; *Coelenterata*, including sea-anemones, jelly-fish, and corals; *Annelida*, of which the best-known example is the earthworm; *Arthropoda*, a very large group comprising insects, lobsters, spiders, etc.; *Mollusca*, including the snail, the oyster, the octopus, etc.; *Echinodermata*, starfish and sea-urchins; *Chordata*, animals possessing at some stage an organ called a notochord. The Chordata are further divided into two unequal groups: *Acraniata*, comprising such animals as the lancelet and the sea-squirt; *Craniata*, including all the animals usually known as "vertebrates" because they possess a backbone. All the other phyla, and the acraniata, may be grouped under the title "invertebrates." There are five classes of vertebrate animals: *Pisces*, fish: *Amphibia*, animals which, while breathing air, are not entirely independent of water—such as the frog; *Reptilia*, snakes, lizards, tortoises, etc.; *Aves*, birds; *Mammalia*, vertebrates which suckle their young. *See* **F23–25.**

Anise, an umbelliferous plant growing mostly in warm climates, and valued for its fruit, aniseed, possessing certain medicinal properties and yielding a volatile oil. Highly aromatic and used as a condiment for pickles and soups.

Anna, an Indian coin, one-sixteenth of a rupee.

Annals, or historical records, were kept by the Romans from an early period. In modern times the term is used to designate any general record of events arranged according to years.

Annates were acknowledgments formerly paid to the Pope by way of fee or tax in respect of ecclesiastical preferment, and consisted usually of a proportion of the income ("first-fruits") of the office. Introduced into England in the 13th century; annexed to the Crown under Henry VIII.; transferred to a perpetual fund for the benefit of the poorer clergy in 1704. (*See* **Queen Anne's Bounty.**)

"Annual Register," a yearly record of political and literary events, founded by Edmund Burke (as editor) in 1759 and Robert Dorsley, the bookseller.

Annunciation, Feast of the (March 25), is a church festival commemorating the message of the incarnation of Christ brought by the angel Gabriel to the Virgin Mary, hence the title Lady Day.

Anointing is the pouring of consecrated oil upon the body as a mark of supreme honour. In England it is restricted chiefly to the ceremony of the monarch's coronation, and the spoon with which the oil is applied forms part of the English regalia. In the Roman Catholic Church anointing represents the sacrament of extreme unction.

Ant. There are about 6,000 species of ants, which belong to the same order (Hymenoptera) as the bees, wasps, and ichneumon flies. They are social in habit, living in communities of varying size and development. There are three basic castes in ants—the females or *queens*, the *males*, and the *workers* (the last-named being neuter), although specialised forms of workers are sometimes found, *e.g.*, the *soldiers* of the harvesting ants. In the communities of those species of ants which evolved most recently there is a highly complex social life and well-developed division of labour. Some species of these ants make slaves of other species, stealing the cocoons before the adult forms emerge. Many ants "milk" greenflies, which they protect for their honey-like secretion, and most ants' nests contain many "guests," such as beetles and silver fish. Some ants harvest grains of corn, and others, from S. America, live on fungi which they cultivate in underground "mushroom beds."

Antarctic Exploration. In earlier centuries it was thought that a great continent must exist in the southern hemisphere, around the South Pole, to balance the known land masses in the north. Its supposed extent was greatly reduced in the 18th century, particularly when Capt. Cook sailed for the first time south of the Antarctic Circle and reached the edge of the ice pack. A portion of the ice-covered continent—the coast of Graham Land—was first sighted by Lieut. Edward Bransfield in 1820. Explorers of several other nations sighted portions of the coast-line in other quarters, but the first extensive exploration was made by Capt. James Clarke Ross, who with the *Erebus* and *Terror* penetrated into the Ross Sea in 1841, and discovered the great Ross Ice Barrier in 78° South lat. Interest in the Antarctic did not revive until after 1890, when an international scheme of research was drawn up. A Norwegian, C. E. Borchgrevink, in 1898–1900, was the first to winter in the Antarctic and to travel on the ice barrier. The British share in this work was carried out by Capt. R. F. Scott's expedition in the *Discovery*, 1901–4. Scott's party sledged across the barrier to 82° 17′ South, then a record "farthest south." A little later, Ernest Shackleton beat this by travelling to within 100 miles of the South Pole. In 1910 Scott organised his second expedition of the *Terra Nova*, and became engaged against his will in a "race for the Pole," when, after his departure, the Norwegian Arctic explorer, Roald Amundsen, suddenly announced that he was sailing for the Antarctic. Amundsen set up his base at the eastern end of the Barrier, and, relying on dog teams for hauling his sledges, reached the Pole on December 14, 1911. Meanwhile Scott and his party, their start delayed by adverse weather, were marching southwards, man-hauling their sledges, for Scott was against the use of dogs. After an arduous journey they reached the Pole one month after Amundsen. The return was a struggle against the weather and increasing weakness, probably due to scurvy, until at last they perished within a few miles of their base. After the First World War the development of the whaling industry greatly stimulated further exploration. Outstanding expeditions included that of Admiral R. E.

Byrd, 1929, when he flew over the South Pole; The British Graham Land expedition, 1934, which carried out the first extensive mapping of any part of the Antarctic continent; and the U.S. Navy's Antarctic Expedition of 1940, when the whole continent was circumnavigated and great areas photographed from the air. In recent years valuable work has been done by the first International expedition, the Norwegian–British–Swedish Expedition to Queen Maud Land, and by the French in Adélie Land. The Falkland Island Dependencies Survey, set up during the war, has continued the scientific exploration of Graham Land. The Antarctic was the scene of high adventure during the International Geophysical Year (1957–58), when scientists from many countries participated in the explorations. The Commonwealth Trans-Antarctic Expedition set out from opposite sides of the continent and met at the South Pole, the U.K. party, led by Sir Vivian Fuchs, from the Falklands, and Sir Edmund Hillary and his party from New Zealand. The U.K. party accomplished the first crossing of the White Continent in 99 days. Their scientific work included the making of seismic and complementary gravimetric studies at frequent intervals along the 2,200-mile traverse. Since the Antarctic is becoming important for many reasons, in weather forecasting, in the whaling industry, and as a possible centre for world air routes, the tempo of exploration and research will become even faster in the future. *See also* **C21** (1).

Anteater. There are two families of anteaters, the Myrmecophagidae and the Manidae. Among the former the Great Anteater (*Myrmecophaga jubita*) is the largest species, about 18 ft. in length, occurring in Central and S. America. Only half its size is the lesser Anteater (*Tamandua tetradactyla*); this is found in forests of tropical America and Trinidad. The Two-toed Anteater (*Cyclopes didactylus*) belongs to northern, South and Central America, and Trinidad. These three animals live almost entirely on ants; they are adapted to this diet, having large claws for digging out ants, and a tubular mouth with a long sticky tongue. The Manidae are the Scaly Anteaters or Pangolins, widely distributed over Africa and the Orient. The difference between the two families is that the first has hair covering the body, the latter has horny scales instead.

Antelope, a large zoological genus of mammalia, mainly deer-like and elegant animals, with lustrous eyes; fleet of foot, and widely distributed.

Antennæ, paired feelers of insects and crustaceans. In radio, the term "antenna" is equivalent to "aerial."

Anthem, a choral composition, with or without instrumental accompaniment, usually sung after the third collect in the Church of England service. The words are from the Scriptures, and the composition may be for solo voices only, for full choir, or for both. Among the chief British composers of anthems are Tallis, Purcell, Croft, Boyce, Goss, and Stainer.

Anthracite is the hardest kind of coal which burns with little smoke and is used for steam-raising as a domestic fuel; contains 90–94 per cent. carbon as against 75–90 per cent. in bituminous coals. Pennsylvania and S. Wales are the largest anthracite coal regions of the world.

Anthropoid, meaning "resembling man," is the term applied to apes whose structure has most similarity to that of man, in particular the apes belonging to the family Simiidæ, which includes the gibbon, chimpanzee, orang-utan, and gorilla.

Antiburghers, a Scottish sect which declined to take the oath required of burgesses in several towns. The Secession Church was split in 1747 and the antiburghers formed the "General Associate Synod," commonly called the Antiburgher Kirk. The abolition of the burgess oath led to a reunion in 1820 under the name of the "United Secession Church."

Anti-Christ, the enemy of Christ, by whom he is finally to be slain. Many legends connected with Anti-Christ were popular in the Middle Ages.

Anticyclone, a region where barometric pressure is greater than that of its surroundings. Such a system is distinguished on weather charts by a pattern of isobars, usually circular or oval-shaped, enclosing the centre of high pressure where the air is calm. In the remaining areas light or moderately strong winds blow spirally outwards, in a clockwise direction in the Northern Hemisphere (and in the reverse direction in the Southern Hemisphere), in accordance with Buy's Ballot's law (an observer with back to wind in Northern Hemisphere has lower pressure to left; in Southern to right). Over the British Isles anticyclonic weather is generally quiet and settled, being fair, warm, and sunny in summer and either very cold and often foggy or overcast and gloomy in winter. These systems move slowly and sometimes remain practically stationary for days at a time, that over Siberia being particularly well defined. Extensive belts of almost permanent anticyclones occur in latitudes 30° N. and 30° S.

Antilegomena, the books of the New Testament which were not accepted as canonical by the early Christian churches, though afterwards admitted to equal authority with the rest. These were: The Epistle to the Hebrews, the Epistle of St. James, the Second Epistle of St. Peter, the Second and Third Epistles of John, the Epistle of St. Jude, and the Apocalypse or Revelation of St. John.

Antimony, a crystalline metal of great brittleness. On being burned, it gives off dense fumes of oxide of antimony. By itself it is not of special utility; but as an alloy for hardening other metals, it is much used. As an alloy with lead for type-metal, and with tin and, copper or zinc for Britannia-metal, it is of great value. Most important antimony ore is stibnite (antimony sulphide).

Antinomian, name applied to one who believes that Christians are not bound to observe the "law of God" on the pretext that faith alone is sufficient to secure salvation. The term was first used during the Reformation by Luther.

Anti-Pope, one chosen by temporal authority in opposition to one canonically elected by the cardinals; commonly applied to the popes Urban VI. and Clement VII., who resided at Avignon during the Great Schism (1378–1417).

Anti-proton, the "negative proton," an atomic particle created in high energy collisions of nuclear particles. Its existence was confirmed in Oct. 1955. *See* **F12** (1), **13**.

Anti-Semitism. The persecution of the Jews had its origin at the beginning of the Christian era, and was, until the 19th century, largely conditioned by religious hatred. With the rise of Liberalism in Europe however, the emergence of the so-called "Jewish Problem" became a political weapon in the hands of reactionary groups and heads of States. Bismarck admitted he found it "a most useful means of attacking the progressives", and the pogroms under the Czars afforded means of diverting attention from State reforms. In France in the '90s a Jew gave his name to one of the most bitter political feuds that has occurred in any country (Dreyfus case), but the Germany of Hitler saw the transformation of racial prejudice into a main policy of State, with its attendant unprecedented persecutions.

Antlers are the branched horns of deer, the branches being called tines. Antlers originate as outgrowths of the frontal bone, and are usually shed once a year. Except in the reindeer and caribou they are restricted to the male.

Apartheid, an Afrikaans word meaning "a state of separateness," the policy of racial segregation pursued by the United Party under Hertzog and Smuts from 1934 onwards and with increasing intensity since 1948 by the Nationalist Party under Malan, Strydom and Verwoerd. In practice, it means the supremacy of the white man and the exploitation of and denial of democratic rights to the non-whites.

Ape, a term applied to the gorilla, chimpanzee, orang-utan, and gibbon—the anthropoid apes.

Aphelion, the point in the orbit of a planet farthest from the sun; the opposite of perihelion.

Aphids, green-flies or plant lice, a numerous species of destructive insects living on roots, leaves and plants. Parthenogenesis (virgin reproduction) is common among them.

Apis, the sacred bull worshipped by the ancient Egyptians; also the scientific name for the bee.

Apocalyptic writings are those which deal with revelation and prophecy, more especially the Revelation of St. John.

Apocrypha (hidden writings), the books which were included in the Septuagint (Greek) and Vulgate (Latin) versions of the Old Testament but excluded from the sacred canon at the Reformation by the Protestants on the grounds that they were not originally written in Hebrew nor regarded as genuine by the Jews. The books include: 1 and 2 Esdras, Tobit, Judith, additions to Esther, Wisdom of Solomon, Ecclesiasticus, Baruch, Song of the Three Holy Children, History of Susannah, Bel and the Dragon, Prayer of Manasses, 1 and 2 Maccabees. The term is usually applied to the additions to the old Testament, but there are also numerous Christian writings of the same character.

Apogee, meaning the greatest distance of the earth from any heavenly body, but restricted to the sun and moon. The sun's apogee corresponds to the earth's aphelion, and the moon's apogee is the point in its orbit most remote from the earth. *See* **Perigee.**

Apollinarians, followers of Apollinaris, Bishop of Laodicea, who lived in the 4th century, and denied the humanity of Christ. In opposition to Arianism. Condemned as heretics.

Apostasy is a revolt, by an individual or party, from one form of opinions or doctrine to another. Julian, the Roman Emperor (331–63), brought up as a Christian, became converted to paganism and on coming to the throne (361), proclaimed religious toleration. Hence his name, Julian the Apostate.

Apostles. The twelve apostles who were disciples of Jesus were: Simon, Peter, Andrew (his brother), James and John (sons of Zebedee), Philip, Bartholomew, Thomas, Matthew, James, Thaddaeus, Simon, and Judas Iscariot. After the Ascension Matthias was chosen to take the place of Judas. St. Paul is always referred to as the chief apostle, though he is not one of the twelve. St. Barnabas has also been called an apostle.

Apostles' Creed, applied to the most ancient of the Church's statements of its belief: "I believe in God the Father Almighty; and in Jesus Christ his only Son our Lord, who was born of the Holy Ghost and the Virgin Mary. . . ." A later version is used in the Church of England at morning and evening prayer.

Apostolic Council, held at Jerusalem, about A.D. 50, presided over by James, to decide what the obligations of Christians were to the Mosaic law.

Apostolic Fathers were the immediate disciples or followers of the Apostles, especially such as have left writings behind them, including Barnabas, Clement, Hermas, Ignatius, Polycarp, etc.

Apostolic Succession is the derivation of holy orders by an unbroken chain from the Apostles, and the succession of the ministry to the powers and privileges of the Apostles.

Apotheosis was the Greek term for the inclusion of a mortal among the Gods. Divine honours were accorded to Julius Cæsar and Augustus.

Apparitions, ghosts, phantoms, spectres, regarded by modern authorities as hallucinations of telepathic origin. (*See* **Telepathy.**)

Appeasement Policy. The name of the policy during 1937 and 1938 of yielding to the demands of Hitler and Mussolini in the hope that a point would be reached when the dictators would co-operate in the maintenance of peace. The policy culminated in the Munich Agreement (which was the subject of much criticism) after a series of concessions including the recognition of the Italian conquest of Abyssinia and the German annexation of Austria. The policy was finally demonstrated as futile when Hitler seized Czechoslovakia in March 1939.

Appian Way, the oldest and finest of the Roman roads originally laid by Appius Claudius (312 B.C.) from Rome to Capua and thence to Brundisium (Brindisi).

Approved Schools *or* **Home Office Schools** are residential schools for the training of children and young persons who, because of bad environment or parental neglect, are guilty of offences or in need of care and protection and have been sent to them by magistrates from juvenile or other courts. A pupil who refuses to submit to discipline may be sent to a Borstal institution.

April, the fourth month of the year, from the Roman *Aprilis* derived from *aperire* "to open"—the period when the buds begin to open.

Apse is a semicircular recess at the east end of the choir or chancel of early churches, and vaulted over.

Aquatint is a method of etching on copper, by which imitations of drawings in water-colours, Indian ink, bistre, and sepia are produced.

Aqueducts are conduits in which water flows or is conveyed from its source to the place where it is to be used. Most famous builders were the Romans and the oldest Roman aqueduct was the Aqua Appia, which dates from about 310 B.C. Among modern aqueducts may be mentioned that of Glasgow, which brings water to that city from Loch Katrine; that of Manchester, which taps Thirlmere; that of Liverpool, with Lake Vyrnwy in North Wales as its source, and the Fron Aqueduct, Radnorshire which carries water from the Elan Valley to Birmingham.

Arabesque, the term applied to the elaborate decorations introduced into Europe by the Spanish Moors. The arabesques of the Vatican galleries, by Raphael, form a splendid example.

Arabian Nights, a collection of fascinating tales of the Orient, of mixed Indian, Persian, Arabic, and Egyptian origination, and first made known in Europe by Antoine Galland, a French Oriental scholar whose original translation was called *The Thousand and One Nights*. *See* **G32 (1).**

Arabic Numerals, consisting of the characters, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, had their roots in India, whence they passed to Baghdad in the second half of the 8th century and were introduced by way of Spain to Europe in the 12th century, taking the place of the Roman numerals.

Aragonite, a mineral consisting of carbonate of lime in a crystalline form, sometimes found pure and sometimes mixed with other metals in minute quantities. Crumbles to powder under heat.

Aramaic Languages, the Semitic dialects current in Mesopotamia and the regions extending south-west from the Euphrates to Palestine from about the 12th century B.C. until after the rise of Islam, when Aramaic was superseded by Arabic. Both Aramaic and Greek were spoken in Palestine during the time of Christ.

Arbalast, a steel crossbow set in a shaft of wood and worked with a trigger, introduced by the Normans.

Arcadia, a district of Peloponnesus (Morea) whose inhabitants in the days of the Pelasgians were of extreme simplicity, and the term has ever since been used to denote an idealised country of happy, natural beings.

Archaeopteryx, a fossil bird providing a connecting link between reptiles and birds. Reptilian features are: teeth in the jaws, a long lizard-like tail and claws to the fingers. The beast was clad in feathers, not scales. The first specimen, found in 1861, in the Solenhofen limestone of Bavaria, is in London's Natural History Museum. *See also* **F22 (2).**

Archbishop, the chief of the bishops of an ecclesiastical province in the Greek, Roman, and Anglican churches. In the Church of England there are two archbishops, the Archbishop of Canterbury, called the Primate of *all* England, and the Archbishop of York, styled the Primate of England.

Archimedes' Principle. When a body is weighed in air and then in any fluid, the apparent loss in weight is equal to the weight of fluid displaced. This scientific fact was noted by the Syracusan philosopher Archimedes (287–212 B.C.).

Architecture, the art and science of building. The provision of shelter for mankind by the orderly arrangement of materials in a manner which expresses man's attitude to living. The forms which buildings take are the outcome of the function for which they are to be used, of the architect's æsthetic sensibility and of the structural method adopted. Until the last hundred years structural methods were limited to timber frames, and columns, lintels, load-bearing walls, arches, vaults, and domes in brick or stone. From these few basic elements have evolved the great variety of historic styles of building to be found throughout the world. To give but one

example, the Greeks created those systems of decorated columns and beams, known as the Orders, which were adapted by the Romans, revived decoratively rather than structurally during the Renaissance and are still used in debased form on the more presumptuous type of modern building. In recent years, however, architecture has taken on a new meaning. Once confined to the rich, in the form of Church, State, or Commerce, it is now, with the coming of democracy, recognised as an essential social service for all. This, and the development of new structural techniques and materials (steel, aluminium, sheet glass, reinforced concrete, plastics, and plywoods, to name a few), have made the interest in historic styles, the mainstay of the older architect, of secondary importance. Modern architecture is the creation of buildings with the highest possible standards of functional performance in terms of efficient planning and structure, good artificial and natural lighting, adequate heating or cooling, and proper acoustic conditions consistent with the price the client can afford to pay. At the same time the architect's task is to design a structure, and the spaces the structure delimits, internally and externally, which are æsthetically stimulating and satisfying, and well related to the land and buildings around. *See* section G. for historical development.

Arctic Exploration. Modern exploration of the Arctic begins in the 16th century, when men sought to reach the East Indies by sailing through the Arctic to the Pacific Ocean. The North-east Passage, via the shores of northern Asia, was the first attempted. In 1553 and 1554 the English navigators Sir Richard Chancellor and Stephen Burrough sailed into the White Sea, but were prevented by storms and ice from advancing farther eastwards. The project was later revived by the Dutch; Barendts in 1594 discovered Spitsbergen, but also failed to get beyond Novaya Zemlya. It was not, in fact, until 1879 that the Swede, A. E. Nordenskiöld, in the *Vega*, succeeded in reaching the Pacific. The attempts to find a North-west Passage were more numerous and determined. In 1585 John Davis penetrated Davis Strait and coasted along Baffin Island. Hopes ran high when Henry Hudson discovered Hudson Bay in 1610, but a practicable passage continued to elude explorers. The problem was to find a navigable route through the maze of channels in the short summer season, and to avoid being frozen in with supplies exhausted. After the Napoleonic Wars the Admiralty sent out many naval expeditions which culminated in Sir John Franklin's expedition with the *Erebus* and *Terror* in 1845. The ships were beset by ice in Victoria Channel and, after Franklin's death, were abandoned by their crews, who perished from scurvy and starvation on their march southwards. To ascertain their fate, several further expeditions were despatched, and the crew of the *Investigator*, commanded by R. J. M'Clure, sailing eastwards from Bering Strait, were the first to make the Passage, though in doing so they were obliged to abandon their ship. It was thirty years before the Norwegian, Roald Amundsen, succeeded in sailing the *Gjoa* from east to west. In the meantime, the North Pole had become the goal of explorers. Nansen, in 1893, put the *Fram* into the ice-pack to drift across the Polar basin, and himself made an unsuccessful attempt on the Pole across the pack. This was eventually achieved by the American explorer Robert E. Peary, who after several expeditions in the North Greenland region, sledged to the Pole with Eskimo companions in 1909. The next phase was the employment of airships and aeroplanes in Arctic exploration. In 1926 Admiral Byrd made the first flight over the Pole, and in the same year Amundsen and Lincoln Ellsworth flew the airship *Norge* from Spitsbergen to Point Barrow, Alaska. Two years later, the *Italia*, commanded by the Italian, Nobile, was wrecked on a return flight from the Pole, and Amundsen lost his life in an attempt to rescue the survivors. With modern developments in aircraft and navigation, flights over the Polar basin are almost a routine matter, and passenger flights between Europe and America via northern Greenland are being pioneered. The first voyage under the North Pole was made in August 1958 by the American nuclear-powered submarine *Nautilus*.

Arenacious Rocks, the rocks composed of grains of sand, chiefly sandstones; quartz and felspar being the most abundant minerals in these rocks.

Argillaceous Rocks are a sedimentary group, including the shales and clays.

Argon, a chemical element discovered by Rayleigh and Ramsay in 1894 in air. Argon is used for filling gas-filled metal filament electric lamps. In gas discharge tube it glows brightly, as does neon, but the colour of the discharge is blue instead of red.

Aria, a song consisting of a first part, a second part, and a repetition of the first part. Songs of this type commonly occur in 18th-century operas and oratorios. The term has been loosely extended to cover airs rendered solo by principal characters in opera.

Arianism, so called after Arius of Alexandria, who denied Christ's divinity. The doctrine was condemned at the Councils of Nicæa (325) and Constantinople (381).

Aries, the Ram, the first of the signs of the Zodiac.

Arithmetic, the branch of mathematics that deals with numerical calculations as in counting, measuring, weighing. The early civilisations used simple arithmetic for commercial purposes, employing symbols and later letters of the alphabet as numerals. When Hindu-Arabic numerals replaced Roman numerals in the Middle Ages it meant a great step forward and led to rapid developments—the invention of logarithms, slide-rule, calculating machines.

Ark of the Covenant was the sacred chest, overlaid with gold, which occupied the inner sanctum of the Temple, and symbolised God's covenant with his people.

Armada, Spanish, the naval expedition fitted out by Phillip II. of Spain in 1588 against England, commanded by the Duke of Medina Sidonia. It comprised 129 ships, was manned by 8,000 sailors and carried 19,000 soldiers and more than 2,000 cannon. Against this formidable force Elizabeth had only 80 ships, manned by 9,000 sailors, under Lord Howard of Effingham, under whom served Drake, Hawkins, and Frobisher. The British Fleet awaited the Armada off Plymouth, and at Tilbury there was a considerable defensive land force under the command of the Earl of Leicester. On July 19 the ships of the Armada were sighted off the Lizard, disposed in a crescent seven miles long from horn to horn. The excellent manœuvring of the English, their fire-ships, and a gale from the N.W. combined so effectively to cripple the Spanish ships that the Armada was scattered in confusion, a very small remnant contriving to reach home via the North of Scotland. It was impossible to embark the army of Parma waiting in the Netherlands. Elizabeth had a medal struck bearing in Latin the inscription, "God blew, and they were scattered."

Armadillo, a genus of animals related to the sloths and anteaters, belonging to South America, and carrying a hard bony covering over the back, under which the animal can completely conceal itself when attacked, rolling itself up like a hedgehog.

Armageddon, according to the Revelation of St. John, the great battle in which the last conflict between good and evil is to be fought.

Armillary Sphere, an early form of astronomical apparatus with a number of circles representing equator, meridian, ecliptic, etc. Used by Hipparchus and Ptolemy and up to the time of Tycho Brahe for determining the position of the stars.

Arminianism, the doctrine of Arminius, originally Jakob Harmensen (1560–1609) of Holland, a devout Christian who opposed Calvinism and the doctrine of predestination. In England a modified Arminianism became the theology of Wesleyan Methodism.

Army. Sweeping changes in Britain's defence policy were announced in 1957 involving reorganisation of the Army and affecting the regimental system. There is to be no further call-up under the National Service Acts after the end of 1960. The effect of this reorganisa-

tion was to reduce the strength of the Army to about 180,000 by 1962 and (by amalgamation) the number of regiments of infantry of the line from 64 to 49.

Arpeggio, a chord whose notes are played in ascending or descending sequence, as on a harp.

Arsenic, a metallic element, of a crystalline and brittle nature, usually met with as a constituent of other minerals, sometimes by itself. Its compounds are very poisonous. Lead arsenate is a powerful insecticide used for spraying fruit trees.

Artesian Wells take their name from Artois in France, where the first wells of this kind were constructed in 1126. They are to be found only when a water-bearing bed is sandwiched between two impervious beds. When a boring is made to the lower part of the bed, the pressure of water is sufficient to cause the water to overflow at the surface. Artesian wells were known to ancient Egypt and China, and have existed in the Sahara since the earliest times. The fountains in Trafalgar Square are fed by artesian wells sunk through the London clay into the chalk about 400 ft.

Arthur's Seat, a hill of volcanic origin, 823 ft. high, dominating Holyrood Park, to the south-east of Edinburgh.

Articles. The *Six Articles* are those contained in an Act of Henry VIII. and were of Roman Catholic origin. The *Thirty-Nine Articles* drawn up in 1563 comprise the doctrines of the Anglican Established Church, and must be subscribed to by all taking holy orders therein.

Arts Council of Great Britain. Founded during the war to assist in maintaining the art of the theatre. With a sum allotted by the Treasury, the Council supported small companies which would have been forced to close by war conditions. As a result companies presented plays by Shakespeare, Ibsen and Shaw in rural and industrial areas which had never been visited by actors. Moreover, the Theatre Royal, Bristol, one of the oldest and most beautiful playhouses in the country, was saved. Parliament made a grant-in-aid of £1·5 million to the Arts Council for the year 1960–61 to foster opera, ballet, music, drama, painting and poetry.

Arum, a genus of plants of the Araceæ order, of which there is but one British species, the wake-robin or cuckoo-pint, sometimes also styled "Lords and Ladies." Its pointed leaves and spikes of scarlet berries are familiar hedgerow objects. The latter are poisonous. The starch in the tuber was formerly used as food under the name "Portland arrowroot."

Arundel Marbles, a collection of ancient Greek sculptures formed by Thomas Howard, Earl of Arundel, in the 17th century and presented to Oxford University by his grandson, Henry Howard, who became Duke of Norfolk.

Aryan is a term used to denote the lingual and ethnological groups otherwise known as Indo-European or Indo-Germanic. Comprises two branches, Western or European, and Eastern or Armenian. The Aryan languages show common origin by their vocabulary, syntax, and inflexions. The word *Aryan*, derived from the Sanskrit, means an "honourable lord of the soil"; the nearest to the parent tongue is Sanskrit, and the chief divisions in Europe are the Teutonic, Romance, Slav, and Celtic. The Turks, Magyars, Basques, and Finns are non-Aryan. The common ancestors of the Aryan group dwelt among the Pamirs at a period of remote antiquity.

Asafœtida, an evil-smelling gum resin exuded from the stem and roots of the *Ferula* genus found in Persia and Afghanistan. As a drug formerly used by doctors to help cure hysteria.

Asbestos, a fibrous mineral which is fireproof. Mined in Canada, S. Africa, S. Rhodesia, U.S.A., Swaziland, U.S.S.R., Cyprus, France, Italy. Woven into fireproof garments for firemen, gloves for furnacemen. Used for lagging steam pipes and boilers. Asbestos board is used in the building trade.

Ascension Day, or Holy Thursday, is the 40th day after Easter.

Asceticism was originally the term applied to the training undergone by Greek athletes. The Stoics and others used it to express the mastering of the passions. The idea passed into Christianity, and from celibacy and abstinence it was carried to extreme lengths in the way of self-mutilation and even torture. Monasticism was one of its manifestations.

Ascot Races are an annual fashionable function dating from 1711 and taking place on Ascot Heath, only six miles from Windsor, in June. Have always had royal patronage. The course is nearly two miles long.

Asdic, echo-sounding instrument, used in ships to detect underwater objects, for instance, U-boats, wrecks, shoals of fish, etc.

Ash, a familiar deciduous tree of the genus *Fraxinus*, of over 60 species, native to North-temperate regions. The ash held an important place in Norse mythology, as it was supposed to support the heavens with its roots in Hell. The species native to Britain, and to Europe, is *F. excelsior*, a tall tree with compound leaves, greenish flowers, winged seeds, and black buds in winter. It is a valuable timber tree, tough and elastic, and largely used for wheels and handles. The rowan is known as "mountain ash," but its only resemblance to the ash is in the shape of its leaves. *F. pendula* or weeping ash is a weeping strain which makes an ideal natural summer house.

Ashburton Treaty was signed between Great Britain and the United States in 1842 and settled the north-east boundary dispute by a compromise line between Maine and Canada.

Ashes, The, the symbol which distinguishes the winning cricket team in the Australian Test Matches. In 1882 the Australians won at the Oval by 7 runs. After the match the following epitaph appeared in the *Sporting Times*: "In affectionate remembrance of English Cricket which died at the Oval on Aug. 29, 1882, deeply lamented by a large circle of sorrowing friends and acquaintances. R.I.P. NB. The body will be cremated and the ashes taken to Australia." When the English Eleven went to Australia the same winter it was said that they had come to recover the "ashes." England won two out of three matches, and after the third match the ashes of what is now generally believed to have been a stump were presented in an urn to Ivo Bligh, later Lord Darnley. He bequeathed the urn to the M.C.C., and it now stands in the Memorial Gallery at Lord's.

Ash Wednesday, first day of Lent, on which ashes are sprinkled on the head as sign of penitence under an injunction of Pope Gregory the Great in the 6th century.

Asmodeus, a demon whose story appears in the apocryphal book of Tobit, and figures frequently in Jewish traditions. Asmodeus is the supernatural figure in Le Sage's *Le Diable boiteux*.

Asp, a small poisonous snake, often mentioned in ancient literature and traditionally supposed to have been used by Cleopatra in killing herself. Probably the Egyptian Horned Viper (*Cerastes*).

Asphalt is the name given to a variety of bituminous substances that (1) occur naturally or (2) from the residue after petroleum distillation. Is largely used, mixed with sand, granite chips, etc., for making road surfaces. It was used in Mesopotamia some 5,000 years ago as a mortar for brickwork and for damp-courses to baths. Rock asphalt is obtained from mines in Switzerland, France, Sicily, and Germany, and lake asphalt is obtained commercially from the famous lake in Trinidad.

Assassination, treacherous murder for political ends, usually of a ruler or distinguished person. Among the most famous assassinations of history were: Julius Cæsar, 44 B.C.; Thomas à Becket, 1170; David Rizzio, 1566; William the Silent, 1584; Henry IV. of France, 1610; Jean Paul Marat, 1793; Abraham Lincoln, 1865; Alexander II. of Russia, 1881; Archduke Francis Ferdinand of Austria, 1914; Dr. Dollfuss, 1934; King Alexander of Yugoslavia, 1934; Mahatma Gandhi, 1948; King Abdullah of Jordan, 1951; Liaquat Ali Khan, 1951; King Feisal of Iraq, 1958; Mr. Bandaranaike, 1959.

Assumption of the Virgin. The Roman Catholic belief, that the Blessed Virgin ascended bodily to heaven after her death, was proclaimed by the Pope towards the end of 1950. It is now, therefore, binding on all Catholics under pain of anathema and the guilt of mortal sin. Protestants are liable to make the mistake of

supposing that such dogmas are new additions to the faith invented by the Pope of the moment. According to Catholic doctrine, no addition can be made to the "faith once delivered to the saints," and every dogma is justified by reference to Bible texts and the traditions of the Church. Both Eastern and Western Churches have been permitted to believe in the Assumption of the Virgin for over a thousand years, and the new dogma merely clarifies the old belief and makes it binding on the faithful.

Asteroids were unknown until the discovery of Ceres by Piazzi in 1801. More than 1,500 have been recognised and many more are believed to exist; since 1891 their paths have been identified by exposed photographic plates. Most of these planetoids or minor planets are mere celestial footballs, the majority having a diameter of well under 50 miles. Ceres, with a diameter of *c.* 480 m. is the largest, then there are Pallas (*c.* 304 m.), Juno (120 m.), Vesta (240 m.), Astraea, Adonis, Hermes, Hidalgo, Eros, Amor, Apollo, and the Trojan group which all take their names from Homer's *Iliad*—Achilles, Patroclus, Hector, Nestor, Priam, Agamemnon, Ulysses, Aeneas, Anchises, Troilus, Ajax, and Diomede.

Astrolabe, a mediæval scientific instrument for taking altitudes, observing the sun by day and the stars by night, and used for telling the time and finding the latitude. Used by the ancient Greeks, later by the Arabs and Persians, and introduced into Europe by way of Spain in the 14th century. Chaucer is said to have sent his son Lois, a ten-year-old student at Oxford, an astrolabe with a treatise on its use in 1391.

Astrology, an ancient superstition which prevailed among the Chaldeans, Egyptians, and Etruscans and had a powerful influence in Europe of the Middle Ages, though not so much upon the Greeks. Formerly astrology had two branches—judicial astrology, the study of the supposed influence of the stars on human destiny, and natural astrology, dealing with calculation of movements of heavenly bodies, time, tides, eclipses, etc., out of which grew the science of astronomy. That the stars control human affairs is an absurd and dangerous belief, yet still accepted by many, judging by some Sunday newspapers.

Astronomy, the oldest and one of the most fascinating of sciences, was in early times associated with astrology, but by a long series of observations and mathematical calculations a gradual knowledge of the movements of the heavenly bodies grew up. Pythagoras (520 B.C.) understood the revolution of the earth upon its axis, but it was not until two thousand years later that his theory gained general acceptance, when the keen and spacious minds, first of Copernicus, and then of Tycho Brahe and Galileo, demonstrated the truth of the Pythagorean theory. With the setting forth of the Copernican system, astronomy was placed on a sure foundation, and the movements of the planets began to be more clearly comprehended. The studies of Kepler and Galileo, making their observations with the telescope, resulted in an immense increase of astronomical knowledge. Newton, to whom we owe the discovery of the law of gravitation, the improvement of the telescope and many other discoveries, placed physical astronomy on well-defined lines. Two great landmarks in more recent times were the discovery of Uranus by Herschel in 1781 which extended the solar system as then recognised, and the estimation by Hubble in 1924 of the distance of Andromeda of nearly a million light years (more recent determinations give 1,500,000 light years), which showed that our Galaxy was just one of many. Today radio-astronomy is advancing astronomical knowledge and making it possible to explore regions beyond the scope of optical telescopes. *See* **Telescopes, Observatories, Galaxy,** *and also* **F3 7.**

Astrophysics, a branch of astronomy concerned with the physical nature and constitution of celestial bodies. Since the second half of the 19th century the application of spectroscopy and photometry has been responsible for the great advance in this branch of science.

Athanasian Creed, one of the three ancient creeds of the Christian Church, often referred to as the *Quicunque Vult*, is a statement of the doctrine of the Trinity and the Incarnation, and though named after St. Athanasius, the view is now widely held that it is the work of St. Ambrose (339–97). (*See also* **Apostles' Creed** and **Nicene Creed**).

Atheism is the denial of the divine, and it assumes three forms—denial of the existence of God, denial that God has been *proved* to exist, and denial of the possibility of knowing of divine existence.

Athodyd, also called "Ramjet" or "Propulsive Duct." This can be considered as an extremely simple gas-turbine engine, without any rotating parts. A power plant with great possibilities for high-speed aerial flight, it consists of a diffuser, combustion chamber, and exhaust chamber and its thrust results from the fact that the gases leaving the athodyd have a higher velocity than the gases entering it.

Atlantic Charter. A document of eight points drawn up by Sir Winston Churchill and President Roosevelt on a man-o'-war in the Atlantic in Aug. 1941. Although a very important document, since it declared the intentions of Britain and U.S.A., it remained informal and was not in fact signed (to obviate necessity for approval by the U.S.A. Senate). The eight points were briefly on the following subjects: (1) No aggrandisement; (2) No territorial changes without wishes of the people; (3) Restoration of self-government to those deprived of it; (4) Access to trade and raw material by all peoples; (5) Improvement of labour standards and social security; (6) Freedom from fear and want; (7) Right to traverse high seas without hindrance; (8) Disarmament of aggressor nations pending a permanent system of general security.

Atlantic Records. The first crossing of the Atlantic by Columbus in 1492 took 70 days, while the first crossing by steam-boat in 1838 was made in 17 days. The Atlantic Blue Riband is now held by the American liner *United States*, which in July 1952 completed the 2,942 sea miles from Ambrose light-vessel to Bishop Rock in 3 days 10 hours 40 minutes (35·59 knots), beating the Queen Mary's 1938 record time of 3 days 20 hours 42 minutes (31·69 knots). The first flight was made in 1919 by Sir John Alcock and Sir A. W. Brown in a Vickers-Vimy biplane from Newfoundland to Ireland (1,890 miles) in 16 hours. The first solo flight was made in 1927 by Charles A. Lindbergh from New York to Paris. The first airship to cross from Scotland to New York was the British R.34. The first regular passenger flight was made by the *Dixie Clipper* in 1939.

Atmosphere is the gaseous envelope of the earth, and consists of a mixture of gases (*see* **Air**) and water vapour, the variability of the latter being of great importance meteorologically. At levels accessible to measurement there is no appreciable change in the relative proportions of the gases, but the greatest part of the ozone would seem to occur in a layer 15–25 miles above the earth's surface. The lower level of the atmosphere up to a height of about 7 miles (6 miles at the Poles and 10 miles at the Equator) is known as the *troposphere*, and it is in this region that nearly all weather phenomena occur. This is the region of most interest to the forecaster studying temperature, humidity, wind-speeds, and the movement of air masses. Temperature falls with height by about 3° F. per 1,000 ft. The *tropopause* is the boundary between the troposphere and the *stratosphere*. Temperature varies little in the lower levels of this region; it is mainly cloudless, and has no vertical currents. Strangely enough, the lowest temperatures of the atmosphere are to be found not at the Poles, but at about 11 miles above the Equator, where a temperature as low as —110° F. has been recorded! The thickness of the stratosphere is not known exactly, but temperatures begin to rise about 20–25 miles from the earth's surface at about the same rate as they fall in the troposphere, owing, it is thought, to the absorption of solar radiation by the concentration of ozone. Recent war-time re-

searches in England have shown that stratospheric air is extremely dry. The uppermost region of the atmosphere is the *ionosphere*, extending to 300 miles from the earth's surface, and containing the Heaviside layer (at about 60–70 miles) and the Appleton layer (at about 120–200 miles); it is in this region that the auroræ normally occur. *See* **F9, 46** (1).

Atmospherics are electrical impulses which are believed to originate in atmospheric electrical discharges such as lightning. They give rise to crashing background noises in the loudspeakers of radio sets, interfering with reception at distances of up to 4,000 miles from the centre of the disturbance. The location of atmospherics with the aid of radio direction-finding methods gives warning of the approach of thunderstorms.

Atom, the smallest unit of an element which can take part in a chemical reaction. Prior to the discovery of radioactivity by Becquerel in 1896 the atom was looked upon as something hard and solid like a billiard ball. It was also thought to be indivisible. This concept was replaced by the Rutherford–Bohr atom (1913). According to this hypothesis the atom resembles a miniature solar system, with the nucleus as the sun, the electrons the planets, and the rest empty space. If the nucleus were enlarged a million million times it would be no greater than a pea but the atom itself would fill the Albert Hall. The nucleus itself has a composite structure, being built of protons and neutrons. The simplest atom is that of hydrogen, with a single electron and a nucleus consisting of a single proton. Biggest naturally-occurring atom is uranium atom with 92 protons in the nucleus. *See* **F9-12.**

Atomic Bomb, this weapon was the result of the concerted efforts of a team of scientists during the impelling urgency of the second world war. They succeeded in releasing an explosive discharge of atomic energy by the fission process. The vast sums and resources necessary for the production of the bomb determined the U.S.A. as the country of its origin. The first bomb was discharged on test in New Mexico (16.7.45), when the effects of blast, heat, and radiation were measured. Its use on Hiroshima (5.8.45) and Nagasaki (9.8.45) was a main cause of the collapse of Japanese opposition in the Far East. In an atomic bomb pieces of uranium 235 or plutonium 239 are brought together until a critical size is exceeded, when an uncontrollable chain reaction is set up. The energy released in the fission of 1 kg. of uranium is about equivalent to that involved in the explosion of 20,000 tons of T.N.T. A development of the atom bomb is the thermonuclear or hydrogen bomb which is a weapon not only a thousand times more powerful than a fission bomb but different in kind. Atomic and hydrogen bombs not only unleash energy but give rise to radioactivity which can induce hereditary changes in plants and animals. It is to be hoped enough bombs have already been exploded to convince mankind that the only alternative to total annihilation is to live together in the world as good neighbours. *See also* **F11** (1).

Atomic Number. The number of protons in the nucleus of the atom, positively charged, equalling and balancing the number of surrounding electrons, negatively charged, is called the atomic number. *See* **N30, F10** (2), **60** (1).

Atomic Pile, an apparatus containing a fissionable element and a moderator, such as heavy water or graphite, in which a self-sustaining fission process proceeds at a controllable rate. The first atomic pile, constructed on a squash court at Chicago, was operated for the first time on December 2, 1942, under the direction of Dr. Enrico Fermi. The pile contained 12,400 lb. of uranium. *See* **F51** for an account of civilian nuclear reactors.

Atomic Weight, the weight of an atom of an element relative to the weight of an atom of oxygen (16·0000). *See* **N30, F10** (1), **60** (1).

Atrium was the central court of a Roman house, uncovered in the centre, usually with a marble tank (impluvium) beneath the opening into which rain could fall.

Attar of Roses, an essential oil used in perfumery and obtained from the fresh flowers of *Rosa damascena* grown in Bulgaria, Anatolia, France, and Kashmir.

August, named after the Emperor Augustus, because it was his " lucky " month.

Auks, duck-like sea-birds, black and white, with short narrow wings, compact bodies, and legs set well back. Breed in colonies on rocky coasts of N. Europe (incl. British Isles) and spend most time in coastal waters. Migrate south in winter. The Auk family includes the Razorbill, Little Auk, Guillemot, and Puffin. The Great Auk became extinct in the 19th century after ruthless hunting for the sake of its feathers. Except for the Black Guillemot, they lay only one egg a year.

Aulic Council, a supreme court of the Holy Roman Empire, established by Maximilian I., in 1501.

Aurora Borealis *or* **Northern Lights,** visible in London on seven nights a year on the average, but increasingly so farther north, *e.g.*, observed in the Shetlands about one night in every four. The zone of maximum frequency surrounds the north magnetic pole and includes Greenland, northern Canada, and the north coast of Alaska. Auroral displays may take several forms (dawn-like glow, often with rays streaming upward, curtain, and corona of rays radiating from a point high in the sky), sometimes changing rapidly with pulsating effects. The aurora is an electrical discharge at great heights, the agent responsible arising in the sun, and is generally accompanied by magnetic storms. The southern lights of the Southern Hemisphere are called the aurora australis. *See* **F46** (1) for upper atmospheric phenomena.

Austerlitz, Battle of, was fought near Brünn, in Moravia, on December 2, 1805, when Napoleon defeated the Russians and Austrians under Kutuzon.

Auto-da-Fé, or Act of Faith, was the ceremony connected with the execution of heretics under the Inquisition of Spain and Portugal, the persons condemned being burned alive. The king and court generally attended in state.

Automation, a word coined by an American for automatic operation and control in industry by the application of electronic methods. The new technique has been defined as " the accomplishment of a job by an integrated mechanism with a minimum of assistance of any kind." Electronic machines are capable not only of reporting defects but correcting them by the application of information stored in them. Just as mechanisation replaced human labour in the industrial revolution of the 19th century, so today automation is replacing mechanisation.

Autonomy denotes the right of self-government, and was first used in reference to the municipalities of ancient Greece, where the right of separate government was allowed.

Autumn, the third season of the year, begins with the autumnal equinox, and ends with the winter solstice, but the term is generally understood as covering the period from mid-August to mid-November.

Auxins, substances which regulate the growth of plants; also called " plant hormones." Auxin preparations are finding practical use: *e.g.*, to promote root formation in cuttings, to prevent premature dropping of apples and pears.

Avalanches are of four kinds. (1) Powdery avalanches consisting of snow which has become loose and dry from long frost. (2) Creeping avalanches, which are loosened by Spring, but being on a gentle slope, creep down slowly by the force of their own weight. (3) Glacier avalanches, masses of ice which split off in summer with a great noise, and go tearing down a precipice to be smashed to pieces at the bottom. (4) The real avalanches of huge accumulations of snow, which are hurled over almost perpendicular walls of rock into the valleys beneath.

Avalon is the earthly paradise of Celtic mythology.

Aventine, one of the seven hills of Rome.

Avesta, the title of the sacred books of the Parsees.

Axe, one of the first tools devised by primitive man in all parts of the world. Axes of stone, bronze, and rough iron have been found in the geological strata.

Avocet, a graceful wading bird related to the stilts, of black-and-white plumage, bluish legs, and slender upturned bill. There are four species.

Avocets nest in colonies and there is one in the sanctuary on Havergate Island, Suffolk.

Aztecs, the name of a native and powerful race found in Mexico when the Spaniards first discovered that country, and with difficulty subdued. *See also* **G10, 11.**

B

Baal, the god of the sun, and meaning lord, or master, was worshipped by the ancient Chaldeans, Phœnicians, and Assyrians, and enters into the composition of many Semitic names: Jezebel, Hannibal, Beelzebub, Baalbek.

Babel, Tower of, described in Gen. xi. 9, the erection of which led to the confusion of tongues.

Babiroussa, a ferocious wild pig, native of the Celebes, sometimes called the horned-hog, from the fact that the long upper tusks, growing upwards, pierce the upper lip and curve backwards like the horns of some of the ruminants. It is longer-legged than ordinary swine.

Baboon, monkeys belonging to the African genus *Papio*. They are considered the lowest of the Old World (Catarrhine) monkeys, and walk on all fours. In the main terrestrial, but take to trees after food. The mandrill is closely related.

Babylonian Captivity, the period spent by the Jews in Babylon after Jerusalem was captured by Nebuchadnezzar, the Babylonian emperor, in 586 B.C. Traditionally the captivity lasted 70 years, but when Babylon was in turn taken by Cyrus in 538 B.C., the exiles were permitted to return to Jerusalem. The term is also applied in church history to the period 1309–77 when the popes were exiled to Avignon.

Badger, a carnivorous mammal related to the weasel, of nocturnal and burrowing habits, inoffensive, subsisting chiefly on roots and insects, though sometimes mice, young rabbits, and eggs form part of its diet. Badger-baiting was a favourite sport in Britain until it was prohibited in the middle of the 19th century.

Bagamond's Roll was the record by which the Scottish clergy were taxed prior to the Reformation.

Bagpipe. Once popular all over Europe, this instrument is still played in Scotland, Ireland, Brittany, and elsewhere. The bag acts as a reservoir of air and, when squeezed by the player's arm, forces air through the pipes. One of these, the Chanter pipe, provides the tune and is played by the fingers as in a flageolet. The remainder, the Drone pipes, give a continuous, unvarying note.

Bailey, comprised all the space within the outer walls of a castle or fortress.

Bailey Bridge, invented by Sir Donald Bailey and first used in N. African campaign 1942–3. Built up of pre-fabricated girders, it can be easily transported and erected.

Bailie, is a Scottish term for the magistrate of a municipal corporation or royal burgh.

Bailiwick, a feudal term denoting the limits of a bailiff's jurisdiction. The term has survived in the Channel Islands, where Jersey and Guernsey are Bailiwicks.

Bairam, a festival in Mohammedan countries.

Balance of Power is the doctrine in British policy whereby European groups should be so balanced as to prevent the emergence of a dominating Power. Thus the balance was maintained between the Triple Alliance (Germany, Austria and Italy) and the Triple Entente (Great Britain, France and Russia) and preserved peace from 1871 to 1914. After the first world war there was tentative support of Germany's recovery to counterweight a possible French hegemony; but when Germany's power grew under Hitler culminating in the second world war, Britain, France and Russia again became allies. With the growing power of Russia, a new system of alliances is being attempted.

Baldachin (It. *Baldachino*), a canopy usually supported by four pillars over throne, altar, or other sacred object. The name is also applied to the silken canopy used in processions and borne by the priest who carries the Host.

Baldrick, an ornamental belt worn across the shoulder or round the waist, to support bugle or sword.

Balearic Crane, the crowned crane of the Balearic Islands in the Mediterranean and the North African mainland, distinguished by its yellowish, black-tipped occipital tuft and by its trumpet note.

Baleen *or* **"whalebone"** the name given to a series of horny plates growing from the roof of the mouth in those whales classified as Whalebone or Baleen Whales (Mystacoceti). There are 250–300 or so plates on each side, and their inner edges are frayed, the whole system constituting a filter for collecting minute organisms used for food. The Baleen Whales include the Right-Whales, the Pacific Grey-Whale, and the Rorquals. (*See* **Whales.**)

Balista, a large military engine, of crude contrivance but considerable effectuality, anciently used for hurling missiles in war by the Romans and others.

Ballad, a popular song of adventure or romance such as a minstrel might sing. The term is now broadly applied to any popular song of simple theme and construction suitable for amateur performance. In literature the term signifies a narrative poem, especially one whose theme is based on folk-lore. *See also* **M6** (2), **12** (1).

Ballade, a piece of piano music which may fancifully be regarded as the musical equivalent of the poetic ballad: *e.g.*, the Ballades of Chopin.

Ballet is a combination of four arts; dancing, music, painting and drama, each of which is ideally of equal importance. The movement of the individual dancers and the "orchestration" of the whole group is in the hands of the choreographer. The dancer's training follows certain basic rules but save in classical ballet there is considerable freedom of movement. Ballet as we know it today developed professionally at the Court of King Louis XIV. of France, though it owes its origins to Italy and in the earliest times to Greece and Rome. Its movements were made up from the dances of courtiers, country folk and tumblers. Technique grew more complex as costume became modified, the body gaining complete freedom with the invention of tights. A succession of great dancers—French, Italian and latterly Russian left their imprint on the art. Contemporary ballet reflects the æsthetic of the Russian, Sergei Diaghilev. In England Dame Ninette de Valois has laid the foundation of a national ballet, at Sadler's Wells and Covent Garden, with a personality that reflects the national character. A Royal Charter was granted in Jan. 1957 setting up the Royal Ballet to co-ordinate the activities of the Sadler's Wells group.

Ballistics, the science dealing with the motion of projectiles, especially shells, bombs, and rockets. Great advances have been made in this science in recent years.

Ballistraria, a cruciform aperture in the walls of a fortress, through which the archers fired arrows.

Balloon, the modern balloon consists of a bag of varnished cloth or gold-beater's skin inflated with a gas lighter than air. The first ascent by man in a hot-air balloon was made on Nov. 21, 1783, and in a hydrogen balloon on Dec. 1, 1783. The most famous of the early scientific flights by manned balloons were those of the Englishmen Coxwell and Glaisher, in 1862, when a height of 7 miles was reached. The first aerial crossing of the English Channel by Blanchard and Jeffries was made on 7 Jan. 1785. Piccard's ascent to 10 miles, in 1931, marked the conquest of the stratosphere. Four years later the huge American balloon Explorer II. inflated with nearly 4 million cubic feet of helium, carried a team of scientists with their floating laboratory to an altitude of 14 miles. In 1957 a pressurised balloon carrying an American doctor rose 19 miles above the Earth. Captive kite-balloons were widely used in the war as defensive measures against air attack. Meteorologists send their instruments up in balloons to collect data about the upper atmosphere, and of recent years physicists have learned much about cosmic radiation from the study of photographic plates sent to the upper regions in balloons. Balloons are also used to launch rockets, the combination being called a "rockoon."

Balsam, a big genus (140 species) of flowering plants. Many species are cultivated for their showy flowers, *e.g. Impatiens noli-me-tangere*, the yellow balsam or "touch-me-not," so called

because the fruit explodes when touched, slinging out the seeds. Balsam fir is a conifer (*Abies balsamea*) from which Canada balsam gum is obtained.

Baltimore Bird, a lively black-and-orange-plumaged starling of the oriole sub-family extending from Brazil to Canada; builds a well-constructed hanging nest.

Bambino, an image of the Infant Christ in the church of the Ara Cœli at Rome, supposed to possess miraculous powers; also a term applied in Italian art to images of the Infant Christ.

Bamboo, a genus of strong grasses, some species growing to over 120 ft. in height; much used by oriental peoples for all kinds of purposes. The young shoots of some species are tender and esculent.

Banana (family *Musaceae*), a large herbaceous plant cultivated in moist regions of the tropics, and one of the most productive plants known. Main producing areas: Brazil, India, Tanganyika, Philippines, Honduras, Colombia, Mexico, Canary Is. Average annual world-production, 11 million tons.

Bandana, the name given to a red spotted handkerchief usually made of cotton, but formerly only applied to silk handkerchiefs of that colour and design.

Bandicoots, Australasian marsupial mammals, of about the size of a large rat or rabbit. They are burrowing animals living largely on insects. The rabbit-eared bandicoot, restricted to Australia, has shrew-like snout, long ears like a rabbit, and long crested tail. The long-nosed bandicoot has a spiny coat, unlike long silky coat of rabbit-eared bandicoot; it comes from E. Australia. The pig-footed bandicoot has two functional toes on the foot, like a pig.

Bank Rate, the rate at which the Bank of England discounts first-class bills of exchange. Increased from 5 to 7% on 19 Sept. 1957 (the highest since 1931), since when it has been reduced five times, ultimately to 4% on 20 Nov. 1958; increased to 5% on 21 Jan. 1960.

Banns of Marriage. *See* Q14 (1).

Banshee is a figure in Irish superstitions supposed to give warning of death.

Bantu, ethnic and linguistic group of African Negro peoples, widely spread over Africa south of the Congo. There are an enormous number of Bantu languages and dialects, including Swahili, Zulu, Luba, Kongo, and Ganda. The Bantu tribal groups, of which there are many, include the Zulu, the Matabele, the Basuto, and the Mashona.

Baobab, a tropical African tree. The species *Adansonia digitata* is one of the largest trees known, though not the tallest; the trunk can reach 30 ft. in thickness. The fruit is wood, but its juice provides a cooling beverage. The bark yields a fibre used for making rope and cloth.

Baptism is a rite practised, either with infants or adults, by almost all Christian sects except Quakers. In the Church of England the baptism of infants is regarded as the act by which they are admitted "into the visible Church of Christ." The Baptists perform the rite only with adults and by the immersion of the entire body.

Baptistery, a building or portion of building devoted to the rite of baptism.

Baptists came into notice at the Reformation. For a time they suffered much persecution, but gradually made headway by their zeal and sincerity. Their distinctive tenet is that every member must make his own profession of personal faith and allegiance to Christ before Baptism. To-day this sect is spread over all parts of the Protestant world, though not always in large communities. They are strong in the United States.

Barbary Ape, a large monkey belonging to the genus *Macaca*. It is the only monkey living in relative freedom in Europe, a small colony being found on the Rock of Gibraltar. It has no tail.

Barber, one whose occupation is to shave or trim beards, a hairdresser. In former times the barber's craft was dignified under the title of a profession, being conjoined with the art of surgery. Barbers first received incorporation from Edward IV. in 1461. In Henry VIII.'s reign they were united with the company of surgeons, it being enacted that the barbers should confine themselves to the minor operations of blood-letting and drawing teeth, while the surgeons were prohibited from "barbery or shaving." In 1745 barbers and surgeons were separated into distinct corporations by George II. The barber's sign consisted of a striped pole, from which was suspended a basin. The use of these symbols is still preserved.

Barberry, a genus of berry-producing shrubs containing a hundred species. Several species are cultivated for their flowers and bright berries. Has an interesting pollination mechanism; the base of each stamen is sensitive to touch, and insects probing for nectar cause top of stamen to spring inwards, so dusting visitor's head with pollen which is in position for pollinating next flower that is visited. The common barberry (*Berberis communis*) harbours one stage of the fungus that causes rust of wheat.

Barbican, a fortified entrance to a castle or city, with projecting towers. In the London street called Barbican there was formerly a barbican in front of the city gates.

Barcarolle, a Venetian gondolier's song applied to instrumental as well as vocal compositions.

Bard, among the ancient Celts a poet or minstrel whose mission was to sing of heroic deeds. He was supposed to have the gift of prophecy, and was exempt from taxes and military service.

Barebones' Parliament, so called from the nickname of one of its members, "Praise-God Barebones." It was specially selected by Cromwell, and sat from July 4 to Dec. 12, 1653.

Barilla, soda carbonate or soda ash obtained by burning certain salt-marsh plants (*e.g.* the saltwort, *Salsola kali*). It used to be in great demand, until the product of the Leblanc and then the Solvay ammonia-soda process was made available by the chemical industry.

Baritone, a male voice whose pitch lies between those of a tenor and a bass.

Barium, a soft, white metallic element usually occurring as sulphate of barium and carbonate of barium. It was first prepared by Sir Humphry Davy in 1808, as an amalgam, by electrolysis of barium chloride. The pure metal was not isolated until 1901.

Barium meal. Barium sulphate is opaque to X-rays and before taking X-ray pictures of the alimentary canal radiologists give a "barium meal" to the patients so that the alimentary canal shows up more clearly.

Barley, a cereal plant whose grain is chiefly used for animal feeding and in the malting industry. Chief producing areas: U.S.S.R., China, U.S.A., Canada, Europe. World production, 57 million tons a year.

Barnacles constitute a sub-class of the Crustacea. The barnacle fouling the bottom of ships is the Goose Barnacle, which has a long muscular stalk and a shell composed of five plates. The Acorn Barnacles, which cover rocks, breakwaters, etc., just below high-water mark are similarly constructed, but they have no stalk. The manner of feeding of barnacles was vividly described by T. H. Huxley, who said the barnacle is "a crustacean fixed by its head kicking the food into its mouth with its legs." It was a naval surgeon, J. Vaughan Thompson, who discovered in 1830 that barnacles have a free-swimming larva (or nauplius). In the Middle Ages a curious myth grew up to the effect that the Barnacle changed into a sea-bird called, for that reason, the Barnacle Goose.

Barometer is an instrument for measuring atmospheric pressure, invented at Florence by Torricelli, pupil of Galileo, in 1644. The standard method consists of balancing the air column against a column of mercury, used on account of its high density. The mercury is contained in a long glass tube, closed at one end, and inverted in a cistern also containing mercury. The height of the mercury column, supporting the air column, is taken as the pressure at the time, and can be read off very accurately by means of a vernier scale. Present-day tendency is to express the readings in units of pressure instead of length, the millibar being adopted (1 mb = 1000 dynes per sq. cm.; 1000 mb $\equiv$ 29·53 inches of mercury approx.). The standard instrument is correct for pressures at 0° C. in Lat. 45°, so that corrections have to be applied for temperatures and latitudes other

than these. Also a correction has to be made for reducing the pressure to mean sea level. (*See* Aneroid.)

Baron, title given in 13th-century England to the highest class of King's tenants-in-chief. The first baron created by letters patent was John Beauchamp de Holt, Baron of Kidderminster, on October 10, 1387. The title derives from the Latin "baro" meaning "a man." In old legal diction "baron et feme" meant "man and wife." To-day a baron is a member of the fifth and last grade of the peerage and is addressed as "Lord."

Baronet, a title instituted by James I. The first baronet was Sir Nicholas Bacon, but numerous others were made about the same time, the fee charged for the honour in each case being about £1,000. It is the lowest hereditary title, and is freely dispersed among those who distinguish themselves in trade, industry, politics, or special civic service. James I. limited the number of baronets to 200, but to-day no number is specified. A royal warrant in 1910 commanded an official list of baronets to be prepared.

Baron of Beef, a double sirloin, not often seen in these days, but common in olden times at court and civic feasts.

Barque, a small sailing vessel with three or four masts. A three-masted barque has fore- and mainmasts square-rigged, the mizzenmast fore- and aft-rigged.

Barrel Organ, a musical instrument in which the music is made by a barrel or cylinder, set with pins and staples, which rotate so as to open the valves for admitting the wind to the pipes. Now almost, if not entirely, superseded by other musical instruments.

Barricades are temporary street fortifications usually erected by insurgents at times of revolution, and the most notable have been those of Paris. In 1830, 1848, and during the Commune disturbances of 1871 they were resorted to, and were the scenes of many sanguinary conflicts.

Barrow is an ancient artificial mound of earth or stone raised over the site of a burial. In Britain barrows were built from 2500 B.C. until the late Saxon period, but the Egyptian are the earliest barrows known, the great pyramids being a spectacular development of the custom of ceremonial burial.

Bar Sinister, a term often improperly used to describe two diagonal lines drawn from left to right, from the sinister chief to the dexter base of an heraldic shield, and supposed to be a mark of illegitimacy. The right term is "bend sinister," and it is not absolutely certain that the illegitimacy interpretation is the correct one.

Bartholomew, Massacre of St., occurred in Paris on the night of Aug. 24, 1572, when over two thousand Huguenots were massacred by order of the Catholic French Court.

Bartizan is a small battlemented turret at the top of a tower.

Basalt Rocks are fine-grained, dark coloured, of igneous origin and occur either as lava currents, as in Mull and Staffa, or as intrusive sheets, like the Edinburgh Castle Rock and Salisbury Craig. One of the most noted examples of basaltic columns is that of the Giant's Causeway in Ireland.

Basanite, a smooth black siliceous mineral, or flinty jasper; a crypto-crystalline quartz, sometimes styled the Lydian Stone. An alloyed metal being rubbed across basanite, the mark of colour left will indicate the nature and depth of the alloy, hence it obtains its name, which signifies, in Greek, "a touchstone."

Base, is a substance which neutralises an acid to form a salt with the formation of water also, but without evolution of hydrogen. A more scientific definition is a substance which dissolves in water to form hydroxyl ions.

Basel, Council of, was the last of the three great Reformation Councils held in 1431–43.

Bashi-Bazouks, name formerly given to irregular troops in the pay of the Turkish sultans. They were a rough but brave class of men.

Basilisk, is a lizard of aquatic habits, with an elevated crest (which it can erect or depress at will) down the centre of its back.

Basques are an old race living in the Pyrenees, with a language of their own, different from all other languages, and noted for its extreme difficulty.

Bas-Relief ("low relief"), a term used in sculpture to denote a class of sculptures the figures of which are only slightly raised from the surface of the stone or clay upon which the design is wrought.

Bass, the fourth or lowest voice in a male voice church choir and therefore the lowest voice in a mixed choir. The term may also be applied to instruments having a lower register than others of their class: *e.g.*, bass clarinet.

Basset horn (= corno di bassetto). An alto form of the clarinet. This instrument is rarely used in modern orchestras.

Bassoon, a bass version of the oboe in which the tube, being 9 ft. long, is bent back on itself for convenience. There is also a double-bass oboe which is called the contra-bassoon.

Bastille, a castle or fortress in Paris, built in the 14th century, and used as a state prison, especially for political offenders. Its bad repute as an instrument of despotism excited the hatred of the populace, who stormed on July 14, 1789, at the beginning of the Revolution, and demolished it.

Bastinado, an oriental punishment, by beating with a pliable rod or cane on the soles of the feet.

Bastion, an earthwork standing out from a rampart, of which it forms a principal part. Usually five-sided, the fifth side opening into the interior of the fortifications. The front face of an ancient Roman bastion was generally convex and semicircular.

Bats. These mammals fly by means of a membrane stretched between each of the long fingers of the hand and between the fifth finger and the body. Another membrane stretches between the legs and the tail. There are twelve British species; namely, the Noctule, Leisler's B., Serotine, Pipistrelle, Long-eared B., Daubenton's B., Natterer's B., Whiskered B., Bechstein's B., Barbastelle, Greater Horseshoe, and Lesser Horseshoe Bats. An interesting and recent discovery is that bats "echo-locate" obstacles by means of supersonic sound waves; this explains their long-admired ability to fly perfectly at night and in dark woods and caves. Bats are mostly insectivorous, catching the insects in their open mouths while flying. The Vampire Bats, feeding exclusively on blood, are confined to tropical America.

Bath, Order of the, believed to have been established by Henry IV. at his coronation in 1399; remodelled in 1725 as a military order; formally instituted in three classes in 1815; civil division added in 1847. In the Order are three classes: G.C.B., or Knight Grand Cross of the Bath; K.C.B., or Knight Commander of the Bath; C.B., or Companion of the Bath. Companionship of the Bath does not carry knighthood nor entitle the holder to the prefix "Sir." The motto of the order is *Tria juncta in uno* (Three joined in one). The insignia for civil and military and the three classes vary. (*See* **Knighthood.**)

Battalion, in the British Army an infantry unit of approximately 850 war strength. Three battalions constitute an infantry brigade, and three brigades a British infantry division. Commanded by a lieutenant-colonel.

Battering Ram, a military apparatus, used in ancient times, mounted on wheels, and composed of a heavy, iron-bound beam, which was impelled with great force upon the walls of a besieged place.

Battlement, a raised wall running along the top of a building, with embrasures through which an enemy could be fired upon. At first solely military, later it was frequently used as an architectural ornamentation.

Battue is the term applied to the practice of employing beaters to force game to a certain point where sportsmen are in waiting with guns.

Bauble, a short stick or wand, surmounted by a representation of a human head, ass-eared, carried by the fools and jesters of olden days.

Bauxite, the chief ore of aluminium. Chemically it is aluminium oxide. Aluminium metal is made industrially by electrolysing purified

bauxite dissolved in fused cryolite. Chief producing areas: Surinam, Br. Guiana, U.S.A., France, Hungary, Indonesia, U.S.S.R., Yugoslavia, Italy.

Bawbee, an old Scots copper coin.

Bayeux Tapestry, a famous tapestry representing the conquest of England by William the Conqueror. It is embroidered on a band of linen 231 ft. long and 20 in. wide in blue, green, red, and yellow, divided into 72 scenes ranging over the whole story of the conquest. Tradition attributed it to William's Queen, Matilda, but it is now believed to be of later origin executed for Bayeux Cathedral by English embroiderers. *See also* **G34 (1)**.

Bayonet, a dagger or small spear fixed at the end of a musket. It takes its name from Bayonne where it was first made about 1650. In 1689 General Mackay invented the socket-bayonet, which allows the gun to be fired with the bayonet fixed.

Beacon, a fire-signal, given from the tops of hills, was much in use in early times. According to Aeschylus, Agamemnon thus signalled the fall of Troy to Mycenæ; and the English signalled the approach of the Spanish Armada.

Beagle, a small hound that tracks by scent, and formerly used for hare hunting.

Bears belong to the Ursidæ family of the Carnivora. They are plantigrade mammals, walking (like man) on the soles of their feet. Found in most parts of the world except Australia. The common Brown Bear was once spread over the whole of Europe; it became extinct in England about the 11th century; 7–8 ft. in length, and stands 3 ft. or more at the shoulder. The Grizzly Bear of N. America is larger, and the coat is shorter and greyer. The Polar Bear is remarkable in having a white coat all the year round; it spends much time in water, and unlike the other bears it is entirely carnivorous. Bear-baiting was made illegal in England in 1835.

Beating the Bounds. (*See* **Bounds.**)

Beaufort Scale of wind force is used to specify numerically the strength of the wind. Since the introduction of anemometers to measure the actual velocity, equivalent values of the ranges in miles per hour at a standard height in the open have been assigned to the Beaufort numbers. *See* **N10.**

Beaver, a genus of mammals of the Rodentia order, with short, scaly ears, and webbed hind feet. Attains a length of from 2½ to 3 ft., and lives in communities where possible, as in North America, constructing dams and habitations. Beavers are found in Russia and Poland. Beaver skins are of considerable commercial value.

Bed of Justice, the cushioned seat occupied by the Kings of France in the parliament chamber, but not used later than 1787, by Louis XVI. at Versailles.

Bedford Level comprises parts of Norfolk, Suffolk, Huntingdon, Northampton, Lincoln, and Cambridge, generally called the Fens, 70 miles long and 20 to 40 miles broad. It was reclaimed and drained in the 17th century by the Earl of Bedford and the Dutch engineer Cornelius Vermuyden.

Bedlam (a corruption of Bethlehem) was a priory in Bishopsgate, afterwards converted into a hospital for lunatics. The asylum was transferred to St. George's Fields, Lambeth, in 1815. The term "bedlamite" came to be applied to any person behaving like a madman.

Bedouins are Arabs who live in tents and are spread over the whole of Northern Africa and Western Asia. They are divided into independent tribes, each governed by its own sheikh. They live on their flocks and herds, rice, etc., and are prone to robbery. Supposed to be the descendants of Ishmael.

Bedrepe, an ancient term signifying the day's work in harvest-time exacted from tenants by their over-lord in the feudal period.

Beech, a deciduous tree belonging to the genus *Fagus* of some eight or nine species found in north temperate regions. The common beech, *F. sylvatica*, is believed to be native to Britain and is one of our finest trees, with massive trunk and smooth, grey bark. Its horizontal branches covered with close foliage, make a deep shade. It is shorter lived than the oak, taking about 200 years to reach full size and then declining. The timber of beech has a variety of uses, *e.g.*, spoons, handles, tools, and chairs.

Bee-eater, name of a family of brilliantly coloured birds closely related to the rollers and kingfishers inhabiting the tropical and sub-tropical parts of Africa, Asia and Europe. The European species successfully nested in Britain for the first time in 1955 and a pair nested in Alderney in 1956. With their long curved beaks they catch insects on the wing, especially bees and butterflies.

Beefeater. (*See* **Yeomen of the Guard.**)

Beelzebub, corruption of Baal or Bel, whom the Philistines worshipped at Ekron. To the Jews he came to be chief of the false gods.

Beeswax, the secretion of the bee, used for the formation of the cells or honey-comb of the hive; when melted it is what is commercially known as yellow wax, white wax being made by bleaching. Being impervious to water, it acts as a good resistant and is an article of much utility.

Beetles (Coleoptera) constitute one of the biggest orders of insects, numbering over 200,000 species. There are two pairs of wings; the hind pair are used for flight, while the front pair are hardened to form a pair of protective covers (elytra). Some beetles have lost the power of flight and then the elytra are joined together.

Behemoth, the name of a semi-mythical spirit in the shape of a large four-footed creature, referred to in the Book of Job.

Bel and the Dragon is the title of certain supplementary chapters to the "Book of Daniel" of an apocryphal character. First appeared in the Septuagint, but the Jewish Church did not accept it as inspired. In 1546 the Council of Trent declared it to be canonical.

Bell, a hollow body of metal used for making sounds. Bells are usually made from bell-metal, an alloy of copper and tin. Small bells used for interior functions are often made of silver, gold, or brass. Ordinary hand-bells are of brass. From the 7th century large bells have been used in England in cathedrals, churches, and monasteries. The greatest bell in the world is the "King of Bells" in the Kremlin at Moscow which weighs about 198 tons, is 20 ft. 7 in. high and 22 ft. 8 in. in diameter. It was cast in 1733, but cracked in the furnace (the broken part weighed 11 tons) and is now preserved as a national treasure. Other large bells in Russia, include the 171-ton one at Krasnogvardersk, near Leningrad, and the one of 110 tons at Moscow. The Great Bell (Great Paul) at St. Paul's, cast in 1881, weighs 16¾ tons, and is the largest in the United Kingdom. Other gigantic bells are the Great Bell at Peking (53 tons); Nanking (22 tons); Cologne Cathedral (25 tons); Big Ben, Westminster (13½ tons); Great Peter, York Minster (10 tons). The Curfew bell is rung in some parts of England to this day, notably at Ripon. The number of changes that can be rung on a peal of bells is the *factorial* of the number of bells. Thus four bells allow 24 and eight bells 40,320.

Belladonna *or* **Deadly Nightshade**, a well-known poisonous wild plant found in Southern Europe and Western Asia. The alkaloid atropine it contains is valuable in medicine, although a large dose is poisonous.

Bell, Book, and Candle. To curse by "bell, book, and candle" was a form of excommunication in the Roman Church ending with the words: "Do to the book, quench the candle, ring the bell."

Ben *or* **Benn**, a Gaelic word signifying mountain or "mountain head." It occurs in many places in the British Isles, as Ben Nevis, Ben Lomond. Takes the form of Pen in Wales and Cornwall.

Benedictine or "Song of the Three Holy Children" from the *Apocrypha*, sung in the Anglican Church at Morning Prayer.

Benedictines are monks and nuns of the Benedictine Order who live under the rule of St. Benedict. They are known as Black Monks because of the colour of their dress. They were introduced into England in the 7th century. The rule is marked by an absence of extravagant

asceticism. The order has always been famous for its learning and its promotion of education. At the dissolution of the monasteries in the reign of Henry VIII. the order had 300 houses.

Benedictus, a canticle used in the morning service of the English Church, and deriving its name from the first word of the Latin verse, *Benedictus*, blessed.

Benefit of Clergy, a privilege allowed to clergymen offenders, exempting them from punishment by the ordinary courts and leaving the bishop's court to deal with them. In 1650 the privilege was extended to all who could prove their ability to read. The system was abolished in 1827.

Benelux. Name given to the economic alliance between Belgium, Holland and Luxemburg. The word is made up from the three names.

Benevolence, a name given to demands made by certain English kings for loans from subjects or corporations. Abolished in 1688.

Benewith Tree, the old name of the honeysuckle on both sides of the Scottish Border.

Bengal Light, a kind of firework composed of nitre, sulphur, and the black sulphide of antimony, in proportions of six, two, and one respectively, giving a blue light.

Benthamism, the philosophy of Jeremy Bentham, the essential principles of which were that the end and aim of human life is happiness, as exemplified in the presence of enjoyment and the absence of pain. Communities and individuals, it taught, should strive after the greatest happiness of the greatest number, the effort to achieve the greatest good for all being accounted in itself the highest morality.

Benzene, a compound of carbon and hydrogen, discovered by Faraday, and the starting-point in the production of aniline dyes and a host of other important organic chemical compounds.

Berbers are the inhabitants of the mountainous parts of Barbary and the northern portion of the Sahara, who are supposed to be the descendants of the aborigines of North Africa. They live mostly in the fastness of the Atlas Mountains and number about 4 million.

Bergamot, an essential oil obtained from the rind of a species of citrus grown chiefly in Calabria, and largely used in perfumery.

Beryl, a mineral, of which the emerald is a grass-green variety. Composed of beryllium and aluminium silicates. The pure mineral is colourless; the colour of most beryl comes from traces of impurities, notably iron and chromium. Otherwise it is yellowish, greenish-yellow, or blue, and is found in veins which traverse granite or gneiss, or embedded in granite, and sometimes in alluvial soil formed from such rocks.

Beryllium *or* **Glucinium**, is a white metal prepared from beryl, and found also in the emerald and other rare minerals. Discovered by Vauquelin in 1797. Copper containing 2 per cent. of beryllium is used for making springs.

Bessemer Process, for making steel depends on the forcing of atmospheric air into molten pig iron to burn out the impurities. (*See* **Steel.**)

Betel, the leaf of an Indian climbing plant, of pungent, narcotic properties. It is destructive to the teeth, and reddens the gums and lips.

Bhang, the Indian name for the hemp plant *Cannabis sativa*, the leaves and seed-capsules of which are chewed or smoked. The potent drug which comes from flowers of the female plant is called hashish in Arabia and marihuana in the United States and Mexico. *See* **P23** (2).

Bible—The Old Testament and the New Testament. The old Testament—the prehistoric portion—consists of 39 books, and is divided into three parts: (1) the Law, (2) the Prophets, (3) Miscellaneous Writings. The Old Testament was written in Hebrew except for parts of Ezra and Daniel, which were in Aramaic. It was not until the 9th century A.D. that a complete Hebrew text was made, the so-called Massoretic text. Before that the main versions were the Greek Alexandrian Septuagent of the 3rd and 4th centuries B.C. and St. Jerome's Latin Vulgate of the 4th century A.D. Portions were translated into the Anglo-Saxon in the 8th century, and the Venerable Bede put the greater part of St. John's gospel into English, but it was not until 1535 that a complete printed English version appeared—the Coverdale Translation. The Authorised Version dates from 1611 in the reign of James I., and because of its beautiful phraseology it has had a lasting appeal. The Revised Version dates from 1885. A new translation of the Bible in the English language of today is in progress; the New Testament is to be published in 1961 and the Old Testament and the Apocrypha later. The finding of the Dead Sea Scrolls (since 1947) has added to our knowledge of Scripture.

Bibliomancy, divination by certain references at hazard to pages, lines, or verses of the Bible, and frequently resorted to in olden times.

Bill of Rights, or Declaration of Rights, was the document setting forth the conditions upon which the British throne was offered to William and Mary in 1688. This was accepted and ultimately became an Act of Parliament.

Birch, a genus of deciduous trees including about 40 species and found only in northern regions. Birches native to Britain, and to Europe generally, are of two species—the silver birch, *Betula pendula*, with its graceful, drooping branches and triangular leaves, and the white birch, *Betula pubescens*, which has erect branches and soft oval leaves. Birch timber is an important plywood timber, the bark is used for tanning leather, and wintergreen oil comes from the bark of black birch, *Betula lenta*, a North American species. The birch is not a long-lived tree, few standing for more than a hundred years. The tallest recorded is at Woburn in Bedfordshire, 102 ft. high.

Birds, or Aves, are, next to mammals, the highest class of animal life. They are vertebrate, warm-blooded, oviparous, are covered with feathers, and possess wings. In construction they vary greatly, according to their classification and their conditions of life. Birds are of three distinct classifications—*Carinatæ*, possessing keeled breast-bones and having power of flight; *Ratitæ*, having raft-like breast-bones, and incapable of flight; and *Archæornithes*, a lizard-tailed sub-class, of which only one species has been known, the extinct archæopteryx, recognised as a "missing link" connecting the birds and reptiles. It is estimated that there are about 120 million land birds breeding in Great Britain, including 10 million each of the chaffinch and blackbird, 7 million each of the starling and robin and about 2 million sparrows. *Bird Arrivals.* The wheatear is usually the first of the migratory birds to return, often reaching Britain at the end of February and always before the middle of March; the sand martin is the first of the "early swallows" to return, followed by the house martin. The first cuckoo arrives about the middle of April, and the whinchat, garden warbler, and sedge warbler during the last week in April. The nightjar, spotted flycatcher, and red-backed shrike are not seen until the first week in May. The swift is among the last to return from Africa and the earliest to depart. *See* **F24** (2), **Z21.**

Birds of Paradise, several species of tropical birds inhabiting the dense forests of New Guinea and neighbouring islands. The male birds are remarkable for their brilliant plumage, long tail feathers, and ruffs on wings and neck, which are displayed to advantage during courtship. Related to the Bower Birds of Australia.

Biretta, a four-cornered head-covering worn by ecclesiastics of the Roman Church and varying in colour according to the rank of the wearer. A cardinal's biretta is red, a bishop's purple, a priest's black.

Bise, a keen dry north wind prevalent in Switzerland and South France.

Bishop is a Christian ecclesiastic, a person consecrated for the spiritual government of an area, a diocese or province, to the spiritual oversight of which he has been appointed (diocesan bishops), or to aid a bishop so appointed (suffragan bishops). In the Church of England there are forty-three diocesan bishops, all nominated by the Crown. Two, Canterbury and York, are archbishops having primacy in the respective provinces. The archbishops of Canterbury and York and the bishops of London, Durham, and Winchester and twenty-one other diocesan bishops in the order of seniority are spiritual peers, and sit in the House of Lords. The (Disestablished) Church of Ireland

has two archbishops and bishops; the (Disestablished) Church of Wales an archbishop and five bishops and the Episcopal Church in Scotland six bishops. There are over 120 Anglican bishops of dioceses overseas, including Africa, Australia, Canada, India, New Zealand, the West Indies, and elsewhere.

Bismuth, a brittle grey-white metal with a pink tinge. It is readily fusible, melting at 264° C. and boiling at about 1420° C. Wood's metal, an alloy with one of the lowest melting points (under 150° F., so that a spoon made of it will melt when placed in a cup of hot tea), contains four parts bismuth, two parts lead, one part tin, one part cadmium.

Bison, a genus of wild cattle, distinguished from the ox by its shorter, wider skull, beard under the chin, high forequarters, and, in winter, a great mane of woolly hair covering head and forequarters. There are two species, the European and the American bison, both now protected in game preserves.

Bittern, a bird of the heron genus, with long, loose plumage on the front and sides of the neck. It is a solitary bird inhabiting marshes, but rare in Britain.

Bivalves, a term applied to shell-fish whose shell consists of two valves, lying one on each side of the body, such as mussels, oysters, and cockles.

Blackbird, or Merle, a member of the Thrush family, a familiar song bird in Britain. Male is all-black with orange bill; female is mottled brown with brown bill.

Blackcock and Greyhen (as the female is called) are closely related to the Capercaillies but smaller. They nest on the ground and prefer wooded country to open moors. Found in northern half of northern hemisphere. Perform excited courtship dances; the male is a handsome blue-black bird with white undertail, the female dark brown mottled.

Black Death, a fierce epidemic of plague, which carried off thousands all over Europe in the 14th century. It raged in England and wiped out whole villages. The English Statute of Labourers (*see under* **Labourers, Statute**) was a measure to direct labour and regulate wages in an attempt to deal with the situation.

Black Hole of Calcutta was the place where a number of English were confined in 1756 by order of Suraj-ud-daula. Into a noisome space, about 20 ft. square, 146 persons were driven, and only 23 were found alive the next morning.

Black-letter, the Old English or Gothic type first used in printing blocks.

Black Woodpecker (*Dryocopus martius*), a large, black bird about the size of a rook, with slightly crested scarlet crown, found in many parts of Europe.

Bladderwort, a submerged water plant which traps water-fleas and other small animals in bladders borne upon the finely-divided leaves.

Blende *or* **Zinc Blende** is zinc sulphide, the principal zinc ore Pitchblende is an important ore for its uranium and radium content.

Blenny, a group of marine fishes with spiny rays, part of the fin running along the back. Several species are found around the British coast.

Blind-Worm *or* **Slow-Worm,** is a limbless lizard. Found in most parts of Europe, non-venomous.

Bloody Assizes, the assizes, conducted in 1685 by George Jeffreys, Lord Chief Justice, at which participants in the Duke of Monmouth's rebellion against King James II. were tried. They were marked by relentless cruelty

Bluebird, a migratory bird of North America, deriving its name from its deep blue plumage. It is one of the few song birds of America, and familiar in the woods from early spring to November. The bluebird was used as the symbol of happiness by Maeterlinck in his play *The Blue Bird.*

Blue Monday, the Monday immediately preceding Lent, when in the 16th century many churches were bedecked internally with hangings of blue.

Blue Peter, a blue flag with a white square in the centre, is hoisted 24 hours before a ship leaves harbour (the letter P in the alphabet of the International Code of Signals).

Blue Ribbon, a term in general use to denote the highest honour or prize attainable in any field or competition. Thus the Derby is the blue ribbon of the turf. The expression is derived from the highest Order of Knighthood in the gift of the British Crown, the insignia of which is a garter of blue velvet.

Blue Stocking, a term used to describe a learned or literary woman, particularly if pedantic and undomesticated. It is said that the term derives from the Bas-Bleu club of Paris, which was attended by the literary savantes of the 17th century. In England a similar literary club was formed about 1780, whose members were distinguished by their blue stockings.

" Blue " Sun, Moon, etc., a phenomenon caused by the scattering of sunlight by transparent particles suspended in the atmosphere, the effect being that blue light is transmitted and red light extinguished to direct vision. The dust from the Krakatoa eruption in 1883 and the drifting layer of smoke from the forest fires in Alberta, Canada, in September 1950 gave rise to " blue " moons and suns, phenomena sufficiently rare to be described as occurring " once in a blue moon." In the cold climatic conditions of the Pamirs and the far north, vegetation is said to look " blue " on account of the rays of high calorific value (red, yellow, green) being absorbed, while only the blue and violet are transmitted. It was Tyndall who first explained the blue colour of the sky.

Blunderbuss, a short, bell-mouthed musket with wide bore, capable of firing many balls at once, and much used in the 17th century.

Boa, a term applied to a family of snakes of large size, some attaining a length of 30 ft. They are not poisonous, but kill their prey by crushing —constriction—hence the name "boa constrictor." They occur both in the Old World and the New, but are more abundant in the latter. Most Boas retain the eggs within the body until young are fully developed, whereas the Pythons almost all lay leather-shelled eggs.

Boar, or Wild Hog, an animal largely distributed over the forest regions of Europe, Asia, Africa, and South America. It has a longer snout and shorter ears than its descendant the domestic hog, and is provided with tusks. Having to forage for itself, it is a more active and intelligent animal than the pig of the sty, and offers good sport to the hunter.

Boat, an open vessel, propelled by oars or sails, or both. The boats of a ship of war are the launch, barge, pinnace, yawl, cutters, jolly boat, and gig; of a merchant vessel, the launch, skiff, jolly boat or yawl, stern boat, quarter-boat, and captain's gig. Every British passenger ship is compelled to carry a launch and proper equipment of lifeboats.

Bode's Law, a numerical relationship formulated by Bode in 1772, which states that the relative mean distances of the planets from the sun are found by adding 4 to each of the terms 0, 3, 6, 12, 24, 48, 96. The actual mean distances (in millions of miles) are: Mercury, 36; Venus, 67·2; Earth, 92·9; Mars, 141·6; Jupiter, 483·3; Saturn, 886·0; Uranus, 1782·8. The gap between Mars and Jupiter caused Bode to predict the existence of a planet there, which was later confirmed by the discovery of Ceres and other minor planets. The law breaks down, however, for Neptune and Pluto.

Bodleian Library, the official library of Oxford University, named after Sir Thomas Bodley, who began in 1598 to restore and add to its treasures. Other notable donors have been Archbishop Laud, John Selden, and Edward Malone. In the 19th century the Ratcliffe Library became its reading-room. It has been enlarged from time to time and in 1947 a new wing was opened by the King and Queen. Under the Copyright Act of 1911 it is entitled to a copy of every book published in the United Kingdom.

Boer War, lasted from Oct. 11, 1899, when the Boers invaded Natal, to May 31, 1902, when the Peace Treaty was signed at Vereeniging. At first the operations of the British troops in Cape Colony were unsuccessful and disastrous reverses were sustained. Lord Roberts was then sent out as Commander-in-Chief, with Lord Kitchener as Chief-of-Staff, and from February, 1900, when Kimberley was relieved and Cronje was compelled to surrender and Ladysmith and Mafeking were relieved, the struggle was practically over.

Boiling-point is the temperature at which a liquid

boils. At that point the pressure of the vapour is equal to the pressure of the atmosphere. Under increased pressure the b. p. rises and under less pressure, as on the top of a mountain, it is lower. As represented on the Centigrade scale the b. p. of water is 100°; alcohol 78·4°; and ether, 35·6°. On the Fahrenheit scale, the b. p. of distilled water is 212°. Boiling points are given for a standard pressure (760 millimetres of mercury).

Bolshevism, the doctrine professed by the left wing of the old Russian Social Democratic Party. The name is derived from the fact that at a conference of the Party held in London in 1903, a majority ("Bolsheviki") secured the acceptance of views urged by their leader Nicolai Lenin. The minority ("Mensheviki") practically withdrew from control of the Party's operations. It was the Revolutionary majority which under Lenin took over the government of Russia in 1917, establishing a communistic centralised control of economic production and distribution, based on the Soviets—the social institutions evolved by the workmen, soldiers, and peasants.

Book of Common Prayer contains the services of the Church of England, and is in the main the same as that of Edward VI., with modifications introduced at later dates.

Book of the Dead, a collection of ancient Egyptian spells for recitation in tombs, containing reference to judgment after death. *See* **G17 (1).**

Books were originally formed, it is supposed, from beech-bark. At first, collected writings were produced in the form of rolls; then in volumes; and when the art of printing spread, they began to be issued in bindings upon the principle still in vogue. The earlier books were massively bound, with metal clasps and bands, and samples centuries old survive to show the durability of their workmanship. Books are technically described, according to their sizes, as 4to, 8vo, 16mo (*quarto, octavo, duodecimo*), the names indicating the number of folds in a sheet. For Standard Sizes of British Books *see* **N13.**

Books, Classification of. All libraries are classified to facilitate reference, but the favourite system is the Dewey Decimal System, which divides the whole field of knowledge into ten Main Classes: General Works; Philosophy; Religion; Sociology; Philology; Natural Science; Useful Arts and Applied Science; Fine Arts; Literature; History (including geography and travel and biography). Each of these Main Classes is again subdivided into ten main divisions. As an example: the main class of Sociology receives the number 300. This range 300 to 400 (the next main class) is graduated into tens, and Economics is 330. The range 330 to 340 is again graduated, and the subject of Labour and Capital is 331. This process is carried on by decimals so that 331·2 deals with Remuneration for Work, 331·22 with Wage Scales, and 331·225 with Extra Pay.

Boomerang, a weapon used by the Australian aborigines, made of wood, in the form of a parabola, one side flat, the other round. When thrown forward into the air, it whirls round and rebounds behind the point from which it was projected. Used both as a missile of war and for killing game.

Borax (**Sodium Pyroborate**) is a white, soluble, crystalline salt. It is widely and diversely used, *e.g.*, as a mild antiseptic, in glazing pottery, in soldering, in the making of pyrex glass, as a cleansing agent and sometimes as a food preservative. Borax occurs naturally in the salt lakes of Tibet, where it is called tincal, in California (Borax Lake, Death Valley), and elsewhere.

Borough English, an English custom still obtaining in a few places, whereby, in default of a testamentary disposition to the contrary, landed property descends to the youngest son in exclusion of elder brothers. The term is obsolete since Jan. 1, 1926.

Borstal, an institution where young delinquents between 16 and 23 on conviction may be sent for detention and reform by a court of quarter sessions or assize. The first was opened in 1902 at the village of Borstal, near Rochester in Kent. Administered by the Prison Commission.

Boston Tea Party, an incident which occurred on Dec. 16, 1773, on board some tea-ships in Boston Harbour. High taxation imposed by the British Parliament under George III. had caused bitter feelings, and instigated by popular meetings, a party of citizens, disguised as Indians, boarded the tea-ships and threw the tea overboard. This incident was a prelude to the American War of Independence (1775–83).

Boulevard, a French term given originally to the ramparts of a fortified city but now applied generally to any wide and busy thoroughfare planted with trees. Particularly famous, of course, are the boulevards of Paris.

Bounds Beating, an old Anglo-Saxon custom. The parish clergyman and officials go round the parish boundaries accompanied by boys, who beat the boundary stones with long sticks of willow. The ceremony takes place on the Rogation days preceding Ascension Day.

Bow, an instrument for propelling arrows, and, in the days when it was a weapon of war, was usually made of yew or ash, and was about 6 ft. long, with an arrow 3 ft. long. It was the weapon with which Crécy, Poitiers, and Agincourt were won. The cross-bow was Italian and was adopted in France, but did not become popular in Britain.

Bow Bells is the peal of the London church of St. Mary-le-Bow, Cheapside, within sound of which one must be born to be entitled to be called a "cockney."

Bowdlerize, to expurgate a book. Derived from Thomas Bowdler (1754–1825), the editor of the Family Shakespeare, in which "those words and expressions are omitted which cannot with propriety be read aloud in a family." He treated Gibbon's *History of the Decline and Fall of the Roman Empire* in the same way, omitting "all passages of an irreligious and immoral tendency." Such prudery met with ridicule and hence the words "bowdlerism," "bowdlerist," etc.

Bower Bird, native to Australia and New Guinea and related to the Bird of Paradise, though less remarkable in appearance. In the mating season the male builds a "bower" of sticks and grasses for courtship displays and as a playground. The Gardener Bower Bird of Papua makes a lawn in front of his bower and adorns it with bright coloured pebbles and flowers which are replaced as they wither. The female builds her nest away from the bower.

Boycott, a term used in connection with a person that the general body of people, or a party or society, refuse to have dealings with. Originally used when Captain Boycott (1832–97) was made the victim of a conspiracy by the Irish Land League which prevented him making any purchases or holding any social intercourse in his district. He had incurred the League's hostility by a number of evictions.

Brahmin, member of the highest Hindu caste. *See* **Caste** and **Hinduism.**

Brains Trust. The original term was the name of a group of experts appointed by President Roosevelt to advise him upon measures (embodied in the "New Deal" programme, 1933) to foster the industrial recovery of the United States after the economic crisis of 1929 and the following years. Also the name given to the B.B.C. programme introduced in 1941.

Brandywine, Battle of, fought between the British and the Americans in 1777 during the American War of Independence, resulting in victory for the former.

Brass is a compound metal containing two-thirds of copper to one-third of zinc, and while being harder than copper, is more easily worked.

Brass-wind, a collective term for those instruments in an orchestra which are made of brass (or other metal) and which are sounded by blowing so as to cause the lips to vibrate within a cup- or funnel-shaped mouthpiece. The shape of the mouthpiece affects the tone, *e.g.*, cornet, trumpet, horn, trombone, tuba.

Breadfruit Tree (*Artocarpus altilis*), a native of the South Sea Islands; the fruits are a brownish green, about the size of a melon, and contain a white pulpy substance which is roasted before being eaten. The tree grows 40 ft. or more. Captain Bligh's ship *Bounty* was on a voyage to Jamaica carrying a cargo of 1,000 breadfruit trees when the mutiny occurred.

Bretton Woods. In order to achieve co-operation on money matters, stable exchanges and expansion of international trade, forty-four nations met in July, 1944, at Bretton Woods, U.S.A. They recommended the setting up of an International Monetary Fund and an International Bank to assist reconstruction, especially in countries devastated by war. Under the American Loan Agreement, Britain was bound to participate, but Russia did not sign.

Brevet is a special commission entitling an officer to a rank in the army higher than that which he really holds in his own regiment, without increase of pay.

Breviary (Lat. *breviarium* = abridgment), the short prayer-book of the Roman Catholic Church which gives the Divine Office, *i.e.*, the canonical hours or services. The directions for Mass are in the Missal. The modern Roman breviary is a reformed version of the 11th-century breviary and was produced by Pope Pius V. in 1568 in response to a decree of the Council of Trent. All Roman Catholic priests are required to recite the whole of the breviary services allotted for each day. *See also* **Matins.**

Brick, a moulded block of clay, either burnt in a kiln or sun-dried, used for building. All the ancient nations made bricks, at first only baking them in the sun, and afterwards by means of fire. The Israelites were employed in brick-making during their captivity in Egypt. The Romans used bricks for all ordinary purposes, and introduced them into England. In these days brick-making is mainly done by machinery —digging the clay, grinding, screening tempering (pugging), moulding, drying, burning (firing). The standard size, proved by centuries of experience to be the easiest to handle and the most economical, is approx. 9 in. × 4½ in. × 3 in. The processes of tile-making are similar. A plain tile is 10½ in. × 6½ in. × ⅜–⅝ in. Many varieties of bricks and tiles are produced for different purposes.

Bridewell, a house of correction standing till 1864 in London near Blackfriars Bridge. Originally a palace built by Henry VIII. So called from St. Bride's (or Bridget's) Well near by.

Bridges are structures for continuing a road, railway, or canal across a river, valley, ravine, or a road or railway at a lower level. From early times bridges were made of timber, stone, or brick, and it was not until the 19th century that wrought- and cast-iron were used. Today the materials mostly used are steel and reinforced concrete. Among the most famous of ancient bridges is that of S. Angelo at Rome, built by Hadrian as the Pons Aelius, A.D. 134. The first stone bridge across the Thames was completed in 1209, and upon it were a number of timber houses; this old London Bridge, as it was called, stood until the 18th century. The Rialto bridge at Venice dates from 1588. The Ponte Santa Trinita at Florence, one of the finest Renaissance bridges and deemed the most beautiful in the world, was destroyed by German mines in 1944 but has now been reconstructed just as it was before. The first cast-iron bridge was Telford's famous Menai suspension bridge with a span of 580 ft., built 1819–26, which lasted until 1940, when it was completely reconstructed. Another example of Britain's supremacy in constructional ironwork was Robert Stephenson's tubular bridge across the Menai Straits, the prototype of all modern plate girder railway bridges. Waterloo bridge, first opened in 1815, has been rebuilt (opened in 1945) and is a fine example of a reinforced-concrete bridge. Other famous bridges are the Niagara (suspension), Forth bridge (cantilever), London Tower bridge (suspension), Tay bridge in Scotland, Victoria Jubilee bridge across the St. Lawrence at Montreal (an open steel structure), Golden Gate suspension bridge, San Francisco (the world's longest single-span bridge), Sydney Harbour bridge, Triborough bridge, New York, Lower Zambesi bridge (longest in the world), Storstrom bridge in Denmark (longest in Europe), Howrah bridge at Calcutta, with the third largest cantilever span in the world, the Volta bridge of Ghana and the Auckland Harbour bridge, both built in recent years. Work started in 1958 on the Forth road bridge, which will have the largest single-span in Europe. (*See also* Bailey Bridges.)

Britannia Metal, an alloy of tin, antimony, and copper, harder than pure tin, corrosion-resistant, and used for teapots, and jugs (often electroplated).

British Association for the Advancement of Science, The, was founded in 1831 by a group of British scientists under the leadership of Charles Babbage (1792–1871) to stimulate scientific inquiry and promote research in the interest of the nation. Its meetings are held annually in different cities of the United Kingdom. It is divided into sections which include the chief physical and biological sciences, economics, anthropology and archæology, psychology and education, engineering forestry, agriculture, and there is also a division for the social and international relations of science. The President each year is one of the most eminent scientists or public men of the time. Sir George Thomson, F.R.S., succeeded Sir James Gray in 1960. New and wider programmes of activity were inaugurated in 1958, including the founding of the Junior B.A. and the setting up of a study group to examine the general education of the scientist through his school and university career. Membership is open to laymen as well as scientists, and particulars can be obtained from the Secretary, Burlington House, Piccadilly, W.1.

British Broadcasting Corporation is a public corporation, acting as trustee for the nation, under Government control and responsible to Parliament. Its object is to disseminate information, to educate and entertain the 14,583,256 (1959) persons holding licences for sound and television broadcasting. The Home Service, organised on a regional basis, broadcasts on 330 metres (London), the alternative Light Programme on 1,500 and 247 metres, Network Three and the Third Programme, on 464 and 194 metres. The European Services broadcast news bulletins and programmes in foreign languages to continental audiences, and the Overseas Services cater for listeners in all parts of the world. The present charter came into force in 1952 and expires in 1962. Nine governors are responsible for policy: Sir Arthur fforde succeeded as Chairman in 1957, and Mr. Hugh Carleton Greene as Director-General at the end of 1959.

British Council, The, founded in 1934 and granted a Royal Charter in 1940, exists to promote a wider knowledge overseas of the United Kingdom and the English language and to develop closer cultural relations with other countries. Its funds are voted by Parliament. It has staff in many Commonwealth and foreign countries. In the U.K. it arranges study programmes for visitors from overseas and services for overseas students, particularly those from the Colonies. The amount of public money allocated to the British Council for 1959–60 was £5,308,150. Headquarters: 65 Davies Street, London, W.1.

British Museum, was created by an Act of Parliament in 1753, when the Sir Hans Sloane collection, which the British Government had acquired for £20,000, was added to the Cottonian Library and the Harleian Manuscripts. It was opened to the public in 1759 at Montagu House, Bloomsbury. The acquisition of the library of George III. (now known as the King's Library) in 1823 made larger premises necessary, and the present building in Great Russell Street was completed in 1847 from designs by Sir Robert Smirke. The great domed Reading Room was opened in 1857, and the Natural History Department was transferred to South Kensington in the eighties. As a museum it is perhaps the most famous in the world, since, apart from its colossal library of books and manuscripts, it has many priceless collections of sculptures, antiquities, prints and drawings, coins and medals. Under the Copyright Acts the British Museum has the right to receive *gratis* a copy of every book published in the United Kingdom. The British Museum Reading Room contains original sources, books, and periodicals which cannot be found elsewhere. Because of necessarily limited accommodation the use of the room is restricted to those who require a wider range of books on the subject of their study

than can be found in other libraries. Those who desire to be admitted to the Reading Room must apply in writing to The Director, British Museum, London, W.C.1.

British Railways. The name under which the railways of Britain were unified on January 1, 1948. Instead of the former four main railway systems six regions were formed: London Midland region (former L.M.S.R.) Western (former G.W.R.), Southern (formerly S.R.), Eastern (southern area of former L.N.E.R.), N.E. region (N.E. of former L.N.E.R.), Scottish region (Scottish system of the former L.M.S.R. and L.N.E.R.). The new (1956) badge of British Railways shows the British lion holding between its paws a silver locomotive wheel. On an heraldic crown of gold are arranged the rose (for England), the thistle (for Scotland), the leek (for Wales), and the oak-leaf (for all Great Britain).

Brocken-spectre or Glory. The series of coloured rings which an observer sees around the shadow of his own head (or an aeroplane in which he is travelling) as cast upon a bank of mist or thin cloud. This effect is produced by reflection and refraction of sunlight in minute water-droplets in the air just as in a rainbow.

Bronze is primarily an alloy of copper and tin, and was one of the earliest alloys known, the Bronze Age in the evolution of tool-using man coming between the Stone Age and the Iron Age. Some modern bronzes contain zinc or lead also, and a trace of phosphorus is present in "phosphor-bronze."

Bubble Chamber. An instrument recently devised for recording quickly and accurately on photographic film the motion of fast atomic particles in accelerating machines. The technique is based on the original "Wilson cloud chamber" using liquid hydrogen. The passage of an atomic particle is marked by a trail of very small bubbles. *See* **F66** (2).

Bucephalus, Alexander the Great's celebrated war-horse, whose memory his owner perpetuated by building the town Bucephala.

Buckingham Palace, London residence of British sovereigns since 1837. Originally built for the Duke of Buckingham (1703); bought by George III. in 1762 and remodelled by Nash 1825–36. Considerable extensions have since been made.

Buddhism, one of the great Oriental religions which arose in India in the 6th and 5th centuries B.C. as a development of, and also as a protest against, the prevailing Hindu religion. Buddha (Sanskrit = enlightened one) was the name given to Siddharta Gautama (b. *c.* 560 B.C.), whose people were rulers of a territory in N.E. India. Buddhism lost its hold in India but spread to other parts of Asia—to Ceylon, Nepal, Tibet, Mongolia, Indo-China, Siam, China, Korea, and Japan. The teaching of Buddha accepts unhappiness as the lot of man. Only by renunciation of all desire can tension be released and suffering ended. *Nirvana*—the aspiration of all Buddhists—is the state of mind reached when the self ceases to matter and becomes absorbed in the Great Self (left undefined by Buddha); a state which had been described as "bliss unspeakable." The goal is reached by way of meditation and self-discipline. This teaching is known as the Four Noble Truths. There is no caste in Buddhism. Researches of recent years have brought to light much that has been obscure and, in its more modern phases, Buddhism has been freed of much of its superstitions, its idolatrous practices and its Vedic gods. It remains in its purity a gentle creed in which renunciation and kindliness are leading elements. Today Buddhism is showing itself as a great unifying force between peoples of different races and cultures.

Buntings, name of a group of finches, seed-eating birds, usually found in open country. The Yellowhammer, Reed Bunting, Corn Bunting, and Cirl Bunting are resident in Britain; the Snow Bunting (which breeds in small numbers in Scotland) and Lapland Bunting are regular winter visitors, and the Ortolan is among the rare visitors.

Busby, a military head-dress of fur. In Great Britain busbies are of two kinds: the fur *busby* worn by the Hussars and the *bearskin* busby, introduced in 1832 and properly called "bearskin," worn by the Guards. The fur of the bearskin comes from the belly of the bear (a Russian bear or a Canadian bear).

C

Caaba. *See* **Kaaba.**

Cabal, the name given to the unpopular Ministry of Charles II.'s time. The initials of the ministers—Clifford, Ashley, Buckingham, Arlington, and Lauderdale—composed the word.

Cabinet. *See* **C8** (1), **36.**

Cable is the rope or chain that is attached to a ship's anchor. Chain cables are now in general use except for very deep waters. A cable's length is 100 fathoms (200 yards).

Cacao is an evergreen tree, from 15 to 20 ft. high, growing abundantly in tropical America, West Africa, the West Indies, Ceylon, etc., yielding seeds, called cocoa beans, from which cocoa and chocolate are manufactured. The specific name of the cacao tree of commerce is *Theobroma cacao*, whose original home was tropical America. The fruit is 7–10 in. long, hard and ridged; inside are the beans, which are covered with a reddish-brown skin. The trees mature at five to eight years and produce two crops a year.

Cachalot, or sperm-whale, is a cetacean which lives in warmer waters, migrating to colder regions in the summer months. Can reach length of 60 ft., female is only half the size of male. Usually found in schools, often several hundred strong.

Cachet, Lettre de, was a private letter of State signed by the King, much in use in France up to the time of the Revolution, for consigning troublesome people to prison without trial.

Cactus, a family of flowering plants numbering about a thousand species adapted to living in very dry situations. The stem is usually fleshy, being composed of succulent tissue, remarkably retentive of water; commonly equipped with sharp thorns which deter animals from eating them. The roots are generally very long, tapping soil water over large area; a "prickly pear" cactus may have roots covering a circular area 25 ft. or more in diameter. The leaves are commonly insignificant or absent, and the stem takes over the photosynthetic leaf function and becomes accordingly flattened to expose greater area to sunlight and air. In some kinds of cactus (*e.g. Echinocactus*) the stem is shaped almost like a sea-urchin. Gardeners propagate cacti largely by cuttings.

Cadenza, originally a passage in which the singer or solo instrumentalist was free to display his virtuosity as he thought fit. This led to such abuse that composers began writing their own cadenzas, thus ensuring continuity and coherence while still permitting the soloist to exhibit his skill.

Cæsium, an element resembling rubidium and potassium, discovered by Bunsen and Kirchhoff in 1860. It was the first element whose existence was discovered spectroscopically.

Caffeine, a highly stimulative alkaloid found in coffee (1½%) and tea (3%). Pure caffeine crystallises in yellow silky crystals; can be prepared by extracting tea dust, or synthesized from uric acid.

Caique, a long, narrow boat peculiar to the Bosphorus, and usually propelled by oars (from two to sixteen in number), and sometimes with sail.

Calcium, a silvery-white metallic element. It melts at 810° C. and is very reactive. It was discovered by Sir Humphry Davy in 1808, but not until 1898 was it obtained pure, by Moissan. Does not occur as metal in nature, but calcium compounds make up a large part of the earth's crust. Most important calcium minerals are marble, limestone, chalk (all three are, chemically, calcium carbonate); dolomite, which is the double carbonate of calcium and magnesium; gypsum, a hydrated calcium sulphate; calcium phosphate and calcium fluoride. Igneous rocks contain much calcium silicate.

Calculating machines are inventions to relieve men and women of the tedium of long routine or involved computations. The calculating machine seems to date from 1642, when Pascal constructed one which could be used for addition and subtraction. General interest was lacking, however, and almost two hundred and fifty

years elapsed before Ohdner in Sweden produced the first numerical arithmetical machines of the type now in general use. Before very long the electric motor replaced the hand in providing the motive power, and so the electric calculating machine was invented. But at all stages of any calculation on hand-operated or electric machines human operators have to supply them with numbers. The principal feature of the more modern machines is that they are automatic; that is, once a sequence of an arithmetical operation has been decided, and instructions given to the machine in suitable form, such as holes punched into cards or tape, or in some other way, the machine carries out its work without further human intervention. In some calculations these machines frequently give the impression that they are "thinking," or "choosing" a way to carry out the calculations as quickly as possible. But even in such cases the criteria for judgment are actually contained in the initial instructions. The idea of automatic computation by machinery is due to the English mathematician Charles Babbage (1792–1871). He made a small machine of this type, based on the idea of the Jacquard loom for lace-making. He next planned, but never completed, two separate automatic machines, a "difference engine" to help in making mathematical tables, and an "analytical engine," which was to be a general-purpose, programme-controlled, machine possessing all the features of modern calculating machines. But Babbage's inventions were designed to be operated mechanically; it was left to the electronic engineers of the 20th century to bring Babbage's ideas to full fruition. The next important step was taken in 1937, when Aiken of Harvard started to construct, and subsequently completed, the first of the electronic machines. In these electricity is conducted either through an evacuated space, or a gas, or a semi-conductor. All calculating machines are of the "Analogue" or "Digital" types. In the analogue type, numbers are represented by physical quantities, for example, electric currents, of which the numbers themselves are the measures. The most important of this class is the Differential Analyser invented by Vannever Bush of America. In the digital machines the numbers are stored in it, and are represented by discrete objects, such as the teeth of a gear-wheel. Most of the important modern machines are of the digital variety. Almost all the ideas underlying the more advanced of these machines can be found in a remarkable mathematical paper published in 1936 by Turing of Manchester. Scientists, engineers, businessmen, administrators, and the fighting services need, and are making considerable use of, these machines. Problems hitherto considered intractable are receiving renewed consideration in view of the possibility of using machines for the numerical calculations required. The electronic computer marks a great advance, and the world is, perhaps, at the threshold of a new era of science, in connection with which the invention of the modern calculating machine may be as important to the world as was that of the Hindu-Arabic numerals to the Middle Ages. *See* **F54–57**.

Calendar, a collection of tables showing the days and months of the year, its astronomical recurrences, chronological references, etc. The Julian Calendar, with its leap year, introduced by Julius Cæsar, fixed the average length of the year at 365¼ days, which was about 11 minutes too long (the earth completes its orbit in 365 days 5 hours 48 minutes 46 seconds of mean solar time). The cumulative error was rectified by the Gregorian Calendar, introduced in Italy in 1582, whereby century years do not count as leap years unless divisible by 400. This is the rule we now follow. England did not adopt the reformed calendar until 1752, when she found herself 11 days behind the Continent. In the world calendar, advocated by the World Calendar Association, the year is divided into four equal quarters of 91 days, leaving one day over in normal years and two days in leap years. Each quarter is divided into three months of 31, 30, and 30 days respectively and therefore contains exactly 13 weeks, beginning with a Sunday and ending with a Saturday. The days left over are extra-calendar days. For instance, the extra day at the end of each year would be known as Worldsday and the extra day in leap years, coming between the first and second halves of the year, would be known as Leapyear Day. Both these extra days would be world holidays.

Calends, the first day of the month in the Roman calendar, when interest fell due, and proclamations as to the order of days were made.

Calorie. Unit of quantity of heat. The "small" or fundamental calorie is the amount of heat required to raise the temperature of 1 gram of water from 15° to 16° C. This is the gram-calorie used in physics and chemistry. The large Calorie (written with a capital C), commonly used in nutritional connotations, is equal to 1000 small calories and is defined as $\frac{1}{180}$ of the heat required to raise the temperature of one pound of water from 32° to 212° F. The daily energy output of an active man is said to be equivalent to about 3000 Calories. *See also* **P39**(2).

Calotype, a wet-plate photographic process invented by H. Fox Talbot about 1840.

Calumet, a sacred decorated reed tobacco pipe used as a symbol of peace or war by the Indians of North America, the bowl being composed of soap stone, and the tube, which is long, being decked with feathers. To accept the calumet when offered is to be friendly, to reject it is to proclaim enmity. There is also a distinctive calumet of war used only on a declaration of war between tribes.

Calypso, West Indian song in the form of a doggerel lampoon composed spontaneously and sung to a guitar.

Cambridge University had a sufficiently good teaching reputation to attract Oxford students in 1209, when lectures at their own university were suspended. In 1226 it had a Chancellor who was recognised by King and Pope. The first college to be founded was Peterhouse in 1284. The university was reorganised and granted a Charter of Incorporation by an act of Elizabeth in 1571. The colleges with their dates of foundation are Christ's (1505), Clare (1326), Corpus Christi (1352), Downing (1800), Emmanuel (1584), Gonville and Caius (1348), Jesus (1496), King's (1441), Magdalene (1542), Pembroke (1347), Peterhouse (1284), Queens' (1448), St. Catherine's (1473), St. John's (1511), Selwyn (1882), Sidney Sussex (1596), Trinity (1546), Trinity Hall (1350), Fitzwilliam House (non-collegiate students) (1869) and four women's colleges: Girton (1869), Newnham (1875), New Hall (1954), and Hughes Hall (formerly Cambridge T.C.) (1885).

Camel, a large ruminant quadruped, inhabiting Asia and Africa, where it is largely used as a beast of burden. There are two species—the Arabian camel or dromedary, with only one hump; and the Bactrian, or double-humped camel. There are no wild dromedaries, and the only wild bactrians occur in the Gobi Desert. The camel is able to go for long periods without water, not, as was formerly believed, because it stored water in its hump, but because of the unique mechanism of its physiology which enables it to conserve water at the expense of not sweating until 104° F. is reached.

Camisards, a French Protestant party of the early 18th century which originated in the Cevennes and resorted to arms in support of its faith.

Campaniles, or bell-towers are usually detached from their parent church, but not always. The most famous are in Italy, and are lofty and elaborate structures. Giotto's tower at Florence, adjoining the cathedral of Santa Maria del Fiore, is architecturally the finest in the world. Other famous campaniles of Italy are those of Cremona (395 ft. high) and Pisa (the leaning tower). The magnificent pointed campanile of St. Mark's, Venice, which collapsed in 1902 and has since been rebuilt in its original form, was begun n 902. Campaniles as separate structures are seldom found in Great Britain: the finest is that of the Westminster Roman Catholic Cathedral. The bell-turrets of St. Paul's in London and St. Peter's at Rome are only a form of campanile.

Campus Martius was a large plain used by the ancient Romans as a military camping ground. It was situated between the Quirinal and Capi-

toline hills, and is to-day entirely built over and forms the heart of modern Rome.

Canal, an artificial watercourse used for navigation which changes its level by means of locks. Some 2,400 m. are in use in Gt. Britain, the English network being based on the four great estuaries Mersey, Humber, Severn, and Thames.

Canary, a light, sweet wine from the Canaries and chief export until the grape blight of 1853. Much consumed in Britain from Tudor to Georgian times.

Candela, unit of luminous intensity, replacing the former *international candle* as standard. So defined that the brightness of a total radiator, or black body, at the temperature of solidification of molten platinum is 60 candelas per sq. cm.

Candlemas, an English and Roman Church festival in celebration of the Purification of the Virgin when she presented the infant Jesus in the Temple and deriving its name from the great show of candles made on the day (February 2) in the Roman celebrations.

Canon, a term applied to signify a recognised rule for the guide of conduct in matters legal, ecclesiastical, and artistic, or an authoritative ordinance: thus we have Canonical Scriptures, Canon Law, etc. A Canon is also a dignitary of the Church, usually a member of a cathedral chapter in the Anglican communion, or in the Roman Church a member of an order standing between regular monks and secular clergy.

Canonical Hours were seven in number in the Western Church; Matins and Lauds, before dawn; Prime, early morning service; Terce, 9 a.m.; Sext, noon; Nones 3 p.m.; Vespers, 4 p.m.; Compline, bed-time.

Canonisation, the entering of one of the faithful departed on the list of saints of the Roman Catholic Church, after proof of purity and distinction of life has been accepted. This having been done, a day is named for the future keeping of the anniversary of the saint's death, and thenceforward appears in the Church Calendar. Beatification, by which a person is called blessed, is usually followed by canonisation, but not necessarily.

Cantata, originally a long piece for solo voice, *i.e.*, the vocal counterpart of a sonata. The term is now used to cover a small oratorio.

Canticles, the name given to the scriptural passages from the Bible sung by the congregation in the various Christian liturgies. They are the *Benedicite*, *Benedictus*, *Magnificat*, *Nunc Dimittis*.

Cap, literally any head-covering article of dress. The "Cap of Maintenance" is carried before the Sovereign at the Coronation, and is used symbolically in heraldry.

Capercaillie, the largest and most handsome of the grouse family, found in the Scottish highlands and the pine forests and mountainous regions of Northern and Central Europe and Asia.

Capet, the family name of a race of French kings, founded by Hugh Capet in 987 with its collateral branches. Reigned until 1848, except for the period of the French Revolution and Napoleon.

Capitol, a term that was first applied to the Temple of Jupiter on the Capitoline Hill, Rome, completed in 507 B.C. It was several times destroyed by fire and rebuilt. The existing Capitol, a large portion of which serves the purpose of a museum, was erected from designs by Michelangelo. In all the chief cities of the ancient Roman Empire there was a capitol or town-hall. In the United States the building occupied by Congress at Washington bears the name of the Capitol, and the halls of the legislative assemblies of the different States are so named.

Capricorn, a zodiacal constellation between Sagittarius and Aquarius, figured out in ancient times as having the head of the goat and the hind part shaped like a fish.

Capuchins are members of a mendicant order of Franciscans, founded in the 16th century with the aim of restoring the primitive and stricter observance of the rule of St. Francis, so called from the capuce or pointed cowl worn by them.

Carat, a term used in assessing the value of gold and precious stones. In connection with gold, it represents the proportion of pure gold contained in any gold alloy, and for this purpose the metal is divided into 24 parts. Thus 24-carat indicates pure gold, and any lesser number of carats shows the proportion of gold contained in the alloy. The carat as a measure of weight is now obsolete, having been replaced by the *metric carat* of 0·2 grams.

Caravan, a band of travellers or traders journeying together for safety across the Eastern deserts, sometimes numbering many hundreds. There are several allusions to caravans in the Old Testament. The great caravan routes of this period from Egypt to Babylon and from Palestine to Yemen linked up with the Syrian ports and so with western sea commerce. Many wars have been fought in the past over their control.

Carbohydrates, group of organic compounds composed of carbon, hydrogen and oxygen, *e.g.*, sugars, starches, cellulose. The carbohydrates play an essential rôle in all living processes. *See* **P39** (2).

Carbon, a non-metallic chemical element which occurs in crystalline form as diamonds and graphite; amorphous forms of carbon include charcoal and soot, while coke consists mainly of elementary carbon. The biochemistry of plants and animals largely hinges upon carbon compounds. The study of carbon compounds is called Organic Chemistry. *See* **F20.**

Carbonari, members of a secret political society originated in Naples, and at one time very numerous. Their chief aim was to free Italy from foreign rule, and they exerted considerable influence in the various revolutionary movements in the first half of the 19th century. Their name was adopted from the charcoal-burners (*carbonari*), and their passwords, signs, etc., were all in the phraseology of the fraternity.

Carbon dioxide. Commonest of the five oxides of carbon. It is formed when carbon and its compounds are burnt with abundant supply of air, and when carbon compounds are oxidised in the respiration process of animals. The atmosphere contains carbon dioxide to the extent of about three parts in 10,000; this figure remains more or less constant because, while carbon dioxide is always being added by animal respiration and the burning of fuels, such as coal and oil by man, plants are constantly removing it in the process known as photosynthesis or carbon assimilation. A heavy gas and obviously not one capable of supporting respiration, it can accumulate in caves, etc., and cause asphyxiation; for instance, in the Grotto del Cane, near Naples, a dog entering the cave is suffocated, whereas a man whose head is above the carbon dioxide level can walk through it unharmed. Solid carbon dioxide is called "dry ice." The gas in aerated drinks and soda water is carbon dioxide.

Carbon monoxide is a colourless gas with no taste or smell. It is formed when coal and coke are burnt with a restricted supply of air; the blue flame to be seen in a coke brazier, for instance, is the flame of carbon monoxide. This gas is very poisonous, forming with the hæmoglobin of the blood a compound which is useless for respiration and cherry red in colour, which gives a visible symptom of poisoning by carbon monoxide. With nickel it forms a volatile compound, called nickel carbonyl, and this reaction is the basis of the Mond process for extracting nickel.

Cardinal, a Roman Catholic ecclesiastical dignitary of the highest rank. Cardinals are divided into three classes, consisting of 6 cardinal bishops, 50 cardinal priests, and 14 cardinal deacons—70 in all. They are appointed by the Pope, and are associated with him in the government of the Church. A cardinal's dress consists of red cassock, a rochet, a short purple mantle, and a low-crowned red hat with cords and tassels.

Cardinal Virtues, according to Plato these were justice, prudence, temperance, fortitude—*natural* virtues as distinct from the *theological* virtues of the Roman Catholic Church, faith, hope, charity. The phrase "seven cardinal virtues," combining the two, figures in mediæval literature. (*See* **Sins, Seven Deadly.**)

Carlists, a Spanish political party espousing the claim of the descendants of Don Carlos, brother of Ferdinand VII., to the throne of Spain. On the death of the latter in 1833, Isabella, his three-year-old daughter, was proclaimed Queen, owing to the abolition of the Salic law. There

were several Carlist insurrections until the party was finally crushed in 1876.

Carlovingians, the second dynasty of the French kings (established 751), included such notable rulers as Charles Martel and Charlemagne. In 987 the Capet dynasty succeeded.

Carmelites, a body of mendicant friars taking their name from Mount Carmel, where the order was first established in the 12th century. The original rule of the order required absolute poverty abstinence from meat and a hermit life. The rigidity of the rule of the order was mitigated by Innocent IV. They wear a brown habit with white mantle, hence their name of White Friars. The order of Carmelite nuns was instituted in the 15th century.

Carnival, the great festival which takes place in Roman Catholic countries on the last three days before Lent, when people give themselves up to the wildest revelry, buffoonery, and masquerading. It is only in the chief cities of Italy, however, that the custom is kept up with anything of the old spirit. At Nice a modernised form of it is given, of which the "battle of flowers" is a feature.

Carnivora, a large group of animals forming an order of the Mammalia, including cats, dogs, wolves, foxes, civets, bears, otters, seals, sea-lions, walrus, and others. *See* **F25** (1).

Carp, a well-known fresh-water fish, found in plenty in most European and Asiatic still waters; reaches a length of about 2 ft. and under favourable conditions lives for about 40 years. Familiar British members of the family are the roach, rudd, dace, chub, gudgeon, tench, minnow, barbel, bream, and bleak. The goldfish, popular in ornamental ponds, is the domesticated variety of a Far Eastern member of the carp family.

Carpets are thick fabrics used for covering floors, and were first made in Eastern countries—Egypt, Persia India—finding their way to Europe in the Middle Ages. A carpet factory was established in France in the time of Henry IV., and one was set up at Mortlake, in England, in the reign of James I. The carpets of 16th-century Persia are celebrated for their artistic workmanship, examples having been preserved in the great museums of Europe. The best-known English carpets are the Axminster, Kidderminster, and Wilton.

Carthusians, an order of monks founded in 1084 by St. Bruno at the Grande Chartreuse near Grenoble, and introduced into England about a century later They built the Charterhouse (corruption of Chartreuse) in London in 1371. The chief characteristics of the order are a separate dwelling-house in the precincts of the charterhouse for each monk, and the general assembly in the Church twice in the day and once at night. They wear a white habit, with white scapular and hood. The liqueur *Chartreuse* was invented by the order and is still their secret. For many years they have derived large revenues from its sale. The order of Carthusian nuns was founded in the 12th century.

Casein, the chief protein in milk and cheese. It is coagulated by the action of rennet or acid. An important class of plastics ("casein plastics") are produced from it, and these plastics are converted into buttons, knitting-needles, etc. 8000 gallons of milk yield about a ton of casein.

Cassowary, a large bird of the ostrich family, inhabiting the Molucca Islands, New Guinea, and North Australia. It is of black plumage, with three toes, and has a horny crest upon its head. In fleetness it can outstrip the horse.

Castanets. Two small pieces of hard wood which are held in the hand and clicked together. The instrument is of Spanish origin and is commonly used to mark the rhythm of certain Spanish dance tunes.

Caste, a term used to specify the different hereditary social sections into which Indian Hindu society is divided. The four leading castes which are of ancient origin and go on from generation to generation, though they no longer fix the occupations of the people, are: (1) Brahmins or priests; (2) Kshatryas or soldiers; (3) Vaisyas or merchants; (4) Sudras or labourers and artisans. Pariahs are considered outcastes and are sometimes called "untouchable." Many other divisions and subdivisions of caste have been developed from these four and each has its own customs. Wealth has no relation to caste as such and a servant may be of high caste and his master of low caste. The caste system in modern India is being modified.

Castor-oil Plant (*Ricinus communis*), an African shrub now cultivated in most tropical countries. It has broad palmate leaves and bears a spiny fruit containing seeds which when pressed yield the well-known oil.

Cat, the general name for all quadrupeds of the *Digitigrade* section of the carnivorous order, from the lion down to the domestic cat. The latter is believed to be descended from the European Wild Cat and from Cats of other varieties. Egypt is credited with having been the first country in which the cat was domesticated. Among the finest varieties are the Short-haired Red Tabby, Persian, and Siamese. *See* **Z9–12**.

Catacombs are subterranean or built-up places of internment. The most famous are those of Rome, constructed by the early Christians, where in times of persecution they concealed themselves. They are of great extent, consisting of a labyrinth of vaulted galleries, 4–5 ft. wide, at different levels. These Roman catacombs are said to have contained over 6 million bodies and to have extended scores of miles in length, though not more than about six miles are now accessible. Catacombs have also been discovered in Naples, Cairo, Paris, etc. Attached to some modern cemeteries are catacombs of the built-up order, formed of chambers of stone or brick in the walls of churches or mausoleums.

Cataracts are gigantic waterfalls. The most famous are those of Niagara in North America, the Orinoco in South America, the Victoria Falls on the Zambesi in Africa, the Falls of the Rhine at Schaffhausen, and the Cascade of Gavarni in the Pyrenees.

Catechism, an elementary book of principles in any science or art, but more particularly in religion, in the form of questions and answers. There is a great variety of these, including the Lutheran, prepared by Luther in 1529. Calvin's Geneva (in 1536), and the Anglican, in the Book of Common Prayer.

Catechumens, a term applied in the primitive Church to children of Christian parents, who were admitted as neophytes, and occupied a place apart in the church.

Caterpillar, the larva of a butterfly or moth, worm-like in its segmented body, usually furnished with feet, often curiously marked and coloured, and frequently more or less hairy.

Cathedral, the chief church of a diocese, so called from its containing a Bishop's seat, or episcopal chair. The finest cathedral in the world is that of St. Peter's at Rome, founded in 1450. Other celebrated cathedrals are Notre Dame of Paris, the cathedrals of Cologne and Milan, St. Paul's in London, Canterbury Cathedral, York Minster, and the cathedrals of Durham, Bristol, Gloucester, Peterborough, Exeter, Liverpool, and Coventry (destroyed by bombs, now being rebuilt).

Cat's-eye, a kind of quartz, much valued as a gem, opalescent, and of various shades.

Cavalier, a name adopted during the troubles of the Civil War to designate the Royalist party; it is also used generally in reference to a knightly, gallant, or imperious personage.

Caves, natural hollow places in the earth, frequently found in limestone, less frequently in volcanic rocks. Popular caves in Britain are Kent's cavern near Torquay, Cheddar and Wookey hole in the Mendips; Fingal's Cave in Staffa (Inner Hebrides) is noted for its splendid range of basalt columns. The scientific study of caves is known as spelæology. The first discovery of Palæolithic paintings (the celebrated bulls) was made in the Altamira caves in Spain in 1879. (*See* **G5**.)

Caviare is a Russian preparation made from the salted roe of certain fish, such as sturgeon, sterlet, and sevruga, and much appreciated by epicures.

Cedar, a dark-leaved, cone-bearing, horizontal-branched evergreen tree that grows to a considerable height and girth, the best known

species in Britain being the Lebanon Cedar, which was introduced in the 17th century.

'Cello. (*See* **Violoncello.**)

Celluloid, one of the first synthetic thermoplastic materials, discovered by Alexander Parkes in 1865 when he was attempting to produce synthetic horn. It is made by treating cellulose nitrate with camphor and alcohol. The non-flam character of photographic film is conferred by the substitution of a cellulose acetate or other material as base for the dangerously inflammable celluloid otherwise used.

Cellulose, a carbohydrate, and a constituent of nearly all plants. Cellulose occurs in an almost pure state in the fibres of linen (flax), absorbent cotton, jute, and filter-paper (used in laboratories).

Celts, an ancient race of Western Europe, originally settled in Gallia, and afterwards spread over other parts of Europe, including Britain. The two chief divisions of Celtic Britons were the Gaels of Ireland and the North of Scotland, and the Cymri of Wales. The descendants of these races still retain many of their ancient characteristics, and considerable interest is manifested in their language and literature. A reference to Celtic art will be found on **G32**.

Cement means, in general technical parlance, an adhesive. Building cements are calcium silicate–aluminate mixtures made by heating lime with clay; the most widely used kind is Portland cement, invented in 1824 by Joseph Aspdin of Leeds.

Cenotaph (Greek = empty tomb), a monument erected in Whitehall, London, to commemorate all those who gave their lives in the service of the British Empire during the first world war. The permanent structure was unveiled by George V. on Armistice Day, 1920.

Censors were Roman magistrates vested with the power of keeping a record of all citizens, and of controlling the manners, morals, and duties of the peoples. In more recent times in England censors have been appointed by the government in connection with publications of the press or for the stage. During the first and second world wars there was a very strict censorship of news.

Census was the title given in ancient Rome to a register of citizens, with full particulars as to their family, children, slaves, and so forth. The term is now used to denote the periodical survey of the number and condition of the people. In Great Britain it takes place every ten years. The first official census in Britain was that of 1801; the last was taken in 1951.

Centre of Gravity of a body is the fixed point through which the resultant force due to the Earth's attraction upon it always passes, irrespective of the position of the body.

Ceorl, the name given to an Anglo-Saxon freeman in bond-service to a landed proprietor.

Cerium, a scarce metallic element discovered by Berzelius in 1803. It is capable of precipitation to powder, and only exists in combination in the minerals cerite, allanite, and a few others. A mixture of cerium and thorium nitrates is used in the manufacture of gas mantles, which owe their incandescent property to the deposit of cerium and thorium oxide with which they are coated.

Cestus, the name given to a girdle worn by Greek and Roman women around their waists, and generally decorated. It was also the name of the loaded gauntlet worn by boxers in the Roman arena.

Cetacea, the order of mammals including the whales, dolphins, and porpoises, which, though strictly aquatic, breathe air, suckle their young, and are warm-blooded.

Chain reaction. *See* **F11 (1)**.

Chalcedony, a fine quartz with a waxy lustre, and much used by jewellers for necklaces, bracelets, etc. Commonly it is white or creamy. Its bright orange-red variety is called carnelian; its brown variety, sard. Chrysoprase, plasma, bloodstone are varieties which are respectively pale apple-green, dark leek-green, green with red spots.

Chalk, a white limestone, calcium carbonate, found in the Upper Cretaceous deposits (formed from the shells of minute marine organisms). In southern England the chalk is a soft rock, but in Yorkshire, Scotland, and Ireland it is solid limestone. French chalk is hydrated magnesium silicate, a variety of talc.

Chama, a genus of large bivalves of the mollusc family, found in tropical waters, especially amongst coral reefs. *Chama gigas* weigh sometimes as much as 300 lb., and one valve has been employed as the basin of baptismal fonts in various churches.

Chamberlain, Lord, the senior officer of The Royal Household who is responsible for all ceremonial within the palace (levées, courts, garden parties, entertainment of foreign royalties and heads of state) but not the coronation or state opening of parliament. He is also in charge of appointments to The Royal Household and is examiner and licenser of plays.

Chamberlain, Lord Great, one of the great officers of state whose duties are now mainly ceremonial. He attends the monarch at the state opening of parliament and at the coronation and is custodian of the Palace of Westminster (Houses of Parliament). The office is hereditary, dating from Norman times, and is held for one reign in turn by the descendants of the De Veres, Earls of Oxford.

Chamber Music, strictly, signifies music suitable for playing in a small room, but is used to cover music specially composed for small combinations of instruments; *e.g.*, string quartets, etc.

Chameleon, a family of lizards of which there are numerous species. The common chameleon is a native of Africa, and is about 12 inches long, including tail. It is remarkable for its power of changing colour to resemble its surroundings when surprised, a power that is due to the presence of pigment-bearing cells beneath the skin. It is slow in movement, and insectivorous.

Chamois, a species of antelope, and a native of Western Europe and Asia. It is not much larger than a goat, lives in mountainous regions, and possesses wonderful leaping power, so that it is very difficult to capture. Its flesh is much esteemed, and from its skin chamois leather is made. The mating season is Oct.–Nov., and the fawns are born in May or June. They can follow their dam when only a day old. Live to be 20–25 years old.

Channel Tunnel, a scheme to bore a tunnel through 20–30 miles of chalk under the sea between Dover and Calais was proposed in the second half of the 19th century. The bill authorising the work was rejected in 1883. In 1930 the scheme was again proposed by many enthusiastic supporters. The tunnel would be the longest ever made and an engineering wonder of the world. It would consist of two tubes with frequent connections. Electric trains would run through, taking only ¾ hour and reducing the journey between London and Paris by about 2 hours. The estimated cost, however, being more than 35 million pounds, the attendant military risks, and doubt as to feasibility of construction led the Government in June 1930 to reject the proposal. Tunnelling was actually begun some years ago on the British side and the project never fails to be a fascinating subject for discussion.

Chantry, a private church or chapel established and endowed for the maintenance of priests to perform daily Mass for the souls of certain specified persons. Chantries were numerous in England up to the Reformation, and some few still remain.

Chapel Royal, the church dedicated to the use of the Sovereign and Court, and at present situated in St. James's Palace.

Charcoal, a term applied to wood that has been subjected to a process of slow smothered combustion. More generally it refers to the carbonaceous remains of vegetable, animal, or combustible mineral substances submitted to a similar process. Charcoal from special woods (in particular buckthorn) is used in making gunpowder. Bone charcoal finds use in sugar refining, as it removes dark colouring matter present in the crude syrup.

Charterhouse, a famous school that was in Aldersgate Street, London, but removed to Godalming. In connection with the school is an almshouse on the old London site, endowed by Thomas Sutton in 1611. Thackeray, as well as Addi-

son, Grote, and other eminent men, were Charterhouse scholars.

Chartism, the principles or practices of a body of political reformers who (1837–48) conducted a movement for amelioration of social and industrial conditions of the working classes. Their platform was stated in the National or People's Charter, drafted by Francis Place in the form of a charter or act of Parliament, and published May 8, 1838. Reform was demanded under six heads: universal adult male suffrage, vote by ballot, annual parliaments, payment of members, equal electoral districts, and abolition of the property qualification.

Chasuble, a sleeveless vestment worn by ecclesiastics over the alb during the celebration of Mass. It is supposed to symbolise the seamless coat of Christ. Its use in English churches was prohibited in 1552, but again permitted after 1559. It gradually fell into disregard, however, but some fifty years ago was resumed in the High Church services.

Chauvinism is a term applied to any exaggerated devotion to a cause, more particularly to excess of public or military enthusiasm. The word springs from Nicholas Chauvin, whose extravagant devotion to Napoleon I. made him a laughing-stock.

Cheese, an article of food made from the curd of milk, which is separated from the whey and pressed in moulds and gradually dried. There are about 500 varieties differing with method of preparation and quality of milk. They used to be made in the regions after which they are named but nowadays many of them are mass-produced, *e.g.*, Cheddar is made not only in all parts of Britain but in Canada, New Zealand, Australia, Holland, and the U.S.A. Cheeses may be divided into 3 main classes: (1) soft, *e.g.*, Camembert, Cambridge, Port l'Evêque; (2) blue-veined, *e.g.*, Stilton, Gorgonzola, Wensleydale, Roquefort; (3) hard-pressed, *e.g.*, Cheddar, Cheshire, Gruyère, Parmesan, Gouda.

Cheetah, the large spotted cat of Africa and Southern Asia, often called the "hunting leopard" because of its employment in the chase.

Chemistry is the science which analyses and describes the properties and composition of various natural substances. It had its rise in alchemy and has gradually developed into a science of vast magnitude and importance. Organic chemistry deals with the chemistry of the compounds of carbon; inorganic chemistry is concerned with the chemistry of the elements; physical chemistry is concerned with the study of chemical reactions and with the theories and laws of chemistry.

Cherokees, a North American tribe of Indians, once a powerful and warlike nation occupying a large portion of the Allegheny range, but now residing within the Indian Territory under civilised rule of law and very prosperous.

Chestnut, the fruit of the chestnut tree; those of the Spanish chestnut, *Castanea vesca*, furnish a favourite esculent. The wood is used in carpentry; while the horse-chestnut (*Æsculus hippocastanum*) is much employed in brush-mounting and in cabinet work.

Chiaroscuro, a term used in painting to denote the arrangement of light and shade in a picture. On the proper handling of chiaroscuro depends the fidelity of depiction of objects and distances.

Chief of Imperial General Staff, the present title of the Supreme Commander of the British Army. General Sir Francis Festing succeeded Field-Marshal Sir Gerald Templer as C.I.G.S. in Sept. 1958.

Chiltern Hundreds, three hundreds—Stoke, Burnham, and Desborough—the stewardship of which is now a nominal office under the Chancellor of the Exchequer. Since about 1751 the nomination to it has been used as a method of enabling a member of Parliament to resign his seat on the plea that he holds an office of honour and profit under the crown. (This has been a disqualification for Parliament since 1707.)

Chimpanzee, a large anthropoid ape, a native of tropical West Africa, of a dark brown colour, with arms reaching to the knee, large ears, and a general organisation resembling that of man. It possesses considerable intelligence, can walk erect with ease, and when full grown is about 4 ft. high.

Chinchilla, a South American rodent. Grey in colour, and black and white underneath. It is greatly esteemed for its beautiful fur.

Chippendale Furniture was introduced in the reign of George I. by Thomas Chippendale, a Worcestershire cabinet-maker who migrated to London and set up for himself in St. Martin's Lane, Charing Cross. He was fonder of inventing designs for furniture than of making it, and in 1752 published a book of patterns; the London furniture-makers of the day soon began to model their work upon it.

Chlorine, a gaseous element of the halogen family, first isolated in 1774 by Scheele by the action of manganese dioxide on hydrochloric acid. It unites easily with many other elements, the compounds resulting being termed chlorides. The gaseous element is greenish-yellow, with a pungent odour. It is a suffocating gas, injuring the lungs at a concentration as low as 1 part in 50,000 and was used during the first world war as a poison gas. Has a powerful bleaching action, usually being used in form of bleaching powder, made by combining lime and chlorine. Also a valuable disinfectant; used, for instance, in rendering water of swimming baths sterile.

Chloroform, a volatile colourless liquid, is prepared for commercial purposes by distilling a mixture of chloride of lime, alcohol (or acetone), and water; but for medical use it is made from chloral hydrate, which yields a purer distillate. When the vapour is inhaled it produces unconsciousness and insensibility to pain. It owes its discovery to Liebig, and its first application for medical purposes to Sir James Young Simpson (**P5** (**2**)).

Chlorophyll, the green pigment contained in the leaves of plants, first discovered by P. J. Pelletier (1788–1829) and J. B. Caventou (1795–1877) in 1818. Enables the plant to absorb sunlight and so to build up sugar. *See also* **Photosynthesis, F30** (2).

Chorale. Originally a Lutheran hymn-tune, but used, especially by J. S. Bach, as a basis for instrumental or choral pieces, *e.g.*, Chorales and Choral Preludes.

Chord. A number of notes played simultaneously.

Chouans, the name given to the band of peasants, mainly smugglers and dealers in contraband salt, who rose in revolt in the west of France in 1793 and joined the royalists of La Vendée. Balzac gives a picture of the people and the country in which they operated in his novel *Les Chouans*. They used the hoot of an owl as a signal—hence the name.

Chough, a member of the crow family, of glossy blue-green-black plumage, whose long curved bill and legs are coral red. It used to be abundant on the cliffs of Cornwall, but its haunts are now restricted to the rocky outcrops of the western coasts and in the mountains near by. It nests in cleft rocks and caves. The Alpine chough with yellow bill inhabits the mountainous districts of Europe and Asia and is not found in Britain.

Chrism, the ointment (oil mixed with balsam) consecrated on Maundy Thursday in the Roman and Greek orthodox churches by the bishop and used at baptism, confirmation, ordination, etc.

Christianity, the religion proclaimed by Jesus Christ. Its principles are set forth in the New Testament, and its churches abound all over the world. Although Christianity has had a great influence on Western civilisation, the West is finding it increasingly difficult to live up to her own Christian principles.

Christmas means "mass of Christ" from the old English *Cristes maesse*, which is celebrated by the Western church on December 25. The actual day on which Christ was born is not known and there is some uncertainty about the year. December 25 as the day of Nativity was not generally observed until the 5th century, A.D., though, as the winter solstice, it had long been observed as a pagan festival of *sol invictus* (unconquered sun). The first Christmas card dates from about 1843 and the Christmas tree, of pagan origin, was introduced into England from Germany by Queen Adelaide, wife of William IV. Santa Clause is a corruption of Saint Nicolas, patron saint of children, whose feast day properly falls on December 6.

Chromatic Scale, a scale proceeding in intervals of

one semitone. *E.g.*, chromatic scale in C C–D♭–D–E♭–E–F–G♭–G–A♭–A–B♭–B–C.

Chromium, a very hard, bluish-white metal, melting at a very high temperature (above 1900° C.). Its chief ore is chromite or chrome iron-ore (ferrous chromite). "Ferro-chrome" is produced by heating chromite and anthracite in an electric furnace, and chrome steels are prepared by adding the pre-calculated amount of ferro-chrome to melted steel. Best known chrome steel is stainless steel first made by Brearley in 1912 and since then developed greatly at Sheffield. A typical formula is 18 per cent. chromium, 8 per cent. nickel, 74 per cent. iron. Equally important are Stellite alloys, containing chromium, cobalt, tungsten (or molybdenum), which have made possible modern high-speed cutting tools. Dies used in manufacture of plastics are commonly of chrome steel. The elementary metal finds little use alone except in chromium-plating for motor cars, etc.

Chromosomes, the bodies contained within the nucleus of every animal or plant cell, each containing several hundreds of the hereditary factors called *genes*. When the cell divides, each chromosome splits, so that every cell contains an identical complement of genes. Human cells have 23 pairs of chromosomes. *See* **F31, 58**.

Church Commissioners The Church Commissioners were established in 1948 by the amalgamation of Queen Anne's Bounty (established 1704) and the Ecclesiastical Commissioners (established 1836) to administer Church revenues and to manage Church property generally. The Commissioners own in investments and real estate a total of over £200 million.

Cid, The, a famous Spanish hero of the 11th century, Don Rodrigo Diaz de Vivar, who, before he was twenty, led a Spanish force against the Moors, and drove them out of Spain. He is celebrated in poem, play, and romance. *See* **G38** (**2**).

Cider, a fermented liquor made from the juice of apples by crushing the fruit to pulp when ripe. The cider of Devonshire, Somersetshire, Worcestershire, and Herefordshire is the best.

Cinchona, the tree native to the Andes which is famous for its bark, source of the drug quinine. It was introduced into Ceylon, India, and Java, the latter becoming the main supplier of quinine.

Cinque Ports, a number of seaport towns on the coast of Kent and Sussex, originally five: Hastings, Romney, Hythe, Dover, and Sandwich. Winchelsea and Rye were added later. These ports were required to furnish a certain number of ships, ready for service, and in return they were granted many privileges. The official residence of the Lord Warden is Walmer Castle. Sir Winston Churchill is the present Lord Warden and Admiral of the Cinque Ports.

Cistercians, an order of monks and nuns taking their names from Cîteaux, near Dijon, where their first monastery was established in 1098. The order was noted for the severity of its rule. They were famous agriculturists. The habit is white, with a black cowl or hood. The order declined, and in the 17th century there was a reform movement instituted by the Trappists, who were later organised into a separate order.

Citron, the fruit of a tree of the lemon order (*Citrus medica*) with thick rind, much used for candied peel.

Civet, a carnivorous quadruped from which civet perfume is obtained.

Civil List is the annual sum payable to the Sovereign to maintain the Royal Household and to uphold the dignity of the Crown. The amount is granted by Parliament upon the recommendation of a Select Committee and has to be settled afresh in the first six months of a new reign. The Civil List of Queen Victoria was £385,000; Edward VII. and George V., £470,000; Edward VIII. and George VI., £410,000; Elizabeth II., £475,000. The annuities payable to members of the Royal Family do not form part of the Civil List but are a charge on the Consolidated Fund; Queen Mother, £70,000; Duke of Edinburgh, £40,000; Duke of Gloucester, £35,000; Princess Royal, £6,000; Princess Margaret and Princess Anne, £6,000 (£15,000 on marriage). Prince Charles has his own income from the Duchy of Cornwall.

Clarinet, a wood-wind instrument with a single reed which gives forth a rich, smooth tone. The reed is "tongued" and the note selected by operating keys which open or close holes in the wooden tube. A larger instrument of lower pitch is known as the bass clarinet.

Cleopatra's Needle on the Thames Embankment is of the time of Tuthmosis III. (1500–1450 B.C.). Presented to the British Government by Mehemet Ali in 1819, but not brought to this country until 1878. Its weight is 180 tons and it is 68½ ft. in height. *See also* **G16** (**1**).

Climate is a generalised representation of the day-to-day weather conditions throughout the year, the combination of all weathers thus determining the climate of a place. Averages and extremes of temperature, variation of humidity, duration of sunshine and cloud cover, amount of rainfall and frequency of snow, frost, gales, etc., are amongst the data normally investigated. The interiors of great land masses are characterised by large ranges of temperature and low rainfall (continental climate), while proximity to oceans has an ameliorating effect with increase in rainfall (oceanic climate). Presence of mountain ranges and lakes and configuration generally produce local modifications of climate, also apparent between the centre and the outlying suburbs of a city. There is evidence that vast changes of climate have occurred during geological time. Since the mid-19th century most of the world has shown a tendency to be warmer; the rise in annual mean temperature is now over 1° C. But this trend now seems to be easing off. Latitude introduces zones of climate, *e.g.*, tropical rain, subtropical steppe and desert, temperate rain and polar.

Cloaca Maxima, the name of the great underground sewer of Rome, constructed in the reign of Tarquinius Priscus (*circa* 588 B.C.) and still extant in its chief structural features.

Clock, a device for measuring the passage of time. The earliest timekeeper was the shadow-clock, a primitive form of sundial, used in Ancient Egypt about 1500 B.C. To find the time at night the water-clock or clepsydra was used. The sand-glass dates from the 15th century. No one knows when the first mechanical clocks were invented, but it is known that a complicated mechanical clock driven by water and controlled by a weighbridge escapement was built in Peking in 1090. The Dover Clock in the Science Museum is not the earliest surviving clock in England, as was once believed, but early 17th century. The Salisbury Cathedral clock dates from 1386 and that of Wells Cathedral from 1392. The pendulum clock was invented by the Dutch scientist Christiaan Huygens (1625–95). The first watches were made in Nuremberg shortly after 1500. The marine chronometer is a high-precision timepiece used at sea for giving Greenwich mean time. The quartz-crystal clocks at Greenwich are accurate to one thousandth of a second a day, and the improved atomic clock, recently developed at the British National Physical Laboratory, which makes use of the natural vibrations of the cæsium atom, is said to be an almost absolute measure of time (accurate to 1 sec. in 300 years). A comparison of the time-keeping of the cæsium clock with the quartz-crystal clock reveals that the earth in its rotation about its axis is slowing down by a thousandth of a second in 2 years. What this irregularity is due to is not yet known.

Cloisonné, a kind of fine pottery with enamelled surface, decorated with elaborate designs, the outlines of which are formed by small bands or fillets of metal. The Byzantines excelled in this work, but in the 20th century Japan and China led in Cloisonné-ware.

Cloisters are covered walks or vaulted arcades attached to monastic and ecclesiastical buildings, usually surrounding a quadrangle and serving for exercise and relaxation.

Cloud chamber, an apparatus invented by C. T. R. Wilson in which the tracks of sub-atomic particles can be made visible. Just as the vapour trails tell of the track of an invisible aircraft high up in the air, so the vapour trails

of an unseeable particle can tell of its behaviour. The rays under investigation pass through a chamber containing air, thoroughly cleansed of dust, supersaturated with water vapour. As the particle passes through it forms a track of tiny water droplets which can be photographed. *See also* **F66** (2).

Clouds are formed by the ascent of moist air, the type depending on the way the air ascends and the height at which condensation occurs. There are three main classes: (1) high cloud (above 20,000 ft.)—cirrus (delicate and fibrous), cirrostratus (thin white veil), and cirrocumulus (delicately rippled) consisting of ice crystals; (2) medium cloud (above 7,000 ft.)—altostratus (dense, greyish veil) and altocumulus (broken flattened cloudlets)—chiefly water particles, often supercooled; (3) low cloud (from near ground to 7,000 ft.)—cumulus (fair weather, broken, dome-topped), cumulonimbus (heavy, towering to great heights), stratocumulus (layer of globular masses or rolls), stratus (like fog but off the ground), nimbostratus (low, rainy cloud).

Clover, plants of the *Trifolium* genus, of which there are about 300 species. The best known kinds are *White Clover*, a common pasturage product in nearly all parts of the world; and *Red Clover*, the most widely cultivated of all, much esteemed as fodder for cattle. The nectar of white clover is an important source of honey; the tongue of the hive bee is too short to tap nectar from the red clover, which is pollinated instead by bumble bees. *The Subterranean Clover* has two kinds of inflorescence; one is normal but the other buries itself underground, where the fruits ripen, a habit reminiscent of the ground- or monkey-nut.

Cloves are the dried flower-buds of a species of myrtle (*Eugenia caryophyllata*) grown principally in Zanzibar and Madagascar.

Club Mosses *or* **Lycopods**, also called "ground pines." These relatively primitive land plants (in the evolutionary scale they are placed below the ferns) are usually found in dry open spaces in temperate countries. These plants have long creeping stems covered with numerous small pointed leaves. Five species occur in Britain. Huge lycopods existed in the Carboniferous period, and their bodies have decomposed to produce a large fraction of our coal seams.

Coal is a carbonaceous mineral substance, commonly black and easily breakable, and may be either dull or shiny. It is very inflammable, and has formed for a long period the most important substance for fuel in employment in most civilised lands. It is composed of chemically altered vegetable matter, chiefly the timber of long extinct lycopodiaceous trees (*se* **Club Mosses**) and is found as a sort of stratified rock in the coal measures. Anthracite coal has lost nearly all its hydrocarbon by change or by pressure, and this and the more highly bituminous coals are greatly employed in manufacturing industries the world over, while those less so are used for household purposes. A ton of coal will yield by high temperature carbonisation from 10,000 to 15,000 cu. ft. of gas, 8 to 12 galls. of tar, 13½ cwts. of coke and about 20 galls. of ammoniacal liquor, varying according to the class of coal used. It is calculated that in seams of one foot thickness or more to a depth of 4,000 ft., the proved resources of coal in Great Britain amount to 120,000,000,000 tons and the probable total resources to 170,000,000,000 tons. Production in Great Britain is over 200 million tons a year and most of it is for home use. In 1947 the British coal industry was transferred to the National Coal Board.

Coal Tar. (*See* **Aniline.**)

Coat of Arms, in heraldry, is a device containing a family's armorial bearings. In mediæval times it was an actual coat upon which such device was embroidered, and knights wore it over their armour.

Cobalt, a white metal melting at 1490° C. Two main ores are *cobalt glance* (in which the element is combined with arsenic and sulphur) and *smaltite* (cobalt arsenide). The principal sources are Ontario and the Belgian Congo. Various cobalt alloys are important, *e.g.*, Stellite, Ferro-cobalt, and Carboloy. Its monoxide is an important colouring medium, and is used for colouring glass and porcelain.

Cobra, hooded and very venomous snakes. The best known species are the Indian Cobra, the Egyptian Cobra, and the Black-necked Cobra. Their food consists chiefly of small rodents. The King Cobra is almost exclusively a snake-eater. "Spitting" Cobras (or Ringhals) of S. Africa are a related genus, capable of spitting their venom several yards.

Coca, a South American shrub, *Erythroxylon coca*, which yields three crops a year of leaves and flowers. The leaves are chewed by the natives and act as a strong stimulant, enabling them to withstand hunger and fatigue to an astonishing degree. It is used in medicine as a tonic, and yields the alkaloid cocaine. Over 50,000,000 pounds of coca leaves are gathered yearly.

Cochineal *or* **Carmine**, a dyestuff consisting of the dried bodies of the female scale insect (*Coccus cacti*). The dye is of ancient origin, was well known to the Aztecs, and was used widely in the Middle Ages. The famous scarlet tunics worn by the English during the Napoleonic wars owed their colour to carmine. The German microscopist Ehrenberg is credited with being the first to apply carmine as a biological stain in 1838.

Cock-a-Bendy, a contrivance for twisting ropes, consisting of a hollow piece of wood through which a pin runs. By reason of the rotation of this pin when the cock-a-bendy is held in the hand, twist is imparted to the rope.

Cockatoo, a member of the parrot family, bearing a crest of feathers on the head, native to Australia and adjacent regions. Predominant colour is white tinged with yellow or scarlet while some species have dark plumage. The great black cockatoo of New Guinea is slaty black with pale red cheeks and can crack Kanary nuts which usually require a hammer to break them open.

Cockatrice, a basilisk or fabulous serpent supposed by an exploded tradition to have been hatched from a supposititious egg of a cockatrice by a serpent. Its glance or breath was, according to legend, fatal.

Cockchafer (*Melolontha*), one of the most destructive of beetles, the larvæ feeding on roots. It is about 1 inch in length, of a brownish colour, and emits a loud whirring sound when flying.

Cockle, the popular name of the shell-fish of the genus *Cardium*, found plentifully in sandy bays near low-water line; there are numerous British species.

Cockroach, popularly called the black-beetle, though it is neither black nor beetle. A great pest of bakeries, kitchens, etc. In Britain there are two species commonly found: the *Common* or *Oriental Cockroach* (*Blatta orientalis*) and the *German Cockroach* (*Blattella germanica*). The former is twice as large as the latter, and dark brown as against light brown or dark yellow; it used to be our commonest species, but is now outnumbered by the German Cockroach. Both are natives of Africa; Common Cockroach reached England about Queen Elizabeth's time; German Cockroach was a later arrival.

Cocoa. (*See* **Cacao.**)

Coconut Palm (*Cocos nucifera*), a tropical tree which grows to a height of from 50 to 100 ft., and has its tops surmounted by feather-like curving leaves. The fruit of this tree is the ordinary coconut, which is one of the most important sources of food and raw material for people living in tropical regions. The shell and fibrous husk are used for a variety of purposes, such as drinking-cups, spoons, brushes, matting, and cordage. Copra, the dried kernel of the coconut, yields oil used in the manufacture of soap, margarine, cosmetics, and chocolate. The cake provides animal feeding-stuffs. Main producing areas: Indonesia, Philippines, Malaya, Ceylon, and Southern India.

Cod are well-known food-fish, found in abundance upon the British coasts and upon the banks lying off Newfoundland, their capture and preparation for market, and the extraction of the oil they yield, forming important industries.

Codes, a term used to designate a system of laws properly classified. The Code of Hammurabi, king of Babylon, *c.* 1700 B.C., had extensive influence over a long period. The Romans formulated several codes of historic importance including the Theodosian Code which summarised the Roman laws from the time of

Constantine to 438 A.D. The final codification was made under order of the Emperor Justinian by his chief minister Tribonian and published in 529 with a new edition in 534. The most important of modern codes is the *Code Napoléon*, compiled between 1803 and 1810, and still in force. It has been used as an example for the codification of the laws of a number of countries from America to Japan. Under Frederick the Great the law of Prussia was codified. English law has never been codified, although the law on certain subjects has been gathered up into a single statute, which practically amounts to its codification.

Codex, a manuscript volume of the Scriptures, comprising the Sinaitic codex of the 4th century, the Vatican codex of the same period, the Alexandrine codex of the 5th century, and others. The British Museum, in 1933, purchased the *Codex Sinaiticus* from the Soviet Government for £100,000.

Cœlacanth (= "hollow spine," pronounced seelakanth), is the name of one of the oldest fishes, a sub-order of the Order Crossopterygii, with large armoured head, which lived some 300 million years ago (Middle Devonian). It was first freshwater in habit, but later became marine. Fossil records ceased 60 million years ago (Cretaceous), and it was believed to have become extinct. In 1938, however, a living cœlacanth fish (*Latimeria chalumnæ*) was caught off the coast of S. Africa, and another off Madagascar in December 1952 which stimulated world-wide interest. A life-size coloured model of the fish is in the British Museum (Natural History).

Coffee, a shrub found originally in Arabia and Abyssinia, but now extensively grown in the West Indies, Brazil, India, and Central America. It yields a seed or berry which, after undergoing the necessary preparation, is ground and largely used in most countries as a popular breakfast beverage. The best coffee is the Mocha, an Arabian variety. The stimulating effect of coffee is due to the caffeine, which is also present in tea. The beverage was introduced into Europe in the 16th century, and the first London coffee shop was opened in 1632.

Coke is the solid residue remaining when coal is carbonised and nearly all the volatile constituents have been driven off. Used as fuel, and as an agent for reducing metallic oxides to metals.

Cold War. Hostility fanned between two countries nominally at peace by propaganda of various kinds.

Colonies. The Phœnicians, Greeks, and Romans, were all colonists. Colonisation in its more modern significance was the result of important geographical discoveries made in the Western World in the 14th century, and later by the Spaniards, Portuguese, Dutch, and French. From about the beginning of the 17th century Britain developed a colonising spirit, and her Colonial Empire grew as her sea power grew. The 13 American colonies were lost to England during the American War of Independence (1775–83). The oldest colony is Bermuda, settled by the Virginia Company in 1612; the youngest is Sarawak (1946), which had been a protectorate since 1888. The largest colony was Nigeria (due for independence Oct. 1960), and the smallest is Gibraltar, which was captured from the Spanish in 1704. The longest river in the Colonies is the Niger, and the highest mountain is Kilimanjaro in Tanganyika. Ceylon was the first British colony with indigenous civilisation to achieve Dominion status (1949). The "colonies" of the British Commonwealth are not colonies in the strict sense (*see* **Outline of the British Commonwealth, C12–15, K189–90**).

Colorado Beetle, a leaf-eating beetle which is a serious pest of potato crops. The adults somewhat resemble a lady-bird, with alternate stripes of black and yellow. The grub is a reddish insect with two rows of small black spots on each side. The orange eggs are laid on potato leaves. The beetle is avoided by birds because it has a nasty taste.

Colosseum, the name of the Flavian amphitheatre at Rome, begun by Vespasian and finished by Titus A.D. 80. In general outline it still remains one of the most magnificent ruins in the world. In the arena of this great building the famous gladiatorial displays and mimic naval battles used to be given, and about 50,000 spectators could be accommodated. *See also* **G26** (1).

Colossus is the name which the ancients gave to any statue of gigantic size. The Colossus at Rhodes, which was a bronze statue of the sun god, Helios, was the most famous, and reckoned among the seven wonders of the world. It stood over 100 ft. high at the mouth of the harbour and legend says that ships could pass between its legs. It fell in an earthquake in 224 B.C.

Columbia University, New York, was founded as King's College by a charter from George II. The University celebrated the two hundredth anniversary of its founding in 1954.

Column, in architecture, is an upright solid body serving as a support or decoration to a building. Columns consist of a pedestal, a shaft, and a capital, over which the supported entablature rises. They are named according to the styles of architecture of which they form part, being Doric, Tuscan, Ionic, Corinthian, or Composite as the case may be.

Comets are celestial bodies which move about the solar system in elliptical or parabolic orbits. Usually these star-like bodies are accompanied by a long shining tail. The parabolic comets are seen once only, and do not reappear; the elliptical comets are periodic, and their recurrence can be calculated with accuracy. Comets are of enormous magnitude, sometimes covering millions of leagues, but their light is feeble in comparison with that of a star. Chief among the periodic comets is Edmund Halley's, the first to return as predicted in 1757. It reappears about every 76 years and is next due in 1985. The most spectacular comet of the 19th century was that found by Donati in 1858.

Comitia were gatherings of the Roman people for the purpose of voting on public affairs. They were of three kinds; the *comitia curiata*, composed of representatives of the patrician families; the *comitia centuriata*, which voted on laws, capital crimes, and imperial affairs; and the *comitia tributa*, a plebeian assembly which elected the lower magistrates of the people and which was the usual organ for laws passed by the whole people.

Common Law, in England, is the unwritten law established by custom, usage, and precedent, and not by statute. Both statute law and equity overrule common law when courts are called upon to decide between them. *See* **D4**.

Commons are unenclosed tracts of land sometimes dedicated to the use in common of the inhabitants of the township in which they lie. Many of these common lands were enclosed during the agrarian revolution in the Tudor period. The four chief rights of common are: (1) estovers—the right of taking wood for house building or firewood; (2) pasture, or right of grazing beasts; (3) turbary, or right of digging turf; (4) piscary, or the right to fish.

Commons, House of, the Lower House of the British Parliament. Is the symbol of democracy and is the Mother of Parliaments. Its 630 (1959) members are elected by the suffrage of men and women voting in constituencies. It is elected for a maximum duration of 5 years. *See* **C7**.

Commune, smallest French administrative division, generally presided over by a mayor and municipal council.

Commune of Paris has twice played a dramatic part in the national history. In 1792 it was able, through its control of the administrative organisation of Paris, to override the National Assembly. In 1871, after the withdrawal of the Prussian troops, it tried to assert its authority. Public buildings were destroyed by members of the Commune and civil war raged during April and half May, but Government troops suppressed the rising.

Communism is an advanced form of socialism, having as its aim an internationally planned society where the exploitation of any section of the community no longer exists. Under communism the State belongs to the people, whose energies are directed towards shaping it for the common good. Ownership of property, apart from personal needs, is not allowed and the aim

is to establish a classless society. As a theory of social equality, communism may be said to have begun with the Jewish Essenes and certain early Christian communities. As a political movement it dates from *The Communist Manifesto* of Marx.

Compass *or* **Mariner's Compass** is an instrument by which the magnetic meridian is indicated, and comprises a horizontal bowl containing alcohol and water, a card upon which the thirty-two points of the compass are marked, and the steel needle which always points to the meridian. Although the discovery of the directive property of a magnet is credited to the Chinese, the first practical use of this property in a compass was made in western Europe in the 12th century. Aircraft and ships now largely employ gyrostatic compasses which are not affected by electrical and magnetic disturbances. Sperry, Brown, and Anschutz are three important types of gyroscopic compass.

Concerto, a kind of hybrid between the Symphony and the Sonata. It may be regarded as a Symphony in which one instrument has a preponderance of solo passages or as a Sonata in which the solo instrument is accompanied by full orchestra.

Conclave, an assembly of Roman Catholic Cardinals met together to elect a Pope. The last Conclave was held in the Vatican, Oct. 26–28, 1958, when Cardinal Roncalli, Patriarch of Venice, was elected Pope John XXIII.

Concordat, an agreement or convention between the Pope and a secular government regarding ecclesiastical matters. The Concordat of Worms in 1122 between Calixtus II. and the Emperor Henry V. was famous as deciding a long struggle in regard to investiture. In 1801, Napoleon concluded a concordat with Pius VII. defining the restored relations between the head of the Church and the French Roman Catholics.

Condor, a large vulture of brilliant black plumage and having a circlet of white feathers round its neck. It is a native of the Andes.

Condottieri were mercenary soldiers engaged in the wars of the Italian States in the Middle Ages.

Confederation is a free association of sovereign states united for some common purpose. It is to be distinguished from a Federation, which is a union of states with one central government, each state relinquishing its sovereignty, though retaining some independence in internal affairs.

Congregationalists *or* **Independents,** the oldest sect of Nonconformists who hold that each Church should be independent of external ecclesiastical authority. They sprang from the Brownists, who arose in Elizabeth's days, but were compelled to take refuge in Holland. Under Cromwell they were able to extend their ministration and became a powerful body. Charles II.'s Act of Uniformity drove them forth again, but they regained full liberty of worship under William III.

Coniferæ are cone-bearing trees, including firs, pines, cedars, cypresses, junipers, yews, etc., and are widely distributed.

Conscience Money is money paid to the Chancellor of the Exchequer by persons who have previously omitted payments and are prompted to do so by their conscience.

Conservatism unites three component elements: a distrust of the unknown and an inclination we all share towards the familiar; a respect for authority; and a feeling for the greatness of the country which has been called imperialism. Conservatives thus stress the importance of adopting existing institutions, including property, and are opposed to Socialism and radical change. The name "Conservative" came into general use after 1834 in place of the older name of "Tory," although "Tory democracy" is now widely used to describe Conservative social reform policy. Conservative doctrine is based upon the teachings of Burke and Disraeli, and the Party has always been associated with agricultural interest and has also been supported, since the latter part of the 19th century, by commercial and financial interests. Defeated in 1945, the Party adopted two years later its "Industrial Charter" envisaging a system of free enterprise which is on terms with authority and which reconciles the need for central direction with the encouragement of individual effort. The Conservatives have held office since 1951, having increased their parliamentary strength in three successive general elections, gaining 321 seats in 1951, 345 seats in 1955, and 365 seats in 1959, at which election they polled 13,750,935 votes (49·4 per cent. of electorate). The Conservative manifesto *The Next Five Years* envisaged the doubling of the British standard of living in this generation.

Consistory, a term applied to the private council or state under the Roman Empire, but in later times used to designate the higher ecclesiastical courts and senates of the Anglican and Roman Churches.

Constable, an office of high rank in mediæval times, and still, in some few offices, representing considerable dignity. The office of Lord High Constable of England existed until 1521, since when it has been revived temporarily for special occasions such as Coronations. Before the introduction of the police system in England, every hundred and parish had its constables upon whom devolved the duty of keeping the peace. The official designation of a policeman is police constable.

Constitution, the fundamental organic law or principles of government of a nation, state, society, or other organised body, embodied in written documents, or implied in the institutions and customs of the country or society; also a written instrument embodying such organic law, and laying down fundamental rules and principles for the conduct of affairs. The British constitution is "customary" or "unwritten," and may be modified by an ordinary act of Parliament. *See also* **C7** (1).

Constitution of the United States. *See* **C27–29.**

Consul, the title borne by the two chief magistrates of the Roman Republic. Three consuls were appointed for France after the dissolution of the Directory in 1799, Napoleon becoming First Consul and holding the office until 1804, when he was made Emperor. Today diplomatic and commercial representatives abroad of sovereign states are styled consuls.

Continent, a word used in physical geography to denote the larger continuous land masses in contrast to the great oceans of the earth. They are: Eurasia (conventionally regarded as 2 continents, Europe and Asia), Africa, North America, South America, Australia, and Antarctica.

Contrabas. (*See* **Double Bass.**)

Contralto, the feminine equivalent of the male alto. Where altos and contraltos are present in the same choir they sing the same part. But, whereas the alto is the highest adult male voice, the contralto is the lowest female voice.

Conurbation, a term which has been defined as "an area occupied by a continuous series of dwellings, factories, and other buildings, harbours, and docks, urban parks and playing fields, etc., which are not separated from each other by rural land; though in many cases in this country such an urban area includes enclaves of rural land which is still in agricultural occupation." The term has been widely adopted for the contiguous densely populated areas which form continuous urban areas. The seven officially recognised in Britain are: Greater London, Greater Manchester, Greater Birmingham, West Yorkshire, Merseyside, Tyneside.

Convention is an assembly of delegates, representatives, members of a party met to accomplish some specific civil, social, political, ecclesiastical or other important object.

Convocation, an assembly called together to deliberate ecclesiastical affairs. In the Church of England the provinces of Canterbury and York each have their convocation.

Copper, one of the most familiar of metals, used in ancient times as an alloy with tin in producing bronze, and preceding iron as an industrial material. Copper ores are most abundant in the U.S.A., Chile, Canada, Northern Rhodesia, and the Belgian Congo. All copper compounds are poisonous. Copper sulphate is largely used in calico-printing and in the production of blue and green pigments.

Copts, members of the native Christian minority in Egypt. They belong to the Coptic Church, whose head is the Patriarch of Alexandria.

Copyright. Under the Copyright Act, 1956, copyright subsists in every original literary, dramatic, musical, and artistic work if the author is a British subject or a citizen of the Republic of Ireland or resident in the United Kingdom, or if the work is first published in the United Kingdom. The Act provides that, except in certain special cases, the author of the work shall be the first owner of the copyright, and there are no formalities, such as registration or payment of fees, to be accomplished. Copyright includes the right to reproduce the work in any material form, to perform the work in public, or, if the work is unpublished, to publish the work. The Act also protects sound recordings, films, and television and sound broadcasts. Literary, dramatic, musical, and artistic works which enjoy the protection of the Act are automatically protected in those countries which are parties to the Berne Copyright Convention or the Universal Copyright Convention. In general, copyright in literary, dramatic, musical, and artistic works is vested in the author for the period of his lifetime and 50 years following, after which it passes into the public domain and becomes freely available to any who wish to make use of it. The Copyright Libraries, entitled to receive *gratis* copies of books published in the United Kingdom, are the British Museum, the Bodleian at Oxford, the University Library, Cambridge, the Scottish National Library, Edinburgh, Trinity College, Dublin, and with certain exemptions the National Library of Wales. The Government Department responsible for matters in connection with copyright is the Industrial Property Department, Board of Trade, 25, Southampton Buildings, London, W.C.2.

Coral, a small marine animal closely related to the sea-anemone, but differing from it in two ways: corals move about when fully grown and develop a limy skeleton. They multiply chiefly by budding. The structure of the coral secretions assumes a variety of forms, fan-like, tree-like, mushroom shape, and so forth. Red coral (the skeleton of *Corallium rubrum*) is mainly obtained from the Mediterranean. The coral reefs of the Pacific and Indian Oceans are often many miles in extent. Living corals occur only in warm seas at about 23° C.

Cor Anglais (English horn = *corno inglese*). A tenor version of the oboe.

Cordite, a smokeless explosive adopted for small arms and heavy artillery by the British Government in the naval and military services in 1889, and composed of 58 parts of nitro-glycerine, 37 of gun-cotton, and 5 of vaseline. It is a jelly or plastic dough, and used in the form of sticks.

Cork, the bark of a species of oak grown largely in the South of Europe and North America. The cork tree is said to yield bark every six to ten years for 150 years, and grows to a height of from 20 to 40 ft. Its lightness and elasticity enable it to be used for a variety of commercial purposes, especially for stoppers of bottles.

Cormorant, a large, long-billed water-bird which captures fish by diving. It has bronze-black plumage with white cheeks and sides and is found around the sea coasts of most parts of the world, including the British Isles. It nests in colonies on sea cliffs and rocky ledges. The Shag or Green Cormorant is a smaller bird with green-black plumage and a crest.

Cornet, an instrument which is fundamentally a small trumpet. Its tone is neither so bold nor so powerful as that of the trumpet, and it is therefore of use in small orchestras whose balance would be upset by the inclusion of trumpets.

Corn Laws were statutes intended for the benefit of British agriculture, and generally prohibited export and imposed a duty on imported corn. From 1436 to the middle of the 19th century such laws were in force, and were often of a stringent nature. They became so oppressive and caused corn to reach so high a price that the poorer classes were plunged into distress. A powerful anti-corn law agitation was organised, of which Cobden, Bright, and Villiers were the leaders, and Sir Robert Peel, in 1846, passed an Act lowering the corn duty to 1s. per quarter. In 1869 this nominal duty was abolished by Robert Lowe in a Customs Duty Act. Since the second world war an effort is being made to control the acreage, purchase, and distribution of crops on a world-wide scale.

Coronae, series of luminous rings surrounding sun or moon produced by the diffraction of light by water droplets in the atmosphere. Usually seen when sun shines through altostratus cloud. The outside of the ring is red and the inside bluish. (*See* **Halo.**)

Coroner, an officer whose duty it is to hold inquests on the bodies of people who are suspected of having died from other than natural causes. He is usually both a lawyer and a doctor; an inquest takes the form of a legal inquiry, a court being constituted, with a jury, the coroner being the presiding officer. Fire inquests are held only in the City of London under a special Act of Parliament.

Corpus Christi Festival is one of the great celebrations of the Roman Catholic Church, and takes place on the Thursday after Trinity. It was instituted by Pope Urban IV. in 1264.

Cortes, the name of the Parliamentary assemblies of Spain and Portugal.

Cosmic Rays, a form of radiation coming from outer space, of deep penetrating power and of great scientific interest. The rays are believed to consist chiefly of particles endowed with positive electric charges, but how they are produced is not fully understood. Balloons have been sent into the upper atmosphere to study cosmic-ray bombardment (referred to in the Press as " flying saucers "), but these can rise no higher than 20 miles. The new space research techniques will make it possible to extend these investigations.

Cotton, the name of a plant of several species, bearing large yellow flowers with purple centres. These centres expand into pods, which at maturity burst and yield the white fibrous substance known as cotton. The raw cotton contains a large proportion of seeds which are removed by " ginning." Long before the Christian era, cotton had been grown and used with great skill in India to make fabrics. The industry was not introduced into England until the middle of the 17th century when Protestant refugees from Flanders came to settle in the wool textile districts of East Anglia and Lancashire. With improvements in machinery and expansion of overseas trade in the 18th and 19th centuries, Lancashire became the centre of the world's cotton industry. Since the first world war there has been a marked decline in Britain's cotton industry.

Counterpoint (adj. **contrapuntal**). The weaving together of two or more distinct melodies to create harmony.

County. The geographical counties of England are of very early origin and the word " county " was first introduced after the Norman conquest as an equivalent of the old English " shire." The 52 ancient or geographical counties of England and Wales should not be confused with the 62 administrative counties (created by the Local Government Act of 1888 when several of the geographical counties were subdivided) which themselves exclude the 83 county boroughs or towns with the status of a county. Scotland has 33 and Ireland 32 counties.

Coup d'Etat, a violent change in the government of a state carried out by force or illegally. Examples are the overthrow of the French Republic in 1851 by Louis Napoleon, who then became Emperor, and more recently the military *coups* in the Middle East which brought about the abdication of King Farouk of Egypt in 1952 and the assassination of King Feisal of Iraq in 1958.

Court Leet, a court of record held annually before the steward of any particular manor or lordship; originally there was only one court for a manor, but in the time of Edward I. it branched into two, the court baron and the court leet.

Crabs are familiar crustaceans, carrying a shell, breathing through gills, and are provided with ten external limbs or claws, the side and smaller limbs being used for walking, and the two front claws for grasping purposes.

Crane, a large, graceful wading-bird with elegant long legs and neck, greyish plumage, superficially resembling the heron and related to the bustard. They migrate in V or W formation and have trumpet-like voices. There are several species, found in all continents except S.

America, including the Crowned Crane with golden coronet and the Demoiselle with tuft-like crest of white feathers. The Common Crane nested in East Anglia in mediæval times but now comes only as a rare visitor from the Continent.

Creed, a brief enumeration of a particular belief or religion. The three important Christian creeds are the Apostles' Creed, the Nicene Creed, and the Athanasian Creed.

Cremation, the ancient custom, revived in modern times, of burning the dead. Many scientific men commend the practice on hygienic grounds, particularly in densely populated countries. Cremation was first legalised in Great Britain in 1885 and the first crematorium opened at Woking in that year. Application for cremation must be accompanied by two medical certificates. *See also* **Q14** (1).

Cricket, a genus of insects of the grasshopper order which move by leaps. The male produces a chirping noise by rubbing its wing-covers together.

Crimean War (1853–56). This war between Russia and the allied powers of Turkey, England, France, and Sardinia, was connected with the Eastern Question (*q.v.*) and the desire of Russia for a port on the Mediterranean. Chief engagements were the Alma, Balaclava, and Inkerman. Fighting virtually ceased with fall of Sevastopol in Sept. 1855. Treaty of Paris signed March 30, 1856.

Crinoids (Crinoidea). (*See* **Sea Lily.**)

Crocodile, the name of the largest existing reptile, and classed with the alligator and the gavial. The crocodile inhabits the Nile region, the alligator the lower Mississippi, and the gavial is found in many Indian rivers.

Cromlech, the name given to an ancient monumental erection consisting of a large rough stone placed on three or more upright stones and found in various parts of Great Britain and the Continent.

Crore (Hind. *kror*), an Anglo-Indian word meaning ten millions, used commercially to signify that number of rupees (100 lakhs).

Crosier, the staff, or crook, of a bishop carried before him on special episcopal occasions It is generally richly decorated in gilt at the top.

Crow, a family of birds including many well-known species such as the rook, raven, jackdaw, carrion crow, hooded crow, magpie, nutcracker, jay, and chough.

Crusades were military expeditions undertaken by some of the Christian nations of Europe with the object of ensuring the safety of pilgrims visiting the Holy Sepulchre and to retain in Christian hands the Holy Places. For two centuries nine crusades were undertaken: First, 1095–99, under Godfrey of Bouillon, which succeeded in capturing Jerusalem; Second, 1147–49, led by Louis VII. of France, a dismal failure, which ended with the fall of Jerusalem; Third, 1189–92, in which Richard I. of England took part, making a truce with Saladin; Fourth, 1202–4, led by French and Flemish nobles, a shameful expedition, resulting in the founding of a Latin empire in Constantinople; Fifth, 1217–21, led by John of Brienne; Sixth, 1228–29, under the Emperor Frederick II.; Seventh, 1148–54, under St. Louis of France; Eighth, 1270, under the same leadership, but cut short by his death on an ill-judged expedition to Tunis; Ninth, 1271–72, led by Prince Edward of England, which accomplished nothing. Millions of lives and an enormous amount of treasure were sacrificed in these enterprises and Jerusalem remained in the possession of the "infidels." The chief material beneficiaries were the Italian maritime cities; the chief spiritual beneficiary was the pope; but in literature and the arts both Europe and the Levant benefited enormously from the bringing together of the different cultures.

Crypt, a vaulted subterranean portion of an abbey, cathedral, or church, now generally used for burials or monumental purposes.

Cryptogam. A plant without flowers, as opposed to the *phanerogams.* The cryptogamic plants include the seaweeds, fungi, mosses, liverworts, ferns, and selaginellas.

Cuckoo, a well-known migratory bird which is found in Great Britain from April to July, and has a very characteristic note, uttered during the mating season only by the male. The hen has a soft bubbling call. It lays its eggs in the nests of other birds (the Meadow Pipit being the commonest foster-parent), but only one egg in each nest. Feeds mainly on insects, particularly hairy caterpillars.

Cuneiform, the term applied to the written arrow-headed characters found in Assyria, Persia, and Mesopotamia. Good examples may be seen in the British Museum, some of them several thousand years old.

Cupola, the inner portion of a dome. Famous cupolas are those in the Roman Pantheon, the Mosque of Santa Sophia at Constantinople, St. Peter's at Rome, and St. Paul's in London.

Curfew, the bell which William the Conqueror ordered to be rung at eight o'clock each night in the towns and villages of Britain, as a signal to the inhabitants to extinguish lights and go to bed. It originated in the fear of fire when most cities were built of timber. It was abolished in 1100, but at Ripon, Sandbach, Chesham, Penrith, Ibberton, Wokingham, it is still rung as a matter of custom.

Curlew, a wading-bird of which there are several species. It frequents marshy places, feeds on worms and insects, and possesses a very long curved bill.

Cutty Sark. The most famous of all sailing-ships; the last of the clippers built in 1869 at Dumbarton for the tea trade with China. She was a ship of outstanding performance (length 212·5 ft., extreme beam 36 ft., gross tonnage 963) and now rests on a permanent berth at Greenwich. Opened by H.M. The Queen to the public in June 1957.

Cybernetics (derived from the Greek word meaning "governor") is the American term for the science of automatic control by machines. The work of the American scientist, Dr. Norbert Wiener, has led to great advances in the construction of electronic computers and to interesting speculations in the field of sociology. (*See* **Calculating Machines.**)

Cyclone, a term usually applied to a tropical revolving storm. Cyclones often occur towards the end of the hot seasons and are mainly confined to tracks in the western areas of the oceans, being known as hurricanes (Caribbean and Pacific), cyclones (Indian Ocean), and typhoons (China Seas). The circulation of air in a cyclone is similar to that in the *depression* of temperate latitudes, but the region of low pressure is much more localised and the pressure gradients steeper. Winds of hurricane strength and torrential rain occur generally, although at the centre of the storm there is a small area, known as the "eye," where fair, calm weather prevails.

Cyclotron, or atom-smasher, invented by Dr. E. O. Lawrence (1901–58), at Berkeley, California, in 1930, is one of the basic research tools for fundamental work in atomic physics, designed to accelerate electrically-charged particles to energies corresponding to several million electron-volts. Other high-voltage accelerators are the synchrotons, cosmotrons, betatrons, bevatrons, etc. *See also* **F65–66.**

Cynics were a set of Greek philosophers, founded by Antisthenes, the pupil of Socrates. They held that virtue was the only good, and condemned arts, sciences, pleasures, and riches. Diogenes was the most famed of the cynics.

Czar was the title of the Emperor of Russia, and is derived from Cæsar. The first Czar was Ivan IV., crowned in 1547. The Czar's wife was styled Czarina, and his eldest son Czarevitch. The last Czar was Nicholas II., killed (July 1918) during the revolution.

D

Daboya, an Indian viperine serpent, venomous, and of nocturnal habits, of the genus *Daboia.*

Dace, a small freshwater fish of the carp family, of elegant shape and silver appearance. It is used as bait for pike.

Dacelo, a quaint-looking bird of the kingfisher order, common to Australia, one variety of which is known as the "laughing-jackass."

Dacoits, Indian brigands, or professional robbers, who were formerly very numerous and ter-

rorised the districts they infested, especially Lower Bengal. Mansingh, "the greatest dacoit of all time," was killed by the Uttar Pradesh police in 1955 after a manhunt lasting many years.

Dactyl, a measure in versification, consisting of a foot of three syllables, the first long, and the second and third short, as *lovingly, verily*. *See* **M3 (1)**.

Dactylopterus, a fish of the gurnard family, with wing-like pectoral fins; sometimes known as the flying fish, though that appellation is more generally given to *Exocœtus exiliens*.

Dado, a term denoting the portion of a pedestal between the base and the cornice; also applied to the lower part of the walls of a room when decorated differently from the upper part.

Dafila, a kind of freshwater duck, with long supple tail, found in Europe, Asia, and America. The pintail duck belongs to this genus.

Dagger-ale, a kind of liquor often referred to in 16th-century English literature, and sold at the sign of the Dagger in Holborn, a London house much frequented by the gallants of the time.

Dagoba, an edifice dedicated to the custody of relics of Buddha, and numerous in the temples of Ceylon and other Buddhist countries.

Daguerreotype, a first practical photographic process, invented in Paris by M. Daguerre during the years 1824–39. The light-sensitive plate was prepared by bringing iodine in contact with a plate of silver. After exposure a positive image came by development of the plate in mercury vapour. Even for open-air scenes the first daguerreotypes involved exposure of 5–10 minutes. The wet collodion process (1851) rendered the technique obsolete.

Dahabiyeh, a kind of boat much used on the Nile, broad at the stern and tapering off gracefully at the prow. It carries one or two masts and lateen sails.

Dail Eireann, the name of the national parliament of the Irish Republic.

Dalmatic, a wide-sleeved ecclesiastical vestment, reaching below the knee. Worn by bishops and deacons over the alb or stole.

Dama, the scientific name of the fallow deer, which is fawn coloured or brown, with white spots.

Damask, a figured textile fabric, made in various forms, with silk threads of many colours, as originally woven in the city of Damascus; in a combination of silk and wool or cotton; in linen only for table-cloths, etc.; or in cotton.

Damaskeening, the art of inlaying one metal upon another, largely practised in the East in mediæval times, especially in the decoration of sword blades. In its modern form it has been greatly developed.

Dandies, the name given to a class of exquisites prominent in early Victorian days, and who attracted attention by excessive regard for dress.

Danegeld, a tax imposed in England in Anglo-Saxon times to raise funds for resisting the Danes or to buy them off. Edward the Confessor abolished the tax, but it was revived by the Conqueror and subsequently retained, under another name, after the danger from the Danes was past. It is the basis of all taxation in this country. Domesday Book was originally drawn up for the purpose of teaching the State how to levy the tax.

Danelaw, the law enforced by the Danes in the kingdoms of Northumbria, East Anglia, and in the districts of the five (Danish) boroughs—lands grouped round Leicester, Nottingham, Derby, Stamford, and Lincoln—which they occupied during the Viking invasions of the 9th and 10th centuries. The country occupied was also called the Danelaw or Danelagh.

Darien Project was an unsuccessful scheme entered upon at the close of the 17th century by Paterson, the Scottish financier, for colonising the Isthmus of Darien and thereby diverting trade from the East in the direction of Scotland.

Darter, 1. A genus of birds of the pelican family, with long pointed bill and serpent-like neck and resembling cormorants in appearance. There are 5 species. 2. A family of small fishes.

Dartsnake, the name of a serpentine lizard of the Aconitas family, noted for the darting manner in which it attacks its prey.

Datary, a Roman ecclesiastical functionary, who acted for the Pope in all matters relating to the issuing of grants and dispensations; the dater or dispatcher of the Papal bulls.

Date Palm, a native of Northern Africa, where it is grown in great profusion. It is also known in Southern Europe and Western Asia to some small extent. It grows to 100 ft. and continues to bear for 2 or 3 centuries, its fruit being of great value as a food. From the leaves the Africans make roofs for their huts; ropes are made from the fibrous parts of the stalks; and the sap furnishes a stimulating beverage.

Dauphin, the title borne by the eldest sons of the Kings of France from 1349 to the Revolution of 1830.

"**Davy Jones**," a nautical term of a humorous turn supposed to apply to the spirit of the sea; it is said among sailors, when a person dies at sea, that he is committed to "Davy Jones's locker."

Day is the most natural unit of time and may be defined as the period of rotation of the earth relative to any selected heavenly body. Relative to the sun it is called the *solar day*. Relative to a fixed star it is called the *sidereal day*. Owing to irregularities in the earth's movements, the time taken for the earth to rotate through 360° relative to the sun is variable, and so the *mean solar day* of 24 hours has been introduced, which is the average throughout the year. The *mean solar day* is our standard, used for purposes of the calendar, and astronomers use *sidereal* clocks to check mean solar time. In practice, for convenience, the sidereal day is determined by the earth's rotation relative to the vernal equinox or first point of Aries, and is equal to 23 hours 56 minutes and 4·091 seconds of mean solar time (*i.e.*, about 4 minutes shorter than a solar day).

D.D.T. (dichloro-diphenyl-trichloroethane). One of the most powerful synthetic insecticides. Mosquito-breeding areas are now sprayed from the air.

Deacon, an ecclesiastical official, who assists in some of the smaller ministerial duties in church or chapel; in the Anglican Church he ranks below a priest.

Dead Languages are such as the ancient Greek and Roman tongues, which are no longer spoken but are preserved in literature.

Dead Sea Scrolls, a group of ancient Jewish documents, consisting of scrolls and fragments which have been recovered since 1947 in the vicinity of Qumran near the Dead Sea and which represent one of the most important finds ever made in the field of biblical archæology and Christian origins. The scrolls, written in Hebrew or Aramaic, were found in caves, the first by chance by an Arab shepherd in 1947. These consisted of biblical texts older by a thousand years than the earliest Hebrew manuscript of the Old Testament (A.D. 895). Many fragments have since been discovered, comprising the whole of the Old Testament with the exception of Esther. In addition there are commentaries and other non-biblical writings, including one called "The War of the Sons of Light with the Sons of Darkness." The writing on the scrolls indicates that they were written over a period of two centuries, the greater proportion before the birth of Christ. A nearby ruin is believed to have been the home of a religious sect to whom the scrolls belonged. By the aid of the latest scientific techniques, including radiocarbon tests, the age of the scrolls is being accurately determined.

Deal, the name given to planks of fir-tree wood of Northern Europe, 9 in. wide and 3 in. thick, 50 cu. ft. of which form a load, and 100 superficial ft. a square. An American deal, it should be noted, is 12 in. broad and 2½ in. thick, and of the uniform length of 12 ft.

Dean, a Church of England dignitary, ranking below a bishop, and the head of the chapter of a cathedral. A rural Dean supervises a *deanery* or group of parishes. There are also Deans of Faculties in some universities, and at Oxford and Cambridge the *Dean* is in charge of chapel services and disciplinary arrangements.

Death's Head Moth, a large insect, not uncommon in England, having on its thorax the outlined semblance of a human skull. It emits a peculiar, mournful sound when startled.

Death-watch. The so-called death-watch, with its mysterious ticking in the night-time, is due to nothing more serious than the furniture-beetle. The larva of this insect burrows in the furniture making the pinholes which are often to be seen in old furniture. It is three years in its pupa condition, and at last becomes a little brown insect with a great talent for shamming dead; so that it is not very much observed. These beetles often strike the wood of their galleries with their heads, and so produce a ticking sound which is a call to the mate. The ticking is most frequent in the summer months, but in warmed rooms it may be heard at any time.

Decade, the number 10, or a period of 10 years.

Decalogue, the Ten Commandments, which, as related in Exodus, were given by God to Moses on Mount Sinai, and contained on two stone tablets.

Decapods. Crustacea with ten (five pairs of) appendages: *e.g.*, lobsters, crabs, shrimps, and prawns.

December, the twelfth month of the year, and the tenth of the old Latin calendar. The Anglo-Saxons called it Mid-winter monath and Yule monath.

Deciduous Trees are such as shed their leaves, or "fall" at maturity, or at certain seasons, as distinguished from evergreens or permanent foliaged trees or shrubs.

Decimal System is based on the unit of 10. Fractional numbers are expressed as divisions of 10; thus the number 3·458 means $3+\frac{4}{10}+\frac{5}{100}+\frac{8}{1000}$. (*See* **Metric System.**) The decimal system is used to classify books in libraries. *See* **Books, Classification of.**

Declaration of Independence was an Act by which the American Congress, on July 4, 1776, declared the American colonies to be independent of Great Britain. "Independence Day" is a holiday in all the States and territories of the United States.

Decree Nisi, a law term used in regard to a Divorce Court decree which dissolves a marriage, if at the end of three months nothing arises to interfere with the decision, whereupon it is made absolute and the parties are free. *See* **D29**.

Deemster is the title of the two judges in the Isle of Man.

Defence Expenditure. The net U.K. Defence Estimates for 1960–61 amount to £1,617·83 million, after deducting expected receipts of £12 million from the Federal German Republic.

Defender of the Faith, a title conferred by Pope Leo X. upon Henry VIII. of England for his tract "Assertion of the Seven Sacraments" against Luther. Later it was withdrawn, but in 1554 was confirmed to him by Parliament and has since been used by English sovereigns.

Deliquescence, the process of liquefaction or dissolving by the absorption of moisture from the atmosphere. For instance, chromic acid crystals on exposure to the air quickly deliquesce.

Delta, a triangular tract of land between diverging branches of a river at its mouth, and so called from its general resemblance to the Greek letter Δ *delta*. The best-known examples are the deltas of the Nile, the Ganges, the Niger, and the Mississippi.

Deluge, a flood, a term commonly applied to the story of the Deluge contained in the Bible, in which Noah and the Ark figure. A similar tradition lingers in the mythologies of all the ancient nations.

Democracy is the condition of direct popular government—"by the people for the people"—the executive powers being vested in representatives elected by the people. *See also* **C6** (2).

Democratic Party of the United States is one of the two major parties, the other being the Republican Party. The party is sometimes regarded as the more liberal party in the U.S.A., but the difference is not a clear-cut left-and-right difference. The Democratic Party was the party of low tariffs and of the rights of the states (in opposition to the federalists). It was very strong in the Southern states which contained the slavery states and thus called "the solid South." The 20-year Democratic era of Roosevelt, who stood for the *New Deal*, and Truman, who stood for the *Fair Deal*, came to an end in 1952 when Gen. Eisenhower won the Presidential election for the Republican Party. *See also* **C28** (2).

Demoiselle, the Numidian crane, a wading-bird.

Denarius, a Roman coin, originally of silver, first coined in 268 B.C. It is the penny of the New Testament.

Dendiculus, a member of the moulding ornamentation of Ionic and also Corinthian entablatures, over the frieze and under the corona, but, properly speaking, because of its projection, part of the latter. It consists of a row of rectangular blocks, at regular intervals, resembling teeth; hence the name.

Dendrite, any stone or mineral on which appears natural tracery resembling trees, leaves, or flowers, the result of the action of the hydrous oxide of manganese.

Denier, an old French coin, and the chief silver coin of Europe during the mediæval period.

Density, a measure of the mass per unit volume of a material, usually expressed in grams per cubic centimetre. *Specific gravity* is the ratio of the density of a material at the temperature under consideration to that of water at the temperature of its maximum density (4° C.). In grams per cubic centimetre the density of gold is 19·3, silver 10·5, lead 11·3, water 0·99997, air 0·00129.

Deodand, the name given in old English law to a personal chattel which had been the cause of an individual's death. This chattel—it might be a cart that had run over and killed a man—was declared a deodand and forfeited to the king to be applied to religious uses. Deodands were abolished in 1846.

Deodar, a coniferous tree of the cedar order.

Depression, a region where barometric pressure is lower than that of its surroundings. These areas of low pressure enclosed by the isobars are usually less extensive than anticyclones and may vary from 100 to 1,000 miles in diameter. The winds, often of gale force when the depression is deep, blow round the system in an anticlockwise direction in the Northern Hemisphere (in the reverse direction in the Southern Hemisphere) and inwards across the isobars. The majority of depressions which cross the British Isles travel from the Atlantic, sometimes in series or families, at rates of between a few miles and 700 miles in a day, bringing their generally unsettled weather with them.

De Profundis (out of the depths), the first two words of the Latin version of the 130th Psalm, and commonly used to designate this psalm.

Derrick, the name of a special jib crane, for lifting and moving heavy weights. It was originally applied to a kind of gallows built by a Tyburn hangman called Derrick in the 17th century.

Dervish, a Mohammedan mendicant monk. There are many orders, including the "howling," "wandering," and "whirling" dervishes. Also one of the fanatical followers of the Sudan Mahdi.

Descant. An additional contrapuntal part, often much ornamented, woven in with an existing part. The vocal descant is one of the earliest uses of counterpoint.

Deserts, vast, barren, stone or sandy wastes where there is almost no rainfall and little or no vegetation. These regions are found in the interior of the continents Africa, Asia, and America between 20° and 30° north and south of the equator. Europe is the only continent without deserts. The most famous are the Sahara, the largest in the world, the Gobi desert of central Asia, the Kalahari desert of south-west Africa, and the great Australian desert.

Deuterium or "heavy hydrogen." The second isotope of hydrogen; the third is called tritium. Deuterium atoms have in their nuclei a neutron as well as a proton; tritium nuclei have two neutrons and one proton. In ordinary hydrogen gas about one out of every 5,000 atoms is a deuterium atom. Deuterium was discovered in 1932 by Professor Harold Urey. The oxide of deuterium corresponding to water is called "heavy water." The nucleus of the deuterium atom is called a deuteron.

Deuteronomy, the fifth book of the Pentateuch, purported to have been written by Moses, and containing the statement of the law, but regarded by many modern critics as of a much later period.

Devil-fish, a strange marine animal of large size and of several species. As it is met with in European waters it is called the fishing frog,

and the chief American species is the giant ray.

Devonian System in geology refers to the strata between the Silurian and the Carboniferous Formations. It includes the Old Red Sandstone Formation. The fauna of the Devonian include the group of fishes known as the Rhipidistra (on the evolutionary route towards the amphibians), Actinistia (cœlacanth), and the Dipnoi or lung fishes.

Dew, moisture deposited by condensation of water vapour on exposed objects especially during calm, cloudless nights. The loss of heat from the ground after sunset, by radiation, causes the layer of atmosphere close to the surface to be chilled below the temperature, known as the dew-point, at which the air is saturated with vapour. Part of the vapour condensed may be transpired from blades of grass and foliage of plants.

Dew Pond is a shallow artificial pond which is on high ground and rarely dries up, even during prolonged droughts, despite being used by cattle and sheep as a drinking source. The name arose from the belief that dew deposits at night provided the moisture for replenishment. Drainage of rain-water and mist condensed on neighbouring trees and shrubs are probably more important factors.

Dextrin, a white, odourless, viscid substance of the same composition as starch, from which it is obtained. It is used as gum, being the material put on the backs of postage stamps and other articles which are required to be made adhesive. It also is utilised in calico printing.

Dhole, the wild dog of the Deccan, of a bright bay colour, and living on game, which it hunts in packs.

Dhow, a one-masted trading vessel, much in evidence on the east coast of Africa and the Red Sea, and formerly employed in the transportation of slaves.

Diæresis, the sign (¨) placed over the second of two vowels coming together, and indicating that each is to be pronounced distinct from the other, as *aërated*; also employed to indicate that a vowel, ordinarily silent, must in this case receive pronunciation, as "Oh, cursëd spite," "My belovëd," etc.

Dial *or* **Sun Dial**, an instrument for telling the time of day by a shadow thrown on a marked surface. This was the first form of outdoor clock, and was introduced into Europe from the East. It is made in various forms—horizontal, upright, or inclined.

Dialect is a form of speech special to a locality or district, and differing from the general literary language of the country. In England these dialects are numerous, but in all of them some survivals from what was once good old English speech are to be found. From the works of Chaucer, Spenser, Shakespeare, and from even later writers, many words are to be read that are obsolete as regards modern literary expression, but are still familiar in dialect idioms. The dialect that has forced itself most into modern literature is the Scottish, a fact largely due to the compositions in dialect of Burns and other Scottish poets. For the full understanding of the force and meaning of English dialects, Professor Wright's monumental *Dictionary of Dialects* is to be commended.

Diana's Temple at Ephesus. The temple of Ephesus, built after the model of Karnak, was looked upon as the greatest of the "seven wonders of the world." Its interior length was 425 ft. its breadth 290 ft.; its roof was supported by 127 richly-sculptured pillars, each the life-work of a king. Originally erected by Ctesiphon, it was enlarged and enriched by every succeeding prince. On the day that Alexander the Great was born, Erostratus tried to destroy it by fire, and partly succeeded; the Ephesians rebuilt it, and the world at large contributed to its restoration. Some years later Alexander the Great commanded his engineers to improve and beautify it. At the entrance to this famous temple was placed the "Altar of Sacrifice." In the Adytum was a second altar, the "Altar of sweet herbs." At the entrance to the Penetralia was a third, the "Altar of sweet incense," on which only the richest and most costly perfumes were placed. The statue of Diana was behind purple curtains.

Diapason. The concord of the first and last tones of an octave and the fixed rule by which organ pipes are arranged to proper pitch. The open metal flue pipes which form the basis of an organ are called the diapason "stops." Their pitch is expressed in terms of length, *e.g.*, 4-ft. diapason, 8-ft. diapason, 16-ft. diapason. The pitch of other pipes is related to that of the diapason: *e.g.*, a trumpet, which is a reed stop, may be said to have an 8-ft. tone, *i.e.*, its pitch is the equivalent of an 8-ft. diapason.

Diaper, a figured textile fabric, the pattern of which is small and is shown in the material, without resorting to colour or differences of fibre. Many kinds of decorative products, treated in the same style, are termed diaper work.

Diatoms. One-celled algae, common in fresh and salt water. Distinctive feature is the siliceous wall which is in two halves, one fitting over the other like the lid of a box. These walls are often very finely and beautifully sculptured. The diatoms constitute the division of the plant kingdom known as the Bacillariophyta. *Diatom ooze* is a deep-sea deposit made up of diatom shells. *Diatomite* or *diatomaceous earth* is the mineral form that such diatom oozes assume (sometimes known as kieselguhr which mixed with nitroglycerine yields dynamite).

Diatonic Scale. The ordinary major and minor scales on which most European music is built, *e.g.*,

C major	C – D – E – F – G – A – B – C
Tone intervals	1 – 1 – ½ – 1 – 1 – 1 – ½
C minor	C – D – E♭ – F – G – A♭ – B – C
Tone intervals	1 – ½ – 1 – 1 – ½ – 1½ – ½

Dice, an ancient game played with small ivory cubes, each face of which is spotted with black marks like domino pieces, and thrown from a box held in the hand, the one who throws the highest number of spots being the winner. The Lydians played dice.

Dictator, the title given by the ancient Romans to their supreme magistrates under the republic, in times of great exigency. The term was limited to six months, but while it lasted the Dictator's rule was absolute. Another class of dictator was the Greek Tyrant, and many despotic rulers of more recent times, like Hitler and Mussolini, have been dictators. (*See* **Fascism**.)

Dictionary, a book containing the words of a language, alphabetically arranged, giving their definitions, and in many cases their pronunciation and etymological significance. The Greek word for dictionary was *lexicon*, hence lexicographer, someone who compiles a dictionary. Samuel Johnson (1709–84), known as the "Great Lexicographer," published his famous dictionary in 1755. The most elaborate of English dictionaries is the *New English Dictionary* (or the *Oxford Dictionary*), edited by Sir J. A. H. Murray, Henry Bradley, Sir W. A. Craigie, and C. T. Onions. This is the accepted authority for English spelling and pronunciation and is a large work of many volumes. The small *Concise Oxford Dictionary* is derived from it. The standard dictionary of America is *Webster's International Dictionary* (20th century), derived from Noah Webster's *American Dictionary of the English Language* (1828). There are also special dictionaries dealing with music, biography, etc.

Dies Iræ (the Day of Wrath), a famous 13th-century Latin hymn, sung at burial services, and taking its place in translated form in the English hymnology.

Diesel Engine. A compression-ignition engine. The air in the cylinder is compressed to over 500 lb. per sq. in. and its temperature is about 800° F.; oil injected into the hot compressed air ignites immediately. The modern oil engine has been evolved mainly from the principles enunciated by Herbert Akroyd-Stuart in his patent of 1890 and, like the steam and other inventions, represents the improvements achieved by many men, including those by Rudolf Diesel of Germany, in respect of high compression pressures and greater fuel economy.

Diet, an assembly of dignitaries or delegates called together to debate upon and decide important

political or ecclesiastical questions. The most famous Diets in history were those of Worms in 1495 and 1521, and the Diet of Augsburg of 1530, all of which dealt with matters of religious controversy awakened by the Reformation movement.

Diffusion is the process of mixing which occurs when two liquids or gases are in contact. It is most rapid between gases, and, as laid down by Graham's law, "the rates of diffusion of different gases are in the inverse proportion to the square roots of their relative densities."

Digit, a finger or toe. In arithmetic any number of one figure is a digit, the nine Arabic numerals being indicated by the fingers in counting on them, as one, two, three, four, five six, seven, eight, nine.

Dimensions are measured magnitudes and involve the qualities of length, breadth, and thickness. A line has only one dimension: length; a plane surface two; length and breadth; and a solid three; length, breadth, and thickness. *See* **N28.**

Dimorphism, the quality of assuming two distinct forms. For instance, carbon, which is graphite in one form, is the diamond in another.

Dingo, the wild dog of Australia, which is very like a wolf. It is of a reddish colour with a bushy tail and is very destructive to sheep.

Dinosaur, the name given to a group of extinct reptiles of the Mesozoic period, some of which were of immense size—much larger than crocodiles. (*See* **Diplodocus**.)

Diocese, a territory under the pastoral authority of a bishop. The term originated in the time of the Roman Empire, and represented then rather an administrative territory than an ecclesiastical one.

Diopside, a variety of pyroxene occurring in prismatic crystals, chemically calcium magnesium silicate. Two light-green varieties, malacolite and alalite, are gemstones.

Dioptase, or emerald copper, a scarce copper ore occurring in prismatic emerald green crystals, and composed of silicate of copper.

Diorama, a series of spectacular paintings exhibited in a darkened room with the light thrown on to the pictures in such a manner as to produce optical effects that give the appearance of reality. These effects can be varied so as to represent night, or day scenes, or scenes of cloud or sunshine, as may be desired. The diorama was the invention of Daguerre and Bouton in 1822, and was first shown in London in 1823.

Diorite, an igneous rock of crystalline structure composed of felspar and hornblende. It used to be classed as greenstone.

Dip Needle. Instrument for measuring the *dip* or inclination of the earth's magnetic field.

Diplodocus, one of the best known of the extinct mammoth dinosaurs, belonging to Mesozoic times. Fossil remains have been discovered in Colorado and Wyoming, and in 1905 a cast of one of these huge monsters, taken from the original in the Pittsburg Museum, was presented to the British Museum by Mr. Andrew Carnegie and is now at the Natural History Museum, South Kensington. It has been named the Diplodocus Carnegii, and is 84 ft. in length, having been reconstructed out of four defective skeletons all found in Wyoming. The height to the top of the spines of the dorsal vertebræ is nearly 14 ft.

Dipnoi *or* **Lung Fishes.** These have the air bladder adapted to function as a lung, and they can remain alive when the stream or marsh in which they live dries up. Species of lung fish occur in Australia, Africa, and S. America. (*See* **Devonian Systems**.)

Diptera, an order of insects. Their main characteristic is that they are two-winged, and the common house-fly is the best-known example. There are at least 50,000 species of these insects, including gnats, blow-flies, mosquitoes, tsetses.

Diptych was a folding two-leaved tablet of wood, ivory, or metal, with polished inner surfaces, utilised for writing with the style by the ancient Greeks and Romans. The same term was applied to the tablets on which the names of the persons to be commemorated were inscribed in the early Church. In art any pair of pictures hinged together is styled a diptych.

Directory, a term applied to the executive of the later French Revolution period, from Oct., 1795, to Nov. 9th, 1799, when Napoleon overthrew it and established the Consulate. The term, as in general use, signifies a book in which names of residents, traders, etc., in any particular locality or sphere are recorded, such as the London Post Office Directory, the Directory of Directors, etc.

Dirge, a hymn or song of mourning and lamentation, which may be music only, or a song only, but is usually a combination of music and words.

Dirk, an ancient Scottish stabbing weapon, dagger-shaped but much longer and heavier. It was usually worn in a scabbard.

Discus, a circular piece of metal or stone about 12 in. in diameter, used in athletic contests by the ancient Greeks and Romans. Throwing the discus was a very favourite game, which was deemed worthy of celebration in Myron's famous *Discobolus* (c. 460 B.C.–450 B.C.), the best copy of which is in Rome. (*See also* **G23** (1).)

Disestablishment is the withdrawing of State support from Church organisation. The agitation for the disestablishment of the Church of England has slumbered for some years past. The Irish Protestant Church was disestablished in 1869. An agitation for the disestablishment of the Church in Wales, carried on for many years, led to the passing of a Bill, and the Church was finally disestablished in 1919.

Disk, an astronomical term denoting the seemingly flat surface of celestial bodies as seen by the eye.

Dispensing Power was a right claimed by English kings of releasing any of their subjects from oaths and vows on payment of certain indulgence fees, but the Bill of Rights of 1689 abolished this privilege, and since then the Pope has been the only authority claiming to exercise such rights. The gross abuse of the dispensing power was one of the causes of the Reformation.

Displaced Person, a person uprooted from his home and living in a country foreign to that person. Before VE day it was estimated that there were in Europe 12 million D.P.s belonging to the United Nations. The numbers of D.P.s whose fate awaits solution are variously estimated and may be as high as 3 million.

Dissenters are those who decline to conform to the uses of the Established Church. All Nonconformist bodies, whether Protestant or Papist, are included in the term Dissenters.

Distaff, the staff of a spinning wheel, being a cleft stick on which wool, cotton, or flax was wound for spinning on the spindle. It was held between the left arm and the side. In olden times there was a "Distaff Day," which fell on the day after "Twelfth Day," so named because women were then supposed to resume their distaffs.

Distal, applied to the end of a limb or bone in anatomy, or to an organ in botany, farthest removed from the point of attachment.

Distillation, a process used to separate liquids of different boiling points. This is effected by placing the mixture in a distillation apparatus and heating. The liquid with the lower boiling point distils over first, the vapour being condensed and collected, forming the first *fraction*. With continued heating the second liquid reaches its boiling point, distils over and the mixture is said to be *fractionated*. Mixtures of liquids with close very high boiling points require more elaborate apparatus. Fractional distillation is a common process in the chemical industry, particularly in the refining of petroleum.

Divertissement, a short musical entertainment which is usually accompanied by dancing.

Divorce. *See* **D7** (1), **24–32.**

Docket, a summary copy of any decree; a brief list, or label; derived from dock, to curtail.

Docks are enclosed water spaces where ships rest while being loaded or unloaded, or waiting for cargo. The wet dock is simply for loading and unloading; the dry dock, or graving dock, is for overhauling and repairing vessels, and is so constructed that, after a ship has been docked, the water can be drawn off; the floating dock is a rectangular structure which is sunk beneath a ship and raises it. The largest series of docks in the world are those on the Thames, extending many miles. (Tilbury has one of the most-up-to-date docks.) Those of Liverpool are the next largest. The launching of big vessels of the *Queen Elizabeth* and *Queen Mary* type

renders a large increase of dock accommodation necessary. In July 1933 the world's largest dry dock at Southampton was opened by King George V. This dock is large enough to accommodate any ship afloat and is 1,200 ft. long, 135 ft. wide, and 50½ ft. deep.

Dodo, an extinct bird, giant and flightless, which lived on the island of Mauritius up until 250 years ago. Another species, the white dodo, lived on Réunion. Some reached exceptional sizes. By the end of the 17th century Mauritius, Rodriguez, and Réunion had all been colonised, and the dodo along with many other birds vanished forever because of their inability to stand up to man and the animals imported into the islands.

Dog-days, a period of 40 days (3 July–11 Aug.) when Sirius rises and sets with the sun. The ancient superstition, which can be traced back in Greek literature to Hesiod (8th cent. B.C.), was that this star exercised direct influence over the canine race.

Doge, the chief magistrate in the former republics of Venice (697–1797) and Genoa (1339–1797, 1802–5).

Dogfish, a well-known genus of fishes of the shark family, of small size, seldom more than 3 ft. in length. The flesh is sold as "rock salmon." The eggs are contained in horny cases called "mermaid's purses."

Dog Licences are necessary for household dogs of six months of age or over. The cost per dog is 7*s.* 6*d.*, and the licence can be obtained at any Post Office. Dogs for tending sheep or cattle, or for leading blind persons, are exempt.

Dogs. *See* **Z2–9.**

Dolce, a musical term indicating that the music has to be rendered softly and sweetly.

Doldrums, a nautical term applied to those areas of the Atlantic and Pacific towards which the trade winds blow and where the weather is calm, hot, and sultry but liable to change suddenly to squall, rendering navigation difficult. To be "in the doldrums" is to be "down in the dumps."

Dollar, unit of the monetary systems of the United States and Canada, and coined in gold and silver. Dollars are in use in many other countries, especially in the Republics of South America, and the word is derived from the German thaler. The U.S. dollar is worth about seven shillings English money compared with five shillings before sterling devaluation in 1949.

Dolomite, the name given magnesium limestone, the double carbonate of calcium and magnesium.

Doloroso, a musical term denoting a sorrowful or plaintive style of playing.

Dolphin, an ocean mammal of the whale family, from 6 to 8 ft. long, with a long, sharp snout, and of an active disposition. They abound in most temperate seas and swim in shoals. A few species live in large rivers (Ganges and Amazon). They can cruise for long periods at around 15 knots and produce bursts of speed in the region of 20 knots, the water apparently flowing smoothly past their bodies.

Dome, a large cupola, hemispherical in form, rising over the main building of a cathedral or other prominent structure. The finest existing dome, that of the Pantheon at Rome, is also the oldest, dating from the time of the Emperor Hadrian. It is 142 ft. in diameter and about the same in height. The dome of St. Peter's, in the same city, has a double shell, is 330 ft. high and 140 ft. in diameter. The dome of the cathedral at Florence is 139 ft. in diameter and 310 ft. high, and that of St. Paul's, London, has 3 shells and is 112 ft. in diameter and 215 ft. high. The circular reading-room of the British Museum has a dome 140 ft. in diameter and is 106 ft. high. The largest of its kind in the world was the aluminium dome of the Dome of Discovery on the Festival of Britain South Bank site (1951), 365 ft. in diameter and 93 ft. high.

Domesday Book is the famous register of the lands of England framed by order of William the Conqueror. According to Stowe, the name was derived from *Domus dei*, the name of the place where the book was deposited in Winchester Cathedral; though by others it is connected with doom in the sense of judgment. Its compilation was determined upon in 1084, in order that William might compute what he considered to be due to him in the way of tax from his subjects. William sent into each county commissioners to make survey. They were to inquire the name of each place, the possessor, how many hides of land were in the manor, how many ploughs were in demesne, how many homagers, villeins, cottars, serving men, free tenants, and tenants in soccage; how much wood, meadow, and pasture; the number of mills and fish ponds; what had been added to or taken away from the place; what was the gross value at the time of Edward the Confessor. So minute was the survey that the Saxon chronicler of the time reports "there was not a single hide, nor one vintage of land, nor even, it is shame to tell, though it seemed no shame to do, an ox, nor a cow, nor a swine was left that was not set down." The record, which did not take in Northumberland, Cumberland, Durham, and parts of Lancashire and Westmorland, was completed on Nov. 15, 1085, and was comprised in two volumes—one a large folio, sometimes called the Little Domesday, which deals with Essex, Norfolk, and Suffolk, the other a quarto, sometimes called the Great Domesday. The first is written on 384 double pages of vellum in one and the same hand, and in a small but plain character, each page having a double column. The quarto is written on 450 pages of vellum, but in a single column and in a large, fair character. The original is preserved in the Public Record Office. (*See also* **Danegeld.**)

Dominant, in music, the fifth tone of the modern scale, and the reciting tone in the Gregorian scale.

Dominicans, an order of mendicant preaching friars founded by St. Dominic in Languedoc in 1215 and confirmed by the Pope in 1216. The rule of the order was rigorous. The dress was a white habit and scapular with a long black mantle. This gave them the name of Black Friars. Their official name is Friars Preachers.

Don, originally a Spanish title of nobility, but now accorded as a courtesy title. Also applied to a person with an academic appointment at the Universities of Oxford and Cambridge.

Donjon, the keep, or inner tower of a castle, and the strongest and most secure portion of the structure. This was the last refuge of the garrison, and there was usually a prison on the lower floor, hence the name *dungeon*.

Don Juan, the legendary hero of many famous works, supposedly based on the life and character of the unscrupulous gallant Don Juan Tenorio of 14th-century Seville. The first dramatisation of the legend and the most famous is Tirso de Molina's *El Burlador de Sevilla*. Don Juan was also the subject of Molière's *Le Festin de Pierre*, Mozart's *Don Giovanni*, Byron's *Don Juan*, and José Zorilla's *Don Juan Tenorio*. The latter is played on All Saints' Day throughout Spanish-speaking countries.

Don Quixote, the "knight of the doleful countenance," the hero and title of Cervantes' classic novel of 16th-century Spain. Don Quijote de la Mancha, a gentle country gentleman of lofty but unpractical ideals, having read many chivalric romances, believes he is called upon to redress the wrongs of the world. Mounted on his nag Rosinante and accompanied by his companion Sancho Panza, a hard-headed and practical peasant, he sets out on his journeys of knight-errantry. *See also* **G46** (1).

Doonga, a rough kind of East Indian canoe, constructed from a single piece of wood, and carrying a square sail. Used chiefly in salt-collecting around the shallow waters of the Ganges.

Dormer, the name of a special kind of window projecting from a sloping roof, and of vertical form. Such windows were common to the architecture of the Netherlands, northern France, and Belgium from the 14th century, and form picturesque features of general architecture.

Dormouse, a small, squirrel-like rodent widely distributed throughout Europe and Asia, and living mainly on fruit and nuts. It is of nocturnal habits and sleeps through the winter.

Dort, Synod of, Assembly of the Dutch Reformed Church, convened in 1618–19, resulted in the adoption of Calvinism as the Reformed religion, and the condemnation of the teachings of Arminius.

Dot, a French term indicating the property which a wife brings to her husband on marriage, and is

usually settled on the woman, being her separate property, though the income from it may go towards the general household expenses.

Dotterel, a handsome bird of the plover family found in northern Europe and Siberia. Nests in the Cairngorms, the Grampians, and E. Ross. Very tame.

Double-Bass. The largest and deepest-toned instrument of the Violin family. The Violoncello corresponds with the vocal bass so that the pitch of the Double Bass has no vocal counterpart—hence its name.

Double-entendre, a corruption of the French phrase "double entente," and used in English to indicate a word or sentence of indelicate double meaning.

Doublet, a body garment worn by men from the 15th to the 17th century; at some periods with skirts and belt, at others padded at the hips and in the sleeves. In their later form, under the Stuarts, doublets were made without sleeves and formed a sort of vest.

Drachm (or **Drachma**), an ancient Greek silver coin and weight. One drachma was equivalent to six obols. The word has survived as the name of a weight: Avoirdupois, one-sixteenth part of an ounce; Apothecaries' Weight, one-eighth part of an ounce.

Draco, a northern constellation, the Dragon.

Drag. Term used in aerodynamics, for resistance offered by the air to the passage of a body moving through it. When speed of sound is reached drag increases abruptly about tenfold. *See* **F70** (1).

Dragoman, an Oriental term used to designate a guide or interpreter. In some regions it is not considered safe to travel without an attendant of this kind. They often assume larger responsibilities, however, and contract for the organisation of caravans and the carrying out of tours.

Dragon, a fabulous monster common to folk-lore in most countries; generally represented as a winged reptile, with fiery eyes and breath of flame. A dragon guarded the garden of the Hesperides; in the New Testament there is mention of the "dragon, that old serpent, which is the devil"; St. George, England's patron saint, is supposed to have overcome the dragon; mediæval legend abounds in dragons. In heraldry it has also a conspicuous place; and in China was the imperial emblem.

Dragonade, the term given to the series of persecutions of Huguenots in France in the reign of Louis XIV., just before and after the revocation of the edict of Nantes, dragoons being chiefly employed in the work. Since then the term has been used in reference to any onslaught on the people by soldiers.

Dragonet, the name of the fish of the *Callionymus* genus, beautifully coloured, and about a foot in length. They are common on the British coast and in the Mediterranean.

Dragon Fly, the common name of a well-known class of insects having two pairs of membraneous wings, and often of very brilliant colours. They are swift of flight and may be seen hovering over sheets of water in the sunshine all through the summer.

Dragon's Blood, a dark-red resinous substance obtained from the fruit of a Malay palm, and possessing medicinal virtues. In a special technique used for making line blocks in printing, dragon's blood is used.

Drama. The word *drama* comes from a Greek word meaning to do or to act, and it is from Greece that the play originates (at least, so far as the West is concerned). Plays have their origin in the long-ago past when players dressed up as various supernatural beings to perform rituals designed to make the gods carry out desired actions. Three or four hundred years B.C. such playwrights as Æschylus, Sophocles, and Euripides began to write plays partly religious and partly secular for the pleasure of their audiences: this was one of the greatest periods the theatre has seen, and such plays as *Œdipus Rex* and *Antigone* still give pleasure in our own theatres. Roman drama was of little significance in general, and the next important stage in the history of the theatre is the Catholic mystery play of the Middle Ages, which, at the time of the Renaissance, developed into the play as we know it now. In England the great Elizabethan playwrights Webster, Ford, Shakespeare were in the forefront of this movement. Cromwell disapproved of the theatre, and the next important stage is the Restoration Drama following the Restoration of the monarchy in 1660. The only European achievement comparable to that of Britain in the history of the stage is that of France with such great playwrights as Molière and Racine. In the 19th and 20th centuries the great playwrights have been Oscar Wilde, Shaw, and others in Britain; Pirandello in Italy; Ibsen in Norway; Strindberg in Sweden; Hauptmann in Germany; Chekov and Turgenev in Russia. There are signs that the drama in verse is once more becoming popular in this country with such writers as T. S. Eliot and Christopher Fry. A summary such as the foregoing cannot include the great dramas stemming from another tradition in Asia—the plays of Japan, China, and India.

Dramatic Unities, as prescribed in ancient times, comprise Time, Place, and Action.

Draughts, a game played with dark and light pieces on a chequered board. *See* **U11** (2).

Drawbridge, a bridge that can be lifted up so that no passage can be made across it. It was a usual feature of a fortified castle in the Middle Ages, and was raised or lowered by chains and levers. It spanned the fosse, and on the approach of an attacking party was raised and formed a special barricade to the gate. Modern drawbridges are such as are raised to allow of the passage of boats up and down a river or estuary. The Tower Bridge is a famous London bridge of this type.

Drongo. The King Crow or Indian Black Drongo is frequently seen in India perched on branches or telegraph wires, darting suddenly to catch insects. Other members of the family are found in Asia, Africa, and Australia. Its plumage is black with steel-blue gloss.

Drosophila *or* **Fruit Fly.** More has been learnt by geneticists from breeding experiments with this insect than with any other.

Dross, the name generally applied to the refuse of molten metal, composed of slag, scales, and cinders.

Drought, a period of dry weather, is a normal and recurring condition in many warm climates, and is frequently provided against by irrigation. In the British Isles really long rainless spells are somewhat rare, and an "absolute drought" is defined officially as a period of at least fifteen days on each of which the rainfall is less than $\frac{1}{100}$ inch. The summer of 1959 was wholly without precedent in all parts of Britain for lack of rainfall, abundant sunshine, and warm weather. In South Yorkshire an absolute drought lasted 59 days, the longest period in British records.

Druids, priests and learned men of Celtic Britain and Gaul. Little is known for certain about them, and the chief records come from Roman authors, notably Pliny and Cæsar. Worship of the sun, belief in special deities and in the immortality of the soul were the central features of their religion. The oak and mistletoe were sacred to them, and they are supposed to have offered human sacrifices. The Romans did much to stamp out Druidism in Gaul, but in Britain it yielded only to Christianity. The megalithic stones at Stonehenge were formerly ascribed to the Druids, but recent evidence suggests that the monument belongs to a Bronze Age culture (*c.* 1500 B.C.).

Drum. There are three main kinds of drum: the bass drum, the side drum, and the kettle drum.

BASS DRUM: a large shallow wooden cylinder whose ends are covered with skin or parchment rendered taut. It is used in a vertical position and beaten on both sides with padded leather hammers. Much used by military bands to beat out the rhythm of a march.

SIDE DRUM. A smaller version of the bass drum, sometimes with a metal body. It is used horizontally and played on the upper side with a pair of wooden drumsticks or, in dance bands, with a wire brush. Jazz-drummers use a combination of bass drum and several side drums on which complicated solo passages may be performed. To increase the rattle, strings of catgut may be strung across the lower parchment. The drum is then called a snare drum.

KETTLE DRUM: a large copper bowl whose mouth is covered with parchment. The tension of the parchment may be altered by means of hand-screws so that the drum may be tuned to a particular note. In a normal orchestra there are two kettle drums known collectively as the tympani.

Drupe is the scientific term for stone fruit. The stone forms the inner part (endocarp) of the fruit, and encloses a seed or kernel, the latter being liberated after setting in the ground by the decomposition of the shell.

Drury Lane Theatre is the oldest London playhouse. There was a theatre of the name in the Stuart period. It was destroyed by fire in 1671. The next theatre on the site was built by Wren, and burned down in 1809. The present house dates from 1812. Sheridan was its manager for a long time.

Dry-rot, the term was first used about 1775 to describe the fungal decay of timber in buildings. Creosote distilled from coal tar is the standard material for preservation of timber, and pentachlorophenol and copper naphthenate are two compounds now extensively used. Dry wood always escapes dry-rot. Chief fungi causing dry-rot are *Merulius* and *Poria*.

Dualism is a term used both in religion and in philosophy. In religion it involves the doctrine of two distinct principles, one good, the other evil, as the controlling influence; in philosophy it opposes materialism and idealism, and insists that spirit and matter are separate substances.

Dublin University *or* **Trinity College** was founded by Queen Elizabeth in 1591. Its library, built between 1712 and 1732, has over half a million books and a very fine manuscript collection.

Ducat, a coin formerly widely current on the Continent, first coined in Apulia in the 12th century. A gold ducat was worth about 9*s.* of our money, and a silver ducat half that sum.

Duck, water bird smaller than the related goose and swan, which together form the family Antidæ. Duck refers to the female, drake to the male. The duck family falls into two separate groups: the river or freshwater (surface feeding) ducks, such as the mallard, pintail, wigeon, shoveler, mandarin, teal, garganey; and the sea (diving) ducks, such as the goldeneye, pochard, scoter, eider, and the fish-eating mergansers or "sawbills." The ancestor of all domestic breeds, with the exception of the muscovy, is the mallard.

Duck-bill *or* **Ornithorhynchus,** a fur-covered mammal inhabiting Australia and Tasmania, possessing a bill like a duck and a body resembling that of a mole. Called also the duck-mole and the duck-billed platypus.

Ducking-stool *or* **Cucking-stool,** a stool in which common scolds, disorderly women, and dishonest tradesmen were formerly tied and plunged into water as punishment. Ducking prevailed from the late 15th century until the early 18th.

Ductility is a property possessed by most metals which renders them capable of being stretched without breaking. Gold is the most, and lead the least ductile of metals, the order being gold, silver, platinum, iron, copper, palladium, aluminium, zinc, tin, lead. In animated nature the spider and the silkworm, with their elastic secretions, are noted examples of ductility.

Duelling originated in France in the so-called days of chivalry. It is an encounter between two persons, with deadly weapons fought according to conventional rules and prearranged, with the object of settling a personal quarrel. There is no instance of a private duel in England before the 16th century. The Duke of Wellington fought a duel with Lord Winchelsea in 1829, and Castlereagh, Pitt, Fox, Sheridan, and Canning all took part in duels. Duels are frequently described in literature.

Duet. A musical composition for two voices or two instruments. A pianoforte duet may be performed by two players on the same instrument.

Dugong. A marine mammal, belonging to the order Sirenia (sea-cows). Inhabits Red Sea and Indian Ocean; also found as far East as the Philippines and Australia. Lives on seaweed. Related to the Manatee.

Duke, the highest rank in the British peerage next to that of a royal prince. Edward, the Black Prince, eldest son of Edward III., who died before his father, was the first English duke, being created Duke of Cornwall in 1337. Since that time all Princes of Wales have held that title.

Dukeries, a range of English woodland and park country, mainly in Nottinghamshire, comprising the adjacent demesnes of several English dukes and nobles. The Dukeries include Sherwood Forest and the estates of Welbeck Abbey, Clumber Park, Worksop Manor, and Thoresby Hall.

Dukhobars *or* **Doukhobars** (Russian = spirit wrestlers), a Russian religious sect founded in the 18th century and numbering many thousand followers. Their leader was Peter Veregin. They deny the divinity of Christ, interpret the gospels figuratively, believe in the equality of all men before God, and reject all authority, including that of the Government. They were severely persecuted in Russia and were befriended by Tolstoy. Many emigrated to Canada to settle in Saskatchewan and British Columbia in 1898–99, where they have become absorbed in the Canadian community and only occasionally get into trouble with authority over the education of their children and their ascetic practices (which include nudism).

Dulcimer. An instrument of stretched wires which are struck by hammers held in the hands. It is the logical precursor of the pianoforte.

Duma, Russian Parliament established by imperial ukase Aug. 19, 1905, consisting of representatives elected on a restricted franchise. Abolished by the Bolshevists in 1917.

Dunciad, Pope's famous satire in verse, in which he replied to the attacks of his enemies and denounced the critics and poetasters with scathing effect.

Dunes. Sand dunes are elliptical or crescent-shaped mounds of loose sand produced by wind action. The dune has a gentle slope on windward side; a steep slope on the leeward side.

Dunlin, very common small wading-bird of the Sandpiper family nesting in Britain. Its range extends to other areas where it also breeds.

Dunmow Flitch, a custom which originated in the parish of Little Dunmow, Essex, in the reign of Henry III., which was that the husband who was prepared to swear before the prior, convent, and townsfolk of Dunmow that he had not repented of marriage or quarrelled with his wife for a year and a day, should be rewarded with the gift of a flitch of bacon. The custom has frequently been abolished and revived.

Dunnock (*Prunella modularis*), a small bird of the countryside of rich brown and dark grey plumage. Sings a cheerful song all the year round. Called hedge-sparrow in southern England. Another member of the same family, the larger Alpine Accentor (*Prunella collaris*), is found on rocky mountain slopes of Europe and Asia.

Duodecimo, a sheet of paper folded into twelve leaves, written "12mo."

Durbar, a term used in India for a State reception, from the Persian word *darbár* meaning "court" or "audience." It may be either a council for administering affairs of state, or a purely ceremonial gathering. Native rulers of India received visitors and conducted business in durbar. The word was applied to great ceremonial gatherings like Lord Lytton's durbar for the proclamation of the Queen-Empress in 1877 and the Delhi durbar of 1911.

Durham University, founded in 1832, a federal university composed of two divisions, the Durham Colleges (5 men's and 3 women's colleges, 2 non-collegiate societies) and King's College, Newcastle upon Tyne.

Dust, solid particles of matter floating in the atmosphere, produced chiefly by volcanic eruptions, sand-storms in desert regions, and industrial and domestic smoke. When the island of Krakatoa erupted in 1883, more than 1 cubic mile of dust was thrown into the air and carried three times round the earth by the explosion wave. The particles in dust-storms are much finer than those in sand-storms and are swept up to far greater heights. The local whirlwinds which form over loose dry soils are termed dust-devils.

Dyke, the term applied to masses of igneous rock which have flowed into grooves of strata or be-

come infused therewith; the word also signifies in alternative usage, a sea-wall and an open drain.

Dynamite, a powerful explosive whose chief element is nitro-glycerine. It was discovered by Nobel in 1867, who absorbed nitro-glycerine in kieselguhr; has a disruptive force of about eight times that of gunpowder.

Dynamo. Machine for transforming mechanical energy into electrical energy. Depends on principle of electromagnetic induction whereby a current is produced in a conductor (*e.g.*, copper wire) traversing a magnetic field. The two essential parts of a dynamo are the conductors or *armature* and the *field magnets*.

Dynasty, a succession of monarchs of the same family, as the Carlovingian dynasty, the Bourbon dynasty, the Plantagenet dynasty, etc.

Dysprosium. Element discovered in 1886 by Boisbaudran: one of the rare-earth metals.

E

Eagle, large bird of prey with huge hooked bill, related to the buzzard, kite, hawk, harrier, falcon, and vulture, together forming the family Falconidæ. There are many species to be found throughout the world, the Golden, Imperial, Tawny, Spotted, and Lesser Spotted being found in Europe. The Golden Eagle, a magnificent-looking bird, nests in the Scottish Highlands, and the White-tailed Sea Eagle, which used to breed in Britain, is now only an occasional visitor. The eagle has been the symbol of royal power since the earliest times, and the American or Bald Eagle is the emblem of the United States.

Earl, a British title of nobility of the third rank, duke and marquis coming first and second. The title dates from Saxon times, and until 1337 ranked highest in our peerage.

Earl-Marshal, in England ranks as the eighth of the great officers of state, is head of the College of Arms, attends the sovereign in opening and closing the session of Parliament, arranges state processions (especially coronations) and assists in introducing newly created peers in the House of Lords. The office is hereditary in the family of the Dukes of Norfolk.

Earth, our habitable globe, is the third of the planets of the solar system in order from the sun, and on an average throughout the year takes 24 hours to turn completely round relative to the sun, the whole earth revolving round the sun in a slightly elliptical orbit once in a year of 365·2564 days. The mean distance of the earth from the sun is 93,004,000 miles. The shape of the earth is that of an oblate spheroid, its equatorial and polar axes measuring 7,926 miles and 7,900 miles respectively. The crust consists of an outer layer of surface soil of varying thickness, beneath which there is a mass of hard rock several miles deep, the percentage (by weight) of the principal elements present being oxygen 47, silicon 28, aluminium 8, sodium and potassium 5, iron 4·5, calcium 3·5, magnesium 2·2, titanium 0·5, hydrogen 0·2, carbon 0·2, phosphorus and sulphur 0·2. Mass of the earth is estimated to be 6,000 million million million tons. Two-thirds of the earth's surface is covered with water. It has only one satellite, the moon. A recent estimate of the age of the earth, based upon detailed study of the isotopic composition of lead ores, is 4,500 millions years. Recent discoveries suggest that the earth is embedded in the atmosphere of the sun and that some of the heat that reaches us from the sun gets here by direct conduction through interplanetary space. *See* **F8–9, 49**.

Earthquake, a sudden violent disturbance of the earth's crust; the region of the surface immediately above the "focus," or source where the earthquake originates, is termed the "epicentre." On account of their destructive power earthquakes have attracted attention from the earliest times, but accurate study dates only from the last century and the development of a world-wide network of recording stations from the present one. The majority of severe earthquakes result from fractures, usually along existing faults, in underlying rock strata subjected to great strains, the shearing movement sometimes extending to the surface. These dislocations set up vibrations which are propagated as waves throughout the bulk of the earth or round the crust. Frequently the main shock is followed by a series of smaller aftershocks. Minor local earthquakes may be attributed to the effects of volcanic activity, but most of the larger ones originate in non-volcanic regions along well-marked lines of weakness in the earth's crust. Generally the ground is felt to tremble, undergoing oscillations which may gradually or suddenly increase to a maximum and accompanied by sounds. Where there is movement of the sea-bed a tidal wave may result. One of the greatest of historic times was that which destroyed and flooded Lisbon in 1755. Among the notable shocks of the present century rank those of San Francisco (1906), Messina, Italy (1908), Tokyo, Japan (1923), Napier, New Zealand (1931), N.E. Assam (1950), South Ionian Is. (1953), Agadir (1960).

Earth Satellites. *See* **F47–49**.

Earthworm, of which there are several species, has a cylindrical body, tapering at both ends, and segmented into rings. It moves by contraction of its rings, aided by retractive bristles; is eyeless, but has a mouth, gullet, and stomach. Earthworms exist in immense numbers, and perform an important part in the scheme of nature by loosening the soil and rendering it more amenable to tillage. They also form a valuable food for birds and many mammals, and are unequalled as bait for certain kinds of fish.

Earwig, a genus of insects of the cockroach family, possessing two pairs of wings and anal forceps. It is of nocturnal habits, lives on vegetable matter, and hides by day under stones or bark. The old belief that it deliberately creeps into people's ears is altogether unfounded.

Easter, the annual Christian festival in commemoration of the resurrection of Christ, the English name being derived from Eostre, goddess of Spring. The date cannot fall earlier than March 22 nor later than April 25. Many disputes arose among the early Christians as to the proper time to celebrate this day which governs all other movable feasts. It was eventually ruled at the Council of Nicaea in 325 that Easter Day should be the first Sunday after the full moon following the vernal equinox. If this happens to be a Sunday, then Easter Day is the Sunday after. It should be remembered, however, that this moon is the paschal moon of the ecclesiastical calendar, quite imaginary, and generally one or two days ahead of the real moon we see in the heavens. In fact the reverend fathers at Nicaea did us a bad turn in having anything to do with the moon but then they had no Astronomer Royal to advise them of the complications. *See also* **N20**.

Eastern Question, a term formerly applied to the problems arising from the instability of the Mohammedan power of Turkey and its relations with the other nations of Europe. Later connected with other problems of the Near East, such as the possession of Constantinople and the position of the Balkan states.

East India Company was incorporated by Elizabeth in 1600. In 1613 the Company set up a factory at Surat, India, and in 1662 Bombay came under the Company's influence and developed into an important trading port. Dupleix wanted to establish French power in India and a struggle for supremacy took place. Clive gained the victory for England and thenceforward British dominion in India remained undisputed except by native princes. In 1772 Warren Hastings was appointed the first Governor-General and in 1784 Pitt's India Act established a Board of Control for the India Company. A great increase of trade resulted, and this rule continued down to 1858, when, as a result of the mutiny, the Crown assumed the sovereignty. With the passing of the Indian Independence Act of 1947, British dominion ended and India was handed back to the Indians.

Eau-de-Cologne, a popular distilled perfume first manufactured at Cologne in the 18th century by Johann Maria Farina, an Italian, and since made in large quantities in Cologne and elsewhere.

Ebony, a name applied to various hard black woods, the best of which are grown in Mauritius and Ceylon. There are also Indian and Ameri-

can varieties. Only the inner portions, the heartwood, of the trees are of the necessary hardness and blackness. Ebony is largely used in ornamental cabinet work, for piano keys, canes, etc.

Ecballium, the scientific name of the squirting cucumber, so named from the fact that when ripe it breaks from the stalk and ejects its seeds and juice from the hole made by the breakage.

Ecce Homo ("Behold the Man!"), used in reference to the pictures and sculptures representing Christ crowned with thorns.

Ecclesiastes, a book of the Old Testament, the word signifying "the preacher." Supposed to contain the reflections of Solomon, though many critics dissent from this view.

Ecclesiastical Commissioners. By a measure which came into force on April 1, 1948, the Ecclesiastical Commissioners and Queen Anne's Bounty were amalgamated as the Church Commissioners (which see).

Ecclesiastical Courts, dealing exclusively with Church affairs, are those of the Archdeacons, the Bishops, and the Metropolitan (York or Canterbury), with the Judicial Committee of the Privy Council as the final Court of Appeal.

Ecclesiasticus, the title of one of the books of the Apocrypha, dating from about 180 B.C. Its alternative title is "The Wisdom of Jesus, the Son of Sirach."

Echidna. The spiny ant-eaters of Australia and Tasmania. There are several species of these egg-laying mammals, which belong to the order Monotremata.

Echinodermata. The division of invertebrate animals which include star-fish, sea urchins, sea cucumbers, brittle stars, sea lilies (crinoids). The adults have a radial symmetry. *See* **F24** (2).

Eclipse, an obscuration of the light of the sun, moon, or other heavenly body by the passing of another body either between it and the eye or between it and the source of its light. The sun is eclipsed by the moon intervening between it and the earth; the moon by the earth passing between it and the sun. Total eclipses of the sun have occurred over parts of the British Isles in the years 1424, 1433, 1598, 1652, 1715, 1724, 1927, 1954 (visible from the Shetland Is.), and the next will be seen only from near Land's End on Aug. 11, 1999.

Ecliptic is the sun's apparent path in the sky; the great circle described by the sun from west to east in the course of a year. The sun is exactly on the equator on approx. March 21, and Sept. 23, and the points where the celestial equator and ecliptic intersect on these days are called the *equinoctial points*. On approx. June 21 and Dec. 22 the sun reaches its greatest and least midday elevation and its greatest distance north and south of the equator, and the points on the ecliptic on these days are called the *solstices*. (*See* **Seasons, N20.**) These four points are equidistant from each other by 90°. The equinoctial points are not fixed. The angle of inclination of the ecliptic to the equator is called the obliquity of the ecliptic, which is also variable, being influenced by the gravitational action of the other planets on the earth. At present the angle is 23½°.

Ecumenical Council. (*See* **Œcumenical Council.**)

Edda, the name given to two important collections of early Icelandic literature—*the Elder or Poetic Edda*, poems handed down from the 9th and 10th centuries, probably Norwegian in origin, and the *Younger* or *Prose Edda* of Snorri Sturluson compiled about 1230. They treat of mythical and religious legends of an early Scandinavian civilisation. *See also* **G38** (2).

Eddystone Lighthouse stands on a group of rocks about 9 miles from the Cornish coast and 14 from Plymouth. The present structure is the fourth that has occupied this dangerous position. The first was of wood, completed by Winstanley in 1700, but three years later washed away, its architect with it. In 1709 a second and stronger wood lighthouse was built by Rudyard. This lasted until 1755, when it was destroyed by fire. Smeaton built the third lighthouse, of granite and Portland stone, on the model of an oak trunk, and this, which was finished in 1759, withstood the storm and tempest for over a hundred years, being superseded by the present building, erected in 1879–82 by Sir James Douglas. It is wholly of granite. Its light can be seen over 17 miles, and in foggy weather it gives an explosive signal every 5 minutes.

Edelweiss, a white perennial flower of the daisy order, common in Alpine regions.

Edentata, the name given to an order of mammals which are without teeth in the front part of the jaws. Sloths, ant-eaters, and armadillos belong to this order.

"Edinburgh Review," the great Whig quarterly from 1802 until 1929, was edited by Jeffrey, and numbered among its contributors Lord Brougham, Sydney Smith, and Macaulay.

Edinburgh University, the youngest of the Scottish universities, was founded in 1582 by the town council and is now one of the leading medical centres of the kingdom. The present buildings were begun in 1789, and the library contains over 300,000 books and 8,000 MSS.

Eels, edible fishes of the order Apodes, with snakelike body covered with minute scales embedded in the skin. The common or freshwater eel *Anguilla anguilla* is found in the Atlantic coastal areas of N. America and Europe and in the Mediterranean, and breeds S.E. of Bermuda. The electric eel of S. America is a variety of great interest, possessing the power of emitting electric shocks. *See also* **F72.**

Egg-plant *or* **Aubergine,** a plant cultivated for its ovate fruit, varying in colour from dark purple to white.

Egret, a slender, graceful bird of the heron family, of pure white plumage, famed for its beautiful silky plumes (aigrettes), which appear in the breeding season, and for which it was ruthlessly hunted and would have been exterminated had not international action been taken to protect it. The Little Egret with black bill, black legs, and yellow feet breeds in the Mediterranean countries.

Egyptian Vulture is smaller than other vultures. Found in S. Europe, frequents native villages and scavanges for offal.

Eider, a large diving duck, found along the rocky coasts of northern latitudes, well known for the beautifully warm soft down, called "eider down," which the female bird plucks from her breast to line her nest. In Norway and Iceland the haunts of the eider are preserved and the birds protected by law on account of the much prized "eider down," which is collected from the nests just before the breeding season. "Eider down" is so elastic that a pound or two of it will fill an ordinary bed covering.

Eiffel Tower, built by the French engineer Alexandre Gustave Eiffel (1832–1923) for the Paris Exhibition of 1889. The tower which is made of iron is 985 ft. high and weighs about 7,000 tons.

Eikon Basilike (Royal Image), the title of a work issued in 1640, supposed to have been written by Charles I. in support of kingly divinity, and replied to by Milton in the same year with his *Eikonoklastes* (image breaker).

Eire (*or* **Eyre**), an old legal term still in use in Scotland in connection with the circuit of judges. Justices in eyre were judges journeying from assize to assize for the purpose of holding trials.

Eisteddfod (a sitting) was originally a congress of Welsh bards and minstrels, and dates from before the 12th century. These assemblies, discontinued for a long period, were resumed in 1819, and have been held yearly since, each lasting three or four days. Their object is to foster the Welsh patriotic spirit; they are devoted to orations and competitions in poetry, singing, and harp-playing, prizes being awarded to the successful contestants.

Eland, the largest species of antelope, a native of Africa; has large pointed horns, stands 5 feet high at the withers, and weighs several hundred pounds.

Elateridæ, a family of beetles of a numerous species with short legs and indented antennæ. Commonly known as Click-beetles or Shipjacks. Their larvae are the wireworms which cause so much damage to farm crops.

Elder, a genus of small trees of the *Sambucus* genus, with pinnate leaves, and bearing clusters of small purplish-black berries. The black elder, the best known, is common in most parts of Europe, and thrives in Britain. A wine is made from its berries, and the juice is used as an aperient.

El Dorado, a "golden land," was an idea much favoured in the days of the early Spanish explorers. It was believed that somewhere on the South American continent there was a country abounding in gold and precious stones. Many expeditions were fitted out to discover it. Sir Walter Raleigh also went forth on this illusive quest. The term is still used in regard to any place of rich promise.

Electric Light is light produced by electricity, and is of three kinds, the arc-light, incandescent light, and fluorescent light. The first is produced when a strong current passes between two carbon electrodes, first brought together, then slightly separated, leaving the current to continue, but setting up a resistance that causes the carbon points and the air between them to assume a white heat which gives forth an intense light, thus completing what is called the electric arc. The incandescent light is obtained by passing the current through a thin metallic wire or other strong resisting substance until it heats to the point of incandescence. In fluorescent lamps electrical energy is transformed into ultra-violet light, and visible light is produced when this falls on the fluorescent substances with which the lamps are coated.

Electric Telegraph may be said to date from 1836, when Sir Charles Wheatstone and his co-inventor Cooke introduced their Single-Needle instrument, which was soon followed by the Double-Needle apparatus. Morse, in 1837, invented his famous recording instrument. The first electric cable was between Dover and France, and was laid in 1850. The first Atlantic cable was laid in 1858, and the second in 1866. It was in 1899 that the first Marconi wireless telegraph messages were sent between England and France.

Electrolysis is the condition established when an electric current passes through a conducting liquid, between electrodes, connected with the poles of a battery, resulting in the decomposition and separation of the liquid, if a compound. Water thus becomes decomposed into hydrogen and oxygen.

Electrometer, an instrument for measuring differences of electrical potential. Unlike the magnetic or heating effects of an electric current, the electrometer is operated by electrostatic forces, there being no flow of current through the instrument. They are employed to make systematic measurements, near the earth's surface, of the potential gradient or strength of the atmospheric electric field.

Electron. All matter is pervaded by these tiny negatively-charged particles whose mass is about 9×10^{-28} gram. When current flows in a metal wire this represents a flow of electrons. All atoms contain electrons, but electrons can be isolated from atoms, as in cathode rays. The electron was discovered by Sir J. J. Thomson in 1897, which ushered in the era of modern physics. *See* **F10, 13.**

Electron Microscope. A microscope in which beams of electrons are focused by magnetic lenses in a manner analogous to the focusing of light beams in the ordinary optical microscope. Modern electron microscopes have very high resolving power and can magnify up to 1,500,000 times. *See also* **F58** (1).

Electronics. The science which deals with the behaviour and control of free electrons. It started with the discovery of the electron by Sir J. J. Thomson in 1897. The practical applications, constituting electronic engineering, have given us radio, radar, photo-electric cells, cathode-ray oscillographs, electron microscopes, computing machines, transistors, etc.

Electrophorus, a simple device for producing static electricity, consisting of a smooth disc of resin or ebonite mounted on a metal base and with a metal cover carrying an insulated handle. The disc is first electrified (negatively) by rubbing it with a dry catskin or flannel and the cover replaced, the upper surface receiving a positive charge and the lower a negative. On lifting off the cover, after having touched it with the finger, the negative charge leaks away to earth and the positive charge is isolated on the cover. The action may be repeated a number of times before it is necessary to replenish the original charge on the disc.

Electroplating is the process of coating metals or other substances with a metallic film, applied in a bath of the solution of the coating material by the action of an electric current.

Elements. In chemistry, an element is a substance in the simplest form to which it has been reduced. Ninety elements are found naturally on the earth, one is observed spectroscopically in the stars, and a further ten or so can be made artificially. Between them these elements can appear in some 1,200 different isotopes, of which 317 occur in Nature. (There are 274 stable isotopes among 81 stable elements.) *See* **F9** (2), **N30.**

Elephant, a proboscidian mammal of which only two species survive—the Asiatic, in India, and the African elephant. No other animals possess a trunk. Both males and females have large ivory tusks, of considerable commercial value. The Indian elephant is usually about 9 ft. high and weighs about 3 tons; African elephants are larger, weigh about 6 tons, and are usually much fiercer. Several fossil elephants of still larger bulk have been discovered, including the mammoth and the mastodon. The Indian elephant is domesticated and used as a beast of burden.

Eleusinian Mysteries, festivals common throughout Ancient Greece, agricultural in their symbolism.

Elf, a fairy personage who is supposed to interfere in human affairs with mischievous intent.

Elgin Marbles, a collection of ancient Greek sculptures and architectural fragments got together by the 7th Earl of Elgin and brought to England between 1802 and 1812. These celebrated treasures had originally formed part of the Parthenon at Athens, and were probably carved by pupils of the sculptor Phidias. Lord Elgin expended over £70,000 upon them, and they were purchased for £35,000 for the British Museum, where they can now be seen displayed.

Elk, the largest animal of the deer family, possessing enormous antlers, and standing, when mature, about seven feet high. The American moose is of the same family.

Ell, an old English cloth measure, representing a length of 45 in. It varied in other countries, from 22 in. in Saxony to 47 in. in France.

Ellipse, in geometry, a plane closed curve in which the sum of the distances of any point from the two foci is constant.

Elm, a stately, wide-spreading tree having some 20 species spread over north-temperate regions, several of which are native and peculiar to Britain. The grandest of the field elms is the English elm, *Ulmus procera*, which may reach a height of 140 ft. and a girth of 25 ft. The wych elm, *U. glabra*, or Scots elm, is a valuable hardwood and used in boat-building.

Elongation, an astronomical term for the angular distance from the sun at which a planet is observed.

Elzevir, the name of a celebrated family of Dutch printers, who produced editions of Latin, French, and German classics, which were highly valued for their beauty of type and accuracy of printing. They flourished in the 17th century.

Embalming, the process by which dead bodies are preserved from decay by means of spices and drugs. The art reached perfection in ancient Egypt, as the mummies which still exist so powerfully testify. In modern times many experiments in embalming have been tried, with various degrees of success.

Ember-days are set apart for fasting and prayer in the Western Church, at the periods appointed for ordination, viz., the Wednesday, Friday, and Saturday after the first Sunday in Lent, Whit-Sunday, Sept. 14 (Holy Cross Day), and Dec. 13 (St. Lucia's Day). They are of very ancient origin.

Embossing, the art of stamping in relief letters or designs upon pliant substances.

Embryology, that branch of biology which deals with embryos, tracing their development from fertilisation of the germ or seed to maturity.

Emerald. The rich green variety of beryl (beryllium aluminium silicate). The colour is due to the presence of chromium oxide.

Emery, a granular substance of the corundum order, generally mixed with other metallic substances, and used in a powdered state for polishing and grinding purposes. Emery stone is

chiefly found in Asia Minor and the Grecian Archipelago.

Emplectum, a kind of masonry used by the Greeks and Romans, consisting of walls built with hollow spaces between, which were filled in with rubble. Much used in fortification construction.

Empyrean, the highest heaven of the Ptolemaic system, and the supposed abode of the Deity.

Emu, large, flightless bird of Australia.

Enamel, a vitrified substance applied as a coating to pottery and porcelain. The art was practised by the Assyrians and Egyptians, and was introduced into Europe by way of Greece. Enamels are all either of the transparent or opaque kind, and are susceptible to an immense variety of colouring, according to the metallic oxides introduced.

Encænia, a festival commemorating a dedication: at Oxford University the annual commemoration of benefactors, accompanied by the conferring of honorary degrees, is held in June.

Encarpus, an architectural ornamentation consisting of sculptured representations of garlands or festoons of flowers or fruits, and generally wrought on friezes or capitals of columns.

Encaustic Tiles were much used in ancient times, as the evidences of ancient Rome and of the mediæval period in Europe generally clearly indicate. In modern times there has been a revival of this art, which has been very successful in many of the present-day examples of our own tile manufacturers, being more beautiful and durable than those of former times.

Encyclical Letters, a term used in reference to letters addressed by the Pope to his bishops upon matters of doctrine or discipline.

Encyclopædists, a term first applied to the eminent writers who collaborated in the French *Encyclopédie* (1751–65). These writers were Diderot, D'Alembert, Voltaire, Helvetius, and others, and their writings generally were sceptical as to religion, and destructive as to politics, and had great influence in popularising the social ideas which afterwards resulted in the French Revolution. *See also* **G50** (2).

Energy may be recognised in many forms: kinetic, potential, electrical, heat, chemical, radiant, and atomic energy. When energy disappears in one form it appears in others, in each case according to a fixed rate of exchange. (*See* **Work.**) Atomic energy is quite different from other forms of energy and is released when matter is actually destroyed, a small amount of matter giving rise to a relatively enormous amount of energy. During the war atomic energy research developed at great speed and culminated in the production of the atom bomb (*q.v.*) when a few pounds of uranium released energy comparable to that of 20,000 tons of high explosive. The hydrogen bomb has an explosive power nearly 1,000 times greater. For peaceful uses of atomic energy *see* **F51**.

English Language is composed of many elements. Anglian, Saxon, Norman French, Scandinavian, Dutch, and the various underlying contributions from Latin and Celtic sources. The result is a strong, expressive, composite language, now spoken by all races of English descent, and is the mother tongue of over 200 million people living in Britain and the Commonwealth and the United States of America.

Engraving is the art of cutting or otherwise forming designs of pictures on wood, stone, or metal surfaces for reproduction by some method of printing. Wood-engraving was the earliest in the field, dating from the 15th century. Later, engraving on steel and copper plates was introduced, and mezzotint, lithography, stipple, aquatint, etc. With the development of photography, and an increased knowledge of the use of acids, many readier methods of engraving were adopted, and now wood-engraving, which was formerly resorted to for all general engraving purposes, is comparatively little used. What is styled "process" engraving is the most utilised.

Ensign, a former title given to a commissioned officer of the lowest rank in a foot regiment, and so called because he was entrusted with carrying the colours or ensign. The rank was abolished in 1871. Officers of like rank are now styled second-lieutenants.

Ensilage, a method of storing and preserving fodder, vegetables, etc., in pits dug in the ground and excluded from air or light. The system was practised in ancient Rome and revived in England in the 19th century.

Entablature, that portion of a building which surmounts the columns and extends to the roof of the tympana of the pediments. It comprises three parts, the architrave, the frieze, and the cornice.

Entellus, one of the common monkeys of India, with a ridged forehead, a long tail, and whiskers and beard. It is regarded by Hindus as sacred, and enjoys immunity from injury at their hands.

Entomology is the study of insects. (*See* **Insects.**)

Entomostraca, a Crustacean sub-class, known as water-fleas, from their jerky method of progression.

Entozoa is a term used to designate generally internal parasites, such as intestinal worms.

Envoy, a special diplomatic agent deputed to represent a government at a foreign court, or to perform a special service, such as the negotiation of a treaty.

Enzyme. Organic catalysts which accelerate chemical processes occurring in living organisms. Examples are: *lipase*, which speeds the hydrolysis of fats; *diastase*, which is involved in the conversion of starch to glucose. Fermentation of sugars to alcohol requires the presence of the enzyme *zymase*. *See* **F25** (2), **59** (1), **P33** (2).

Epaulette, a shoulder badge fringed with cord, worn by English army officers until 1855; now confined to naval officers, and varying in form and richness according to the rank of the wearers.

Ephemoptera *or* **May-flies**, an order of insects. In the larval condition they exist from two to three years, but no sooner do they arrive at maturity than their lives are hurried to a close. They rise up in pyramids on warm summer nights, take no food, propagate, and perish. The Latin name expresses the fact that the adults have an ephemeral existence.

Ephesus, Councils of, were held in A.D. 431 and 449 to deal with heretical doctrines.

Ephod, a vestment worn by a Jewish high priest, and sometimes by priests of lower rank. In olden times it was of rich texture and set with gems.

Ephors were the five annually elected magistrates who exercised almost supreme authority in ancient Sparta; and later the office was adopted by the Romans. The last of the Spartan ephors existed in 225 B.C. when Cleomanes III. exterminated the existing magistrates and abolished the office.

Epic, a heroic narrative poem dealing with important events and introducing supernatural features; the most famous examples are Homer's *Iliad* and *Odyssey*, Virgil's *Æneid*, Ariosto's *Orlando Furioso*, Tasso's *Jerusalem Delivered*, and Milton's *Paradise Lost*. *See* **M12**.

Epiglottis, a lamella or cartilage designed to cover and protect the entrance to the larynx during the process of food swallowing.

Epigram, a term originally used to indicate a monumental inscription; afterwards applied to any concise and pointed specimen of verse, but in later times is applied to short, witty expressions in prose as well as verse. *See* **M10** (2).

Epilogue, an address, in prose or verse, delivered at the end of a play, and a usual accompaniment to the dramatic work of the 16th, 17th, and 18th centuries, but now fallen into desuetude.

Epiphany, a church festival celebrated on January 6, Twelfth Day.

Epoch, a period of time of such importance that succeeding years are numbered from it; an era is a succession of time, but an epoch is a point of time. Among the various epochs may be counted the birth of Christ and the Reformation. There are also the geological epochs, and epochs in arts, science, and invention, as well as in history generally.

Equator, the imaginary great circle of the earth, every point of which is 90 degrees from the earth's poles, and dividing the northern from the southern hemisphere. It is from this circle that the latitude of places north and south is reckoned. The celestial equator is the circle in which the plane of the earth's equator meets the celestial sphere.

Equidæ, the zoological term for the family of hoofed quadrupeds comprising two genera—*Equus*, to which the horse belongs, the *Asinus*, comprising the ass and zebra. In the Tertiary period there were several other species of Equidæ—*Hipparion*, *Protohippus*, etc.—of which fossil remains have been discovered.

Equinox, the time when the sun crosses the plane of the earth's equator, making day and night of equal length. *See* **N20**.

Equites, a body of ancient Roman cavalry, recruited from citizens of rank.

Eras are distinctive periods of time associated with some remarkable historical event or personage. The *Christian era*, dating from the birth of Christ, adopted for the reckoning of the years about the 8th century, was invented by the Christian scholar Dionysius Exiguus in the 6th century. It is now generally understood that the year A.D. 1 is put too late by four years. The *Jewish era* dates from 3761 B.C.; the *Julian era* from the alteration of the calendar by Julius Cæsar, 45 B.C.; the *Mohammedan era* from the date of the *Hejira*, or the flight of Mohammed from Mecca to Medina, which is A.D. 622, July 16, in the Gregorian Calendar.

Erbium. Element discovered by Mosander in 1842. Belongs to the group of rare-earth metals.

Erl-King, a forest fiend of German mythology, who lured children from their homes and carried them off. In Goethe's ballad the "Erlkönig" it is a traveller's child who is lured to destruction.

Ermine, a small animal found in northern latitudes, and abundant in Arctic America. Its coat becomes a lovely white in winter, the tip of the tail only remaining black. Its fur is highly prized.

Ernie, the name given to the "electronic random number indicator equipment", the electronic machine which selected the prizewinning numbers in the first Premium Bond draw held June 1–2, 1957.

Eros. This asteroid is 15–20 miles in diameter. It comes closer to the earth than any other member of the solar system with the exception of the moon and several very small asteroids. Determination of solar parallax based on observations of Eros in 1930–31 yielded the most accurate estimate of the distance of the sun from the earth (93,004,000 miles).

Erse, a term used by Lowland Scottish, and English writers for the Gaelic language spoken in the Highlands of Scotland. Sometimes erroneously applied to Irish, the Gaelic language as spoken in Ireland and revived as an official language in recent times. Dr. Johnson, Sir Walter Scott, and other writers used "Erse" to signify Scottish Gaelic. The language of the Scottish Lowlands (that used by Robert Burns) is related to the English language and not to Gaelic and is variously termed Scots, Braid Scots, the Doric, the Scottish vernacular, and, fashionably of late, Lallans.

Escapement is the contrivance by which the pressure of the wheels in a watch or other timepiece is accommodated to the vibratory action of the pendulum or balance-wheel, providing the regulating power which maintains an even impulse in spite of irregularities caused by friction or air resistance.

Escarpment, the face of an abrupt cliff or hill; also a portion of fortified ground whose edge is cut away almost vertically to prevent the enemy from climbing.

Escurial *or* **Escorial**, a magnificent palace built in the 16th century by Philip II. of Spain at a village 26 miles north-west of Madrid. In addition to a palatial residence it has a fine Doric church, a valuable library, and the royal mausoleum, the burial-place of the kings of Spain.

Escutcheon, a shield-shaped surface called a field, upon which a man's armorial bearings are represented. A woman's escutcheon is lozenge-shaped.

Esoteric, a term which had its origin in the teaching of Aristotle, but in later times has been applied to such doctrines as are intended only for privileged students or those of the inner circle.

Espalier, lattice work upon which to train fruiting or ornamental trees.

Esparto Grass grows in great abundance in Spain and North Africa, and the pulp is largely used for paper-making as well as for other purposes.

Esperanto, an artificial international language created by L. Zamenhof of Warsaw and first published in 1887. It does not seek to replace national languages but to serve as a second language for international communication. It is based on the internationality of many words in the principal modern languages, and is entirely phonetic in spelling and pronunciation.

Eskimoes, the people of the Arctic regions. They dwell in skin tents in summer and snow *igloos* in winter and live by hunting, fishing and trapping.

Eskimo Dog, a very hardy animal of great utility to the inhabitants of the Arctic regions as sledge-drawers. In appearance it suggests the Pomeranian, but is of a larger breed and has a wolf-like head.

Esquire, formerly a title applied to a young man of noble birth who attended on a knight and carried his shield. The title ranked next below that of knight and was applied to the eldest sons of knights and the younger sons of peers. Later it became a courtesy title and given to any man as a mark of respect.

Essenes, a Jewish sect which established itself in the 2nd century B.C. near the Dead Sea. They lived a spiritual and ascetic life according to "the love of God, of virtue and of man." They had no personal possessions and bathed every morning. The claim has been advanced that Jesus and John the Baptist belonged to this sect.

Essential Oils are oils derived from plants by distillation or expression, and much used in perfumery as well as to some extent in medicine.

Estate Duty is the duty payable upon the value of all property which passes or is deemed to pass on the death of any person. As from July 30, 1954, not exceeding £3,000, nil; £3,000–£4,000, 1%; £4,000—£5,000, 2%; £5,000—£7,000, 3%; £7,500—£10,000, 4%; £10,000—£12,500, 6%; rising gradually to 80% on estates exceeding £1,000,000. The 1960 Budget proposed that there should be graduated relief for gifts made more than two, three, or four years before death of 15%, 30%, and 60% respectively, to take effect for deaths occurring after 4 April 1960.

Estates of the Realm in Great Britain are the Lords Spiritual, the Lords Temporal, and the Commons. They are the great classes invested with distinct political powers, and whose concurrence is necessary to legislation.

Etching, a process of engraving, on copper usually, the design being drawn with a steel needle, and the lines produced by the action of an acid or mordant.

Ether, a volatile liquid, composed of carbon, oxygen, and hydrogen. It is a valuable anæsthetic obtained by heating alcohol with sulphuric acid.

Ethics, the science of moral conduct and duty. Aristotle, Plato, Kant, Bacon, Hobbes, Paley, Whewell, Hume, Bentham, Locke, Mill, and Herbert Spencer have all contributed to the development of Ethics, the last-named being the most illuminating of exponents of a clear ethical system.

Ethide, a compound formed by the union of an element with the monad radical ethyl.

Eton College, a famous school for boys, near Windsor, founded 1440.

Etruscans, people believed to have come from Asia Minor who colonised Italy about 900 B.C., settled in what is now Tuscany and part of Umbria, reached the height of their civilisation about 500 B.C., and were ultimately absorbed by the Romans. They were skilled technicians in bronze, silver, and goldwork, and excelled in the art of granular decoration. *See* **G24**.

Etude. (*See* **Study.**)

Etymology treats of the science and structure of words, including classification and derivation.

Eucalyptus, an Australian tree that grows to a great height, and possesses remarkable properties. It exudes a valuable gum, has a fibrous bark, and yields an oil from its leaves which is of great use in bronchial affections.

Euphonium, alternative name for the Bass Saxhorn in B♭. A large brass instrument of the trumpet type played by operating three valves.

Eurasian, a half-caste or person of mixed European and Asiatic parentage.

Europium, element discovered by Demarcay in 1906. A member of the rare-earth metal group.

Evaporation is the process by which a solid or liquid is resolved into vapour by heat. As it is rarely that the atmosphere is completely saturated, evaporation is nearly always going on at the surface of the earth, especially over the sea and other water surfaces, the vapour rising and, being lighter than the air, forming clouds which afterwards break, the vapour thereupon falling to earth again as rain. The same process occurs over smaller surfaces, the rate of evaporation being dependent on the general atmospheric conditions.

Everest Expeditions. For many years after Mt. Everest had been shown to be the highest mountain in the world, political conditions in Nepal, lying south of the summit, and in Tibet, to the north, prevented mountaineers from attempting an ascent. At last in 1921 the Tibetan authorities gave permission, and the first expedition, organised, as were all subsequent British expeditions, by a joint committee of the Royal Geographical Society and the Alpine Club, and led by Col. C. K. Howard-Bury, was sent out. This was primarily a reconnaissance; besides mapping the northern flanks, it found a practicable route up the mountain. By 1939, six further expeditions had climbed on the northern face. Some were baulked by bad weather, others by problems previously little known, such as the effect of high altitudes on the human body and spirit. Nevertheless, notable climbs were accomplished. In 1924, for example, Col. E. F. Norton reached 28,163 ft., and it was on this expedition that G. L. Mallory and Andrew Irvine were seen going well at about the same height. They never returned, however, and what disaster befell them is not known. After the war, political conditions again closed the Tibet route: permission was eventually obtained from the Nepalese Government to make the attempt from the south. In 1951 a reconnaissance expedition under Eric Shipton reached the ice-fall at the exit of the Western Cwm (a high valley lying south-west of the massif), and reported favourably on the prospects for an ascent. The first attempt from this side was made the following year by a Swiss expedition led by Dr. E. Wyss-Dunant, two members of which made an attempt on the summit, but were stopped at approx. 28,200 ft. by the intense cold and the very strong winds. When the British 1953 Expedition, led by Col. (now Brig. Sir) John Hunt, was being organised, stress was laid on three main points; proper acclimatisation of the climbers; use of oxygen for the final stages; and the establishment of very high altitude camps, so that the final assault parties would set out fresh and unencumbered. Great attention was also paid to recent developments in diet, clothing, and equipment. In all these matters the 1953 expedition was able to draw on the accumulated experience of their predecessors. By the end of April, a base camp had been established below the ice-fall, and with the aid of thirty-four Sherpa porters supplies had been carried up into the Western Cwm. The next critical stage was the ascent of the steep head of the cwm, the Lhotse face, with the threat of avalanches always present. By most strenuous efforts, a camp was established on the South Col (25,800 ft.) on May 21. From this camp on May 26, T. D. Bourdillon and R. C. Evans climbed the South Peak of Everest (28,720 ft.), then the highest altitude ever attained. On May 28, Edmund Hillary and the Sherpa leader, Tenzing Norkey, spent the night at the highest camp (27,900 ft.) and on the following day, May 29, climbed to the South Summit, negotiated the difficult final ridge, and reached the summit of Everest—the climax of a long, arduous, and stirring endeavour.

Evolution, in the words of Sir Julian Huxley, is "a natural process of irreversible change which generates novelty, variety, and increase of organisation." The theory, as laid down by Darwin, is that all existing species, genera, and classes of animals and plants have developed from a few simple forms by processes of change and selection. Up to the time of Darwin a large part of the civilised world believed that life had been created suddenly at the beginning of the world which God had created, according to Archbishop Usher, on 22 Oct. 4004 B.C. The evidence of the rocks, however, has given a more convincing theory of creation, and by studying the fossils preserved in the various layers of the earth's crust the past history of the earth's life has been pieced together. Darwin has been called the Newton of biology. *See* **Section F** (Part II).

Excommunication, exclusion from the rights and privileges of the Church. It is of two kinds—the major, which means a total cutting off, and the minor, which shuts out only from participation in the Eucharist. In mediæval times, major excommunications were often launched against rulers and leaders.

Exchequer, which derives its name from the checkered table on which accounts were calculated in early Norman times, is a term connected with the revenues of the Crown. The Court of Exchequer Division existed up to 1881. In former times it had jurisdiction in all revenue matters. The term Exchequer is now mainly applied to the Governmental department which deals with the public revenues, and is presided over by a Chancellor, who is also a Cabinet Minister.

Existentialism. An anti-rational modern philosophy best known through the literary works of the Frenchmen Jean-Paul Sartre and Camus. As a philosophical movement, it dates back to the German Heidegger (rector of a university in Nazi Germany), Kierkegaard, the 19th-century Danish theologian, and even Dostoievsky. There appears to be no consistent body of belief, and existentialism is mainly concerned to express an emotional attitude to the universe. Man, it is inferred, is a failure, unacceptable to Nature; he is, and always must be, imperfect. Sartre (an atheist) considers that the world is meaningless, there is nobody to help human beings in their predicament—they must help themselves. "Man is what he makes of himself." If a man is able to realise that he is abandoned to the tyranny of Fate, absolutely alone, and can count only on his own powers, then he will find freedom and greatness in this knowledge. Each individual must be free to make of himself what he can; everything is permitted to him within reason. Kierkegaard, on the other hand, was a Christian who believed that the intellect must be crucified—Christianity is not a belief, it is a form of relationship with God. There must be a defiant affirmation of God. This belief, often called Christian existentialism, has influenced such theologians as Brunner, Barth, Haecker, and others. The only consistent beliefs which appear to be accepted by all existentialists are: (1) defiance of reason and science; (2) an excessive individualism—an assertion of the right of each man to make himself in whatever way he thinks best.

Exoterics, the opposite of esoteric, is the term applied to doctrines openly expounded.

Exotics are plants of tropical origin not fully acclimatised.

Exploration. Modern exploration began in the second half of the 15th century with the voyages of the great Portuguese and Spanish discoverers. They were followed by sailors of other European nations, who profited from their developments in navigation and from their charts, and in less than one hundred years the coast-lines of much of the Americas, Africa, and south-west Asia had been revealed and the globe circumnavigated. The motives of these early explorers were mixed: they were seeking adventure, trade, plunder, national power, and the conversion of the heathen. Few if any were directly interested in advancing scientific knowledge. But from the reports of their voyages and travels, scholars at home compiled descriptions of the strange new world which stimulated their successors to undertake more systematic enquiries. One of the earliest English expeditions to be despatched for scientific research was that of William Dampier on the *Roebuck*, which was sent out by the Admiralty in 1699 to examine the coasts of North-west Australia. In the 18th century British explorers were at work mainly in the Pacific Ocean, with the object of

breaking the Spanish monopoly of trade. Capt. James Cook sailed thither in 1769 to observe first the transit of Venus at Tahiti, and then to search for the alleged great southern continent. On this voyage he discovered and charted much of the coasts of New Zealand and the east coast of Australia. On his second voyage he was the first to sail across the Antarctic Circle, and he showed that the southern continent was much smaller than had been supposed. By 1800 the general outlines of the continents, except for Antarctica were known, and explorers in the 19th century were largely engaged in opening up the interiors. In Africa British explorers solved two problems which had puzzled men for centuries: Mungo Park and Richard Lander established the true course of the River Niger, and Sir Richard Burton, J. H. Speke, Sir Samuel Baker, and others revealed the true sources of the Nile. The greatest African explorer of that age was undoubtedly David Livingstone, the missionary, who in three great journeys explored the Zambesi and the region of the Great Lakes, spreading the Gospel, fighting the slave trade, and opening up the interior to settlement and trade. In North America Alexander Mackenzie was the first to cross the main breadth of the continent from sea to sea. In Asia motives were also mixed; men like Charles Doughty, who explored in Arabia, and Sir Francis Younghusband, who journeyed from China to India across the Gobi and the Himalaya, were impelled by a love of adventure and the quest for knowledge, but political considerations were often involved. In recent years, with the main features of the world's surface known, exploration has become more intensive. Teams of scientists go out to study restricted areas in detail. An Antarctic expedition can contribute to our knowledge of world weather, or by biological research into the life history of whales, can help to improve our food supplies. Similarly, expeditions in Africa can help to check the loss of valuable agricultural land through soil erosion, or to develop areas of settlement by schemes for irrigation and power. And there are still great areas to be adequately mapped. All these problems are inter-related, and in solving them the modern explorer can call on many improved techniques and instruments—the aeroplane, the aerial camera, tracked motor vehicles, radio, in fact all the resources of modern science. But the human element is still vital, and for those with the old explorers' spirit there will always be problems left to solve.

Explosives are substances which burn to produce gases in such great volume that an explosion is induced. Gunpowder was the first explosive to be used; Roger Bacon's powder, consisting of charcoal, sulphur, and nitre, was the only practical explosive for centuries. 1845 brought gun-cotton, made by treating cotton with a mixture of sulphuric and nitric acids; but it was not until 1865 that Sir Frederick Abel perfected the process of manufacture that made it safe enough to store and use. In 1867 Alfred Nobel discovered how to make dynamite by absorbing nitro-glycerine in kiesulguhr; in 1886 he produced cordite, evaporating a solution of gun-cotton and nitro-glycerine in acetone, the resultant jelly being squeezed through jets to form cords. Cordite came into general use as a propellant. High explosives, providing bursting charge for shells and bombs, include: T.N.T. (trinitrotoluol), picric acid (known as lyddite, melinite, etc.), cyclonite (R.D.X.). Chemical explosives have been eclipsed by the atomic explosives, Uranium 235 and plutonium; 1 kilogram ($2\frac{1}{5}$ lb.) of Uranium 235 is equivalent to about 20,000 tons of T.N.T.

Extreme Unction, the final sacrament of the Roman Catholic and Greek Churches, administered to a dying person, and consisting of the anointing with holy oil, after confession and absolution.

F

Fabian Society, a society of British socialists established in 1883. George Bernard Shaw, H. G. Wells, Beatrice and Sidney Webb became its leading personalities. The Fabians stood for a non-Marxian, evolutionary socialism and believed in the "inevitability of gradualness". It is affiliated to the Labour Party and has a strong intellectual influence on the Labour movement.

Fables are fictitious narratives intended to enforce some moral precept, and may be either in prose or verse, and deal with personified animals and objects or with human beings. Æsop in ancient times and Hans Christian Andersen and the Brothers Grimm (in many of their stories) in later days, have given fables. Mention must also be made of La Fontaine's and Krylov's fables.

Faience, a kind of decorated glazed earthenware invented in Faenza, Italy, about the end of the 13th century. Wedgwood-ware is a notable example of modern faience.

Faille, a light fabric used for veiling material and other purposes of adornment. In the Middle Ages the name was applied exclusively to long veils worn by nuns.

Fairies are imaginary creatures supposed to be invested with supernatural powers. At one time a general belief in them was prevalent, especially amongst the peasantry, and the uncivilised races still existing cling to similar ideas. It was fancied that the world of fairyland was composed of good and evil spirits, variously embodied, always contending for supremacy, and exercising good and bad influence over humankind. If a person was lucky it was the work of the good fairy, if unfortunate the evil fairy was the cause. Early literature is crowded with the denizens of fairyland—fairies, elves, fays, sylphs, sprites, gnomes, goblins, genii, and so forth. Shakespeare's *Midsummer Night's Dream* is a fairy world of its own, and Spenser's *Faerie Queen* is a still more separate and distinct creative effort. Among the fairies of the domestic order, "Robin Goodfellow" was much talked of in England; as the "Banshee," with its warning apparition, was peculiar to Ireland; while the "Brownie," who rendered nocturnal help in household affairs, was more special to Scotland.

Fairs were established in mediæval times as a means of bringing traders and customers together at stated periods, and formed the chief means of distribution. The great English fairs of early times were those of Winchester and Stourbridge near Cambridge. Traders from the Netherlands and the Baltic gathered there with the great merchants of London, and goods of every kind, wholesale and retail, were sold. The British Industries Fair is the modern counterpart of the mediæval trade fair. One of the biggest trade fairs was at Nijni-Novgorod, founded in the 17th cent.; other big continental fairs are those of Leipzig (founded in the 12th cent.), Lyons, and Prague.

Fairy Rings are the circles caused in grassland by certain fungi. The circles expand outwards as the fungus spreads and at the advancing margin there is a ring of lush vegetation, and inside this, where the fungus is most dense, a ring of dead plants. Farther inward where the fungus is dying there is again a belt of strong vegetation. In olden times these rings were held to be the scene of fairy dances.

Fakirs are Mohammedan or Hindu mendicants who are held in great regard in India. There are two classes: those who are strict devotees to the principles of Islam and are called dervishes (*q.v.*); and those who are unattached to any religious order, but are simply wandering beggars—or itinerant so-called "holy men." Some of the more fanatical fakirs commit self-mutilation, and pride themselves upon their wretchedness.

Falange, the ruling party in Spain which came to power as a result of the Nationalist revolt against the Liberal Government, which gave rise to the Civil War of 1936. All power is vested in the Leader (El Caudillo), General Franco.

Falchions were a kind of sword, generally curved, used by the Roman soldiers, and afterwards adopted by other nations.

Falcon, name given to diurnal birds of prey which belong to the same family, *Falconidæ*, as the hawk, eagle, buzzard, kite, and harrier. They are swift of wing and feed on birds and small mammals. These birds have long, pointed wings, strong, hooked and notched bill, long,

curved claws, and an eye of great power. They are found all over the world. Those that breed in Britain are the Kestrel (the most common), Hobby (one of the swiftest of European birds), Merlin, and Peregrine, a swift and magnificent bird with slate-grey back, blackish crown, black "moustache" and whitish breast. Other members of the family are the Gyr Falcon from northern latitudes, Iceland and Greenland, which is a winter visitor to Britain, the Lanner, Saker, Eleonora's falcon, Red-footed falcon, and the Lesser Kestrel. The Gyr Falcon and the Peregrine were used in the sport of falconry in olden times. Because of its fearlessness and larger size, the female bird was used. When the quarry was sighted, the bird was unhooded, set free, and after mounting high into the air would dart swiftly down to strike the prey. The heron was the usual victim.

Falculia, a black-and-white bird only found in Madagascar, possessing a bill shaped like a sickle.

Fall-out. Radiations produced by nuclear explosions which may cause bodily and genetic damage. (1) *Local fall-out*, due to the return to earth of larger particles, occurs locally, and within a few hours after the explosion; (2) *Tropospheric fall-out*, due to particles which remain in the troposphere and come down within a month or so, possibly all over the world, but within the altitude in which the explosion occurred; (3) *Stratospheric fall-out*, which comes from fragments taken up into the stratosphere and then deposited, in the course of many years, uniformly all over the globe.

Fallow Deer, received its name from its fallow or yellow colour. It is smaller than the red deer, and has cylindrical antlers with palmated ends. It is native to many parts of Europe.

Falsetto, tones of a voice, particularly the male voice, which are pitched higher than the natural tones of the voice. Used in choral singing by male altos.

Fandango, a lively Spanish dance executed by two persons, who usually mark time with castanets.

Fantail, a variety of the domestic pigeon; also a genus of Australian birds of the *Muscicapidæ* family. A small New Zealand bird is called a fantail.

Fantasia, a composition for orchestra or solo pianoforte which is not bound by the rules governing formal compositions, *i.e.*, symphonies, sonatas, etc.

Fantoccini, or marionettes, were first introduced in Italy, where they are still popular. Our English "Punch and Judy" descended from this source.

Fan Tracery, a complicated style of roof-vaulting, elaborately moulded, in which the lines of the curves in the masonry or other material employed diverge equally in every direction. It is characteristic of the late Perpendicular period of Gothic architecture, and may be seen in St. George's Chapel at Windsor and the Chapel of Henry VIII. at Westminster Abbey.

F.A.O. (**Food and Agricultural Organisation of the United Nations**). *See* **C18** (1).

Farmer-General, the name given to any of the numerous aristocrats who in the days of the old French monarchy farmed certain taxes, contracting to pay the Government a fixed sum yearly, on condition that the specified taxes were collected and appropriated by themselves. The revolution of 1789 swept Farmers-General away.

Farthingale, a hoop of whalebone worn beneath a woman's skirts for the purpose of extending them, fashionable in the 16th and 17th centuries. The crinoline of the 19th century was a partial revival.

Fascism, a movement which started in Italy in 1918 under the leadership of Mussolini to suppress Socialism. The Fascist party came into power in Italy in Oct. 1922, following the March on Rome. In Germany the Fascist party came into power in Aug. 1934, when Hitler began to exercise supreme and uncontrolled authority, following the death of President von Hindenburg. Fascism is a doctrine which sets the State above the individual and gives supreme power into the hands of one man. It flourishes in times of great depression. It seeks to destroy parliamentary democracy and working-class movements, is nationalistic in sentiment and in the past has not shrunk from using any means to achieve its ends. Italian fascism derived its name and emblem from the Latin word *fasces* (= bundles). The *fasces* were the axe and bundle of rods carried by the Roman lictors before praetors, consuls, dictators, and emperors and symbolised the discipline and authority of the state.

Fata Morgana, the name given to a curious mirage often observed over the Straits of Messina, attributed to the magic of the fairy Morgana, half-sister of King Arthur, who was fabled to live in Calabria.

Fathers of the Church were early writers who laid the foundations of Christian ritual and doctrine. The body of their writings includes important controversial works, legal codes, histories, topographies, and speculations of a scientific and philosophical nature. The earliest were the Apostolic Fathers, some of whom were contemporary with the Apostles. The next in order are the Primitive Fathers of the 2nd and 3rd centuries, including Justin Martyr, Clement of Alexandria and Tertullian. The later Fathers were of the 4th and 5th centuries, among them being Athanasius, Basil, John Chrysostom, and St. Augustine.

Fats are important foodstuffs. In physiology they constitute a valuable form of reserve food. They contain carbon, hydrogen and oxygen; chemically they are described as esters of glycerol (glycerine). Commonest fats are stearin, palmitin, and olein, esters formed by the combination of glycerol with stearic, palmitic, and oleic acid respectively. Fats are converted into soap by alkali; this process (saponification) also releases glycerol.

Fault, a term designating a breakage coupled with displacement of geological strata.

February, the second month of the year, comprising ordinarily 28 days, but in leap years extending to 29 days. When first introduced into the Roman calendar by Numa about 713 B.C. it was made the last month of the year and preceded January. It was not until 450 B.C. that it was made the second month.

Federal Union. *See* **C22** (2).

Federation. (*See* **Confederation.**)

Félibrige, a movement founded in 1854 to revive the ancient glories of Provence, initiated by the French poet Fréderic Mistral.

Felidæ, the scientific name of all mammals of the *Carnivoræ* order which walk upon the tips of their toes, and embracing the members of the cat family, from the lion downwards.

Fellahs *or* **Felaheen,** are Egyptian labourers, agricultural chiefly, and form the lowest class of the community, possessing little or no political status. They are of Nubian, Coptic, and Arab descent.

Felo-de-se, one who deliberately and while in sound mind destroys himself.

Felspar, the name given to a group of minerals, silicates of aluminium, which make up probably more than half of the earth's crust. It is formed in granite and other rocks, both igneous and metamorphic.

Felucca, a long narrow vessel with two lateen sails; occasionally propelled by oars and used on the Mediterranean for carrying light merchandise.

Fencibles, a body of volunteer cavalry organised in 1794 for service within the United Kingdom. It comprised over 14,000 men, was of great utility during the invasion panic of that period, and seems to have been the forerunner of the yeomanry cavalry.

Fenestella, the niche set apart on the south side of the altar for the piscina in Roman Catholic churches.

Fennel, a plant cultivated for its aromatic seeds, which are of considerable utility as a medicament; also used for salads and garnishing.

Fens are low-lying lands covered with water, or of a boggy or marshy nature. The Fen districts of England are chiefly in Lincolnshire and Cambridgeshire, but in recent times most of the Fen land has been drained and cultivated.

Fermentation, the action of chemical ferments or *enzymes* in bringing about chemical changes in the materials of living animals and plants.

Ferret, a carnivorous animal of the Pole-cat family, with a pointed head and long sinuous body, well adapted for following rabbits and game into their burrows and hiding-places, it

being kept in this country for that purpose. It is a native of Spain and Africa, and does not exist in England in a condition of natural freedom. *See* **Z12**.

Feudal System existed in England from the Saxon period down to the end of the 13th century. It was a military and political organisation, based on land tenure, the land being divided into feuds or fiefs, held on condition that certain military duties were performed; and, in default of this, the land reverted to the superior lord. Feudal tenures were abolished by statute in England in 1660, although from 1495 they had practically been inoperative. The system was not abolished in France until the Revolution of 1789. There was a feudal system in Japan as late as 1871.

Feu de Joie, the discharge of guns to denote public rejoicing.

Feuilleton, a French term for a serial story or other light literature occupying the bottom portion of a newspaper page, and adopted in England to some extent in recent years, several of the daily journals now running serial stories.

Fieldfare, a member of the thrush family, a regular winter visitor to Britain. It is of a reddish-brown colour with spotted breast and is about ten inches long.

Field-Marshal, the highest ranking title in the British army, and only bestowed on royal personages and generals who have attained great distinction. The first British Field-Marshal was created in 1736, when John, Duke of Argyll, had the title conferred upon him by George II.

Fiery Cross, a call to arms used in the Scottish Highlands in olden times, and consisting of a wooden cross, which, after being set on fire and quenched in goats' blood, was carried blazing to and fro among clansmen to rouse them to action.

Fife. A small flute with a compass of about two octaves used only in military drum-and-fife bands.

Fifth Column. When Franco, the Spanish dictator, revolted against the Spanish Republic in 1936 and attacked Madrid with four armies, he declared that a group of fascists within the city was assisting the besiegers. The term is used to describe a body of spies behind a fighting front.

Fifth-Monarchy Men were a fanatical Puritan sect which proclaimed about 1645 that the Millennium was near at hand, when Christ would come to earth again and establish the Fifth Universal Monarchy. They were dispersed by Cromwell in 1653, but in 1661 revived and became a menace to the public peace, and 11 of them were arrested and executed.

Figaro, a well-known comic character in drama and opera, invented by Beaumarchais, adopted by Mozart, and the name of a popular paper of Paris.

Fighting-Fish, small pugnacious Siamese fish with long anals and ventrals of five rays. They are kept in glass globes in Siam, and when brought into contact will fight to the death, these encounters being the occasion of much gambling.

Filibuster, a name first given to pirates and buccaneers in the 17th century, who took possession of small islands or lonely coast lands, and there maintained themselves apart from any governing authority. In later times the term was used to specify men taking part in expeditions whose object was to appropriate tracts of country, and settle upon them in disregard of international law. The most notable expeditions of this kind in modern times were those of Narcisco Lopez against Cuba in 1850–51, and of William Walker against Nicaragua, between 1855 and 1860. Both leaders were captured and executed. The term is also used to express the right of a minority in the United States Senate for unlimited debate, which is used on occasions to delay legislation for an unlimited period.

Filigree, the name given to a class of ornamental work done with threads of gold or silver, or with fine wire, and frequently attached to apparel or decorative objects. It was made by the ancient Greeks, and in the Middle Ages was greatly in vogue, and reached a high standard of artistic beauty. It is still made in certain parts of Italy and Portugal.

Filioque, the part of the Nicene Creed which proclaims that the Holy Ghost emanates jointly from Father and Son, and is styled the doctrine of the "double procession." It is generally accepted in the Western Church, but is rejected in the Greek Church.

Finches, a large family of small birds belonging to the Passerine or perching order of birds. There are about 200 species, including greenfinch and hawfinch, chaffinch, goldfinch and siskin, bullfinch, crossbill, linnets and twites, buntings and the house-sparrow.

Finial (*archit.*), the ornamental apex of a spire, pinnacle, or gable, and of Gothic origin.

Fir, a cone-bearing tree with small evergreen leaves and of considerable use as timber. There are four leading varieties—the Silver Fir, the Norway Spruce, the Larch and the Lebanon Cedar. All these firs attain to a considerable height, and all yield turpentine or other resinous material.

Fire-Fly, a small winged insect which is able to throw out a strong phosphorescent light in the dark. There are some remarkable specimens in tropical countries.

Fire of London, of 1666, extended from East to West, from the Tower to the Temple church, and northward to Holborn Bridge. It broke out in a baker's shop in Pudding Lane, and lasted four days, and destroyed 87 churches, including St. Paul's Cathedral, and many public buildings, among them the Royal Exchange, the Custom House, and the Guildhall. In the ruins were involved 13,200 houses and 400 streets. The plague had not disappeared from London when the fire occurred.

Firkin, a former measure of capacity, the fourth part of a barrel, now only used in reference to a small cask or tub for butter, lard, tallow, etc.

Firman, a document of authority issued by Oriental governments granting any special privilege or concession, containing a command or installing a new officer, or conveying protection like a passport. The decree is issued by the ruler and signed by one of his ministers.

Fischer-Tropsch Process. A process for making synthetic petrol from carbon monoxide and hydrogen. The synthesis is accelerated by cobalt-thoria and nickel-thoria catalysts.

Fish Louse. Parasitic crustacea found on marine and fresh-water fishes.

Fission, Nuclear. A nuclear reaction in which the nucleus of an atom (*e.g.*, uranium 235, plutonium) captures a neutron, and the unstable nucleus so produced breaks into two nearly equal fragments and throws out several neutrons as well. In biology the term fission is applied to reproduction by fragmentation of a single-cell organism, as in amœba. *See* **F11** (1), **50** (2).

Flabellum, an ecclesiastical fan, formerly employed to drive away flies from the chalice during the celebration of the Sacred Mysteries; the flabellum was usually formed of the tail-feathers of the peacock.

Flagellants were a fanatical sect which sprang into notice at Perouse in the 13th century during a time of plague. They held processions and flogged themselves as they walked naked about the streets until they bled. They declared that sins could not be remitted without such practices. The sect continued down to the 16th century, in spite of their being declared heretics by Pope Clement VI., and 90 of them being burnt at the stake.

Flageolet. A sweet-toned instrument which is in effect a portable organ pipe whose length, and therefore pitch, may be varied by opening or closing holes in the pipe with the fingers. Sometimes called the English Flute or "Penny Whistle."

Flag Officer, a British naval officer who enjoys the right of carrying a flag at the mast-head of his ship, and is of the rank of Admiral, Vice-Admiral, or Rear-Admiral.

Flagship, the ship that flies the Admiral's flag, and from which all orders proceed.

Flamen were priests of ancient Rome dedicated to the service of particular deities, such as those of Jupiter and Mars, and were always of patrician birth.

Flamingo, a strangely beautiful, extremely slender wading bird of white and rose-pink plumage with long, slender legs and neck and a long,

down-curved bill with which it rakes the mud and obtains its food of worms and molluscs. The wings are bright crimson, bordered with black, and a flock in flight is a picture of singular beauty. There is a large and famous colony in the Camargue.

Flash-Point. This is found by heating an oil in a special cup and taking the temperature at which sufficient vapour is produced to ignite when a small flame is applied. It is an index of the inflammability of oils.

Flat. A keyboard instrument has white keys and black keys. The notes played by the white keys are called "naturals." There are eight of these to each octave and they are called A, B, C, D, E, F, G, A. The black key immediately below a natural (one semitone interval) is called its "flat," *e.g.*, the black note below B is B flat and is written B♭. Conversely the black key above a natural (one semitone interval) is known as its "sharp," *e.g.*, the black note above A is A sharp and is written A♯. Since B natural is a full tone above A natural, it follows that B flat and A sharp are the same note.

Flax, a textile fibre obtained from the flax plant, which is an annual, and is largely cultivated for commercial purposes, being grown in Russia, Germany, Italy, Holland, and the North of Ireland. After undergoing various preparatory processes, the flax is spun into yarn and woven into linen fabrics.

Flea. Fleas are small parasitic insects belonging to the order *Aphamptera* (so called because these creatures have no wings). They obtain their food by sucking blood from their host. They are laterally compressed, which immediately distinguishes them from lice. The human flea (*Pulex irritans*) is able to jump vertically a distance of over 7 in.

Fleet Prison, a noted debtors' prison that stood in Farringdon Street, London, where the Congregational Memorial Hall now stands, taking its name from the Fleet Ditch. Notorious for the cruelties inflicted on prisoners. It was pulled down in 1846.

Fleet Street, a famous thoroughfare in London, now the centre of journalism and newspaperdom, though it was long celebrated for its taverns where the literary coteries of the day were wont to meet. It takes its name from the Fleet stream which used to run from Hampstead through Holborn to the Thames at Blackfriars.

Flemings, the people of Flanders, whose ancestors of mediæval times excelled in the textile arts; England owes its early eminence as a manufacturing nation to the migration of numbers of Flemings to this country in the 16th and 17th centuries.

Fleur de Lis, the former national emblem of France, the flower of the lily. It was superseded by the Tricolour in 1789, but is still adhered to by the supporters of the old French royalties.

Flint, a kind of silica of light grey colour and excessive hardness, which enabled it to be utilised in the formation of cutting implements in prehistoric times, and, before the invention of lucifer matches, was used along with steel for striking lights.

Flint Implements are objects found in the earlier geological strata, and constituting evidence of the condition and life of the period. They include knives, clubs, arrow-heads, scrapers, etc., used as weapons, tools and possibly as surgical instruments and in religious ceremonies. At the end of the Neolithic Period and the beginning of the Bronze Age a people using a new type of stone axe became evident in Europe, advancing towards the south and central regions, and supposed by many to be the ancestors of the present European stock, or Aryans. Similar to prehistoric specimens are the flint and obsidian implements of some of the primitive peoples of today. Ritual weapons and sacrificial knives continued to be made of stone long after the introduction of metals for practical purposes.

Flodden Field, Battle of (Northumberland), was fought on Sept. 9th, 1513, when England under the Earl of Surrey defeated Scotland under King James IV.

Florin, a coin first made in Florence in the 13th century. The name was afterwards given to an English gold coin of the value of 6s. issued in 1433. The English florin of to-day represents 2s., and dates from 1849.

Flounder, one of the most familiar of the smaller flat fishes common round the British coasts, and seldom attaining a weight of over three pounds.

Fluorine, a chemical element found in combination with calcium in fluorspar, and occurring in minute quantities in certain other minerals. Discovered by Scheele in 1771. It was first obtained by Moissan in 1886. A pale yellow gas, it is very reactive and combines with most elements except oxygen. Its acid, hydrogen fluoride, etches glass, the fluorine combining with the silicon to form volatile silicon fluoride.

Fluorescent Lamp. (*See* **Electric Light** and **Ultra-Violet Rays.**)

Fluorspar, a mineral; chemically, calcium fluoride. Can be colourless, green, or yellow, but is most commonly purple. Blue fluorspar under the name of Derbyshire "blue John" has been used for ornamental purposes.

Flute. A wooden musical instrument, part of the wood-wind of an orchestra, played by blowing across a mouth-hole, the notes being produced by pressing the fingers on finger-holes or keys. It has a compass of three octaves and a singular purity of tone. In simple form the flute has been known since Greek times, but the modern flute dates from the 18th century.

Fly, the popular name for a large number of insects with one pair of wings and a proboscis terminating in a sucker through which fluid substances can be drawn up. The best-known species are the common house-fly, the bluebottle, and the blow-fly. In the larval form flies are maggots, and feed upon decaying substances, animal flesh, etc. Flies are able to walk upon ceilings or upright surfaces by having suckers at the soles of their feet.

Flycatcher, name of a large family of small birds, the Muscicapidæ. They are insect feeders, catch their food in the air, and are distributed over most countries of the world. The spotted and the pied nest in Britain, which they visit from April to September.

Fly-drill, a kind of machine-tool having a reciprocating fly-wheel imparting steady momentum, the driving power consisting of a cord winding in reverse directions alternately upon a rotating spindle.

Flying Dutchman, a mythical mariner who, as the legend goes, was doomed as an expiation for his crimes to be for ever striving to reach harbour with his ship but never succeeding. Wagner constructed an opera round this weird subject.

Flying Fish are frequently to be seen in southern waters, and are capable of gliding considerable distances without touching the water. To build up speed for its "take-off" the fish swims rapidly, to break the surface at 15–20 miles an hour. Maximum air speed is about 40 miles an hour.

Flying Fox, an animal of the bat family, but of much larger size, and confined to the tropical and sub-tropical Old World. Like the bats, it is nocturnal, but it feeds entirely on fruits.

Flying Lemur, a remarkable genus of mammals, of which there are only two species, inhabiting Malaya and the Philippines respectively. They live on insects, fruit, and birds, and are provided with a parachute-like membrane which covers them from the neck to the tip of the tail, and is used in regulating their gliding.

Flying Lizard, a kind of Asiatic lizard, possessing wing-like projections from each side, which enable it to make flying leaps through the air, though not sufficient for continuous flight.

Flying Saucers, the name given to certain saucer-like shapes which have on occasion been seen travelling through the atmosphere. For some time speculation was rife, especially in America, but it has now been established that when not hallucinations, meteorological or cosmic-ray balloons, they are nothing more than atmospheric phenomena like mirages or mock suns caused by unusual atmospheric conditions. Described by Dr. Menzel, astrophysics professor at Harvard "as real as rainbows are real."

Flying Squirrel, rodents of which there are several species in Europe and America. It possesses a

parachute-like fold of skin by means of which it projects itself through the air. In appearance they are much like ordinary squirrels, to which they are related. The African flying squirrels belong to a different family.

Fog is caused by the presence of particles of condensed water vapour or smoke in the surface layers of the atmosphere, the term being applied meteorologically when the resulting obscurity is such as to render objects invisible at distances of up to 1 km. Fogs are frequently formed when the air near the ground is cooled below its dew-point temperature by radiation on a still, cloudless night; by flowing over a relatively cold land or water mass; or by mixing with a colder air stream. An accumulation of smoke over a large city may cause a high fog cutting off the daylight and producing gloom.

Foliation, a geological term applied to rocks whose component minerals are arranged in parallel layers as the result of strong metamorphic action.

Folio, a printing term for a sheet of paper folded once, a half sheet constituting a leaf.

Folklore concerns itself with the mental and spiritual life of the people—both civilised and primitive—as expressed in the traditional beliefs, customs, institutions, and sayings that have been handed down from generation to generation by word of mouth, and with the observation, recording, and interpretation of such traditions. (The word *folklore* itself was first suggested and used—as two words *Folk Lore*—by W. J. Thoms in the *Athenæum* of August 22nd, 1846, and was at once absorbed into the English language.) Traditional lore of the kind included in the term folklore takes many forms and ranges from omens of good and bad luck (spilling the salt, breaking a mirror, dropping an umbrella, etc.) and the wearing of amulets or the possession of talismans (such as the horseshoe) as protection against misfortune, to elaborate ceremonial dances such as the Abbots Bromley Horn Dance, the Hobby horses of Padstow and Minehead, the Northern sword-dances, and the Christmas mummers' plays. Especially important are the beliefs and customs associated with birth, babyhood, marriage, and death, such being occasions when the individuals concerned require special protection or when unusual happenings can be used for foretelling their future. The child born on a Sunday will be the luckiest; rocking an empty cradle will ensure the speedy arrival of a new baby; throwing an old shoe after a newly-married couple brings them luck; the bride should be carried over the threshold of the new home; on the sea-coast, death is believed to take place at the ebb-tide; the bees must be told of the death of the master of the house, or they will leave the hive. Another very large section of the subject deals with the traditional sayings and practices associated with particular days and seasons of the year—calendar customs, as they are called. The eating of pancakes on Shrove Tuesday; Mother Sunday customs and the simnel cake; Good Friday as the right day for planting potatoes, but emphatically the wrong day for washing clothes or cutting one's finger-nails; the necessity of wearing something new on Easter Sunday; the children's maypole dances and May garlands; midsummer fires; All Hallowe'en as the most favourable occasion for divining the future—especially in respect of marriage—and for games and sports such as apple-bobbing; the numerous practices accompanying the harvest. All these are examples of calendar customs; their full story would occupy several volumes. Folklorists are interested in all such oral tradition because they think that to a large extent it represents what folk have mentally stored up from the past and transmitted to their descendants throughout the centuries, and because therefore it is able to assist other historic methods—ethnographical, linguistic, archæological, etc.—in the elucidation of the early story of man. In those countries with a great diversity of peoples in all stages of culture, a knowledge of folklore and what it can teach of the mind of man is of great importance to administrators. The Folk-Lore Society was founded in 1878, and that part of the subject represented by song and dance has now its own organisation in the English Folk Dance and Song Society.

Force, as a term in physics, signifies an influence or exertion which, when made to act upon a body, tends to move it if at rest, or to affect or stop its progress if it be already in motion. The c.g.s. unit of force is the dyne; the practical unit 1 gram wt. = 980·616 dynes at sea-level Lat. 45°.

Formaldehyde. Chemically it lies between methyl alcohol and formic acid; oxidation of methyl alcohol yields formaldehyde, and oxidation of formaldehyde produces formic acid. It is used as a disinfectant, in silvering mirrors, and in the manufacture of phenol-formaldehyde plastics (of which bakelite is the best-known example).

Forme, a body of letterpress type, composed and secured for printing from; or a stereotype or electrotype. The former is used more for newspaper formes and the latter in good book work.

Formic Acid can be obtained from a colourless fluid secreted by ants and other insects and plants. It is a strong irritant. Commercially it is obtained from sodium formate, which is synthesised by the absorption of carbon monoxide in caustic soda. It is used in the electroplating, tanning, and textile industries.

Formula, in mathematics and physics a statement of certain facts in symbolical form.

Forte, a musical term signifying "loud," and represented by the letter "f"; "ff" (fortissimo) indicating "very loud."

Forth Bridge, which spans the Forth at Queen's Ferry, near Edinburgh, was completed in 1890 at a cost of £3 million. It is 5,330 ft. in length (with approaches 8,295 ft.). *See also* **Bridges.**

Forum, in ancient Rome, was a public meeting place and the centre of judicial and public business. It was also a market.

Fossils are the petrified remains of plants and animals and have been the means of disclosing a knowledge of prehistoric periods and of the history of the earth's life which would otherwise have been unknown. *See also* **F18.**

Foucault's Pendulum. This instrument, which demonstrates the rotation of the earth, was conceived by the French scientist Foucault in 1851. It is a pendulum consisting of a metal ball suspended at the end of a long wire. Its direction of swing in space remains constant, but owing to the earth's rotation it appears to change direction by 15° in an hour, and this amount represents the hourly angular rotation of the earth.

Four Freedoms, a phrase coined by President Roosevelt in January, 1941, embodying what should be the goal of the Allies. They were (1) Freedom of speech and expression; (2) Freedom of every person to worship God in his own way; (3) Freedom from want; (4) Freedom from fear.

Fox, a well-known carnivorous animal of the Vulpine family, found in considerable numbers in most parts of the world. The common fox of Europe is a burrowing animal of nocturnal habits, living upon birds, rabbits, and domestic poultry, in the capture of which it displays much cunning. The fox in Britain is preserved from extinction chiefly for hunting purposes. Among other notable species are the Arctic fox and the red fox of North America, of which the valuable silver fox, coveted for its fur, is a variety.

Fox-Shark, a large species of shark common in the Atlantic and in the Mediterranean. It is very destructive to small fish, but although it attains a length of 15 ft. it is not to be classed with the sharks that are dangerous to man.

Franciscans. (*See* **Friars.**)

Franco-German War (1870–71). It was opened by a declaration of war by Napoleon III., but the Germans who were better prepared than the French, won victory after victory. In September Napoleon and the whole French army were made prisoners at Sedan, a Republic was then proclaimed, and Paris sustained a four months' siege. In the end France ceded Alsace and part of Lorraine to Germany, who claimed a war indemnity of over £20 million.

Francolin, a genus of birds closely related to the common partridge, belonging to Africa and sometimes referred to as the spur-legged partridge. The common francolin ranges from Cyprus to Assam, where it is known as the black partridge.

Francs-Tireurs, an irregular body of French troops prominent in the Franco-German War. Also any organised corps of irregular troops who conform to the usages of war.

Frankincense is of two kinds, one being used as incense in certain religious services and obtained from olibanum, an Eastern shrub, the other is a resinous exudation derived from firs and pines, and largely used in pharmacy.

Franklin, the name given in feudal times to a country landowner who was independent of the territorial lord, and performed many of the minor functions of local government, such as serving as magistrate.

Freemasonry dates back to mediæval times, if not to a more remote period. It is a secret organisation, having lodges for social enjoyment and mutual assistance. The Grand Lodge of England was established in 1717; that of Ireland in 1730, and that of Scotland in 1736. Roman Catholics are prohibited by Papal ban from being masons.

Fresco, a painting executed upon plaster walls or ceilings, and much in favour for churches and public buildings in former times. The work is done with prepared pigments. *See also* **G38** (1).

Freshwater Shrimp, a small crustacean abounding in British streams, and feeding on dead fish or other decomposing matter. Although of shrimp-like form it is not closely related to salt-water shrimps. Its generic name is *Gammarus*.

Friars, members of certain mendicant orders of the Roman Catholic Church. The four chief orders are the Franciscans or Grey Friars, the Dominicans or Black Friars, the Carmelites or White Friars, and the Augustinians (Austin Friars).

Friday, the 6th day of the week, named after Frigga, the wife of Odin. It is the Mohammedan Sabbath, and is a general abstinence day of the Roman Catholic Church. According to popular superstition, Friday was an unlucky day.

Frigate, a small, swift war-vessel, generally with two decks, and carrying a number of guns, usually from 30 to 60. Now superseded by the armoured cruiser.

Frigate-Bird, a web-footed bird widely distributed over tropical latitudes, and deriving its name from its great expanse of wing and forked tail, which seem to suggest the shape of a swift vessel. It feeds on flying fish mostly, being unable to dive. A frigate-bird was found dying on the Hebridean island of Tiree in July 1953; only twice previously had one been recorded in Europe—the first on the German coast in 1792, and the second on the coast of France in 1902.

Fringillidæ, the scientific family name of a large class of passerine birds, including finches, red-polls, crossbills, grosbeaks, linnets, and buntings.

Fritillary, the name of a large class of British butterflies, all of them of beautiful colours and marking. There are seven species, the most prized of which is the "Queen of Spain" variety.

Frog, a familiar amphibian, breathing through gills in the earlier (tadpole) part of its existence, and through lungs later. It remains three months in the tadpole stage. The frog hibernates underwater in the mud during the winter.

Frost occurs when the temperature falls to, or below, 32° F., which is freezing point. Hoar frost is applied to the needles or feather-like crystals of ice deposited on the ground, in the same manner as dew. Glazed frost is the clear icy coating which may be formed as a result of rain falling on objects whose temperatures are below the freezing point. These layers of ice, often rendering roads impassable for traffic, damaging overhead power and communication systems and endangering aircraft, can also be caused by condensation from warm, damp winds coming into contact with very cold air and freezing surfaces.

Froth-Hopper *or* **Frog-Hopper.** A family of bugs (belonging to the insect order Hemiptera) which in the young stage surround themselves with a protective mass of froth. These insects, which suck the sap of plants, bear a faint resemblance to frogs, and the adults possess great leaping powers.

Fugue. A contrapuntal piece of music in which the several "voices" take up the theme in turn.

Fulani, a Mohammedan race inhabiting the Sudan, at one time possessing a kingdom in Nigeria, sometimes called the Sokoto Empire.

Fuller's Earth, a special kind of clay or marl possessing highly absorbent qualities, and used from ancient times in the "fulling"—that is, cleansing and felting—of cloth. It is common in certain parts of the south of England, and is valued as a skin emolient.

Fungi, a class of organism resembling plants, which reproduce from spores and lack the green colouring matter *chlorophyll*. They consequently have to get their food from organic substances, whether as parasites on living plants and animals or as saprophytes on dead matter. Fungi include moulds, rusts, mildews, smuts, mushrooms, etc. Penicillin was produced from a mould fungus. Potato blight is a fungus disease which caused the failure of the potato crop in Ireland in 1846. 50,000 different fungi are know. *See also* **F28** (2), **P8** (1).

Fusible-plug, a safety-plug placed in the skin of a steam-boiler, so as to be melted and allow of the discharge of the contents when a dangerously high temperature is attained.

Fustian, the name given at various times to different kinds of textile fabrics. Originally, fustian was made of linen and cotton; later, wool was used; but in recent times the name has been mainly applied to a twilled cotton material with a nap surface.

Fustic, a dyewood yielding various shades of yellow according to the mordants used. The wood of the Venetian sumach, *Rhus cotinus*, yields young fustic; old fustic comes from the wood of *Clastrastis tinctoria*, which grows in tropical America and the West Indies.

G

Gabardine, a long, loose, coarse, over-garment, worn by men of the common class in the Middle Ages, and prescribed by law as the distinctive garment of the Jews.

Gabbatha, the Hebrew term for that part of a judgment-hall which was occupied by the governor or supreme authority, and from which he pronounced sentence. Used in John xix. 13 to designate the place where Pilate sat at Christ's trial.

Gabbro, a kind of igneous rock, often very coarse-grained, containing a good deal of plagioclase felspar, and monoclinic pyroxene; it may occasionally also include biotite, magnetite, ilmenite, and hornblende. A gabbro containing nickel at Sudbury in Canada is one of the richest sources known of that metal.

Gaberlunzie, the name given to an old-time class of beggar in Scotland, who had licence to ply his "profession" within a prescribed district.

Gable, the triangular end of a building, rising above the cornice to its apex. The end wall of a sloping roofed house is called the gable-end; and a gable-window is a window situated in the gable or constructed in gable form.

Gadfly, a widely distributed family of flies with only one pair of wings (*Diptera*), possessing great power of flight. The females are very voracious, being able to bite through the skin and suck the blood of animals. The males are harmless.

Gadolinium. An element belonging to the rare-earths metals discovered in 1886 by Marignac.

Gaelic, relating to the Gaels and their language, a term now applied only to the Celtic people inhabiting the Highlands of Scotland, but formerly also to the Celts of Ireland and the Isle of Man.

Gaine, a sculptured figure, the upper part of which is in natural form and outline, and the lower part (except sometimes the feet) is some simple architectural feature seeming to envelop the body and legs. The gaine was often used in ancient Greek and Egyptian architecture.

Galago, a sort of lemur, native to Africa, large-eyed, in keeping with its nocturnal characteristics.

Galatians, St. Paul's Epistle to the, is supposed to have been written by the Apostle about A.D. 56. It was addressed to the Galatian Churches, and, in addition to supporting Paul's apostolic authority, advocated justification by faith.

Galaxy *or* **Milky Way** is the part of the heavens, in Milton's words, "powdered with stars." The term galaxy is also used as a name for our

stellar universe, the huge disk-shaped cloud of gas and stars that is turning in space like a great wheel, with a diameter of about 100,000 light years. The Milky Way is really only a small part of this disk, and every star in the galaxy is moving round the centre under the gravitational control of the whole. The sun and planets lie near the edge of the disk, and it takes them about 250 million years to travel once round. The number of stars that can be seen with the unaided eye is just over 2,000, and they all belong to our galaxy. With the large modern optical and radar telescopes many other systems, similar in size and weight to our galaxy, have been discovered, scattered more or less uniformly through space, and the universe is said to include at least 100 million such galaxies. *See also* **F3–6.**

Gale, a high wind now technically defined as one of at least Beaufort force 8. Between thirty and forty gales a year occur on the north and west coasts of the British Isles and only about half of this number in the south-east. At St. Ann's Head, Pembroke, the anemometer registered a gust of 113 m.p.h. on Jan. 18, 1945, which is a record for these islands. Gusts exceeding 70 m.p.h. are rarely experienced in London. Gale warnings are issued for specified areas by the Meteorological Office, the warnings taking the form of radio broadcasts and the hoisting of storm signals at certain points on the coast. *See* Beaufort Wind Scale, **N10.**

Gall, abnormal vegetable growths, usually the result of an egg-deposit on leaves or bark by certain small flies called Cecidomyiids. Two of the best-known galls of oak are oak-apples and bullet-galls. The latter are spherical in form and yield tannin, useful for tanning and other commercial purposes.

Galleon, the name given to the old three-decked Spanish treasure vessels employed in conveying the precious minerals from the American colonies to Spain. The term is often applied to any large, especially stately, sailing vessel.

Galley, an oar-propelled sea-boat used by the ancient Greeks and Romans for transport purposes, manned by slaves. Boats of a similar class were used by the French down to the middle of the 18th century, and manned by convicts.

Gallic Acid, obtained from gall nuts, sumach, tea, coffee, and the seeds of the mango, is used in the manufacture of inks and as an astringent in medicine. It was discovered by C. W. Scheele (1742–86), a Swedish chemist.

Gallium, a white metal related to aluminium, but which can be cut with a knife. It was discovered spectroscopically by L. de Boisbaudran in 1875. Long before Mendeleyev had predicted that an element with its properties would be found to fill the then existing gap in the Periodic Table; this gap came immediately below aluminium, so he suggested the name "eka aluminium" for it.

Gallup Poll, a system, introduced by Dr. Gallup of the United States, for testing public opinion on topical subjects by taking a test poll on questions framed to elicit opinions.

Galvanised Iron is iron coated with zinc. The name comes from the fact that such a coat protective against rust could be deposited electrolytically. Electrodeposition is sometimes used, but the cheaper and more common process depends on dipping the iron in a bath of molten zinc.

Gambeson, a protective garment of leather or padded material, reaching from the neck to the knees, worn by soldiers prior to the introduction of plate-armour, and also beneath the hauberk.

Gamboge, a resinous gum obtained from certain trees native to Siam, Indo-China, and Ceylon, and used as a yellow pigment in paints and also as a purgative.

Game is the term applied to wild animals which are protected from indiscriminate slaughter by Game Laws. In the United Kingdom game comprehends deer, hares, pheasants, partridges, grouse, black game, moor game, woodcocks, bustards, and certain other birds and animals of the chase. Game can only be killed (with few exceptions) by persons holding game licences, which cost £3 a year. Occupiers of land and one other person authorised by them in each case are allowed to kill hares and rabbits on their land without licence. Game cannot be sold except by a person holding a proper licence. There is a "close time" prescribed for the different classes of game; for instance, the selling or exposing for sale of any hare or leveret during March, April, May, June, or July is prohibited by law. Grouse cannot be shot between Dec. 11 and Aug. 11; patridges between Feb. 2 and Aug. 31; pheasants between Feb. 2 and Sept. 30; and black game between Dec. 11 and Aug. 10. In regard to foxes, stags, and otters, custom and not Parliament prescribes a certain law which sportsmen rigidly adhere to. Game reserves are legally protected areas where natural vegetation and wild life are allowed to remain unmolested by sportsmen or those who might destroy for economic ends. *See* British Game Seasons, **N20.**

Gaming *or* **Gambling**—*i.e.*, staking money on the chances of a game—differs from betting in that it depends upon the result of a trial of skill or a turn of chance. The Betting and Gaming Act of 1959 replaced all the old laws on gaming, which went back to an Act of 1541 entitled "An Acte for Mayntenance of Artyllarie and debarringe of unlauful games," under which some games were unlawful if played for money in any circumstances. Roulette and any game of dice were among such games. Under the new Act any game is lawful, subject to certain conditions.

Gamut. The set of lines and spaces on which music is written.

Ganga, the pin-tailed sand-grouse, a handsome bird mostly found in North-Western Africa.

Gangue. Useless minerals associated with metallic ores.

Gannet, a fish-eating bird which dives on its prey from a great height, swallowing it under water; is found in large numbers off the coast of Scotland, and has breeding stations in the Hebrides, St. Kilda, Ailsa Craig, the Bass Rock, Grassholme Island, and on Ortac and Les Etacs (rocks off Alderney). It is a bird of white plumage, black tips to long narrow wings and wedge-shaped tail, and weighs about 7 lb. The gannet breeds in colonies on ledges of steep, rocky, island cliffs. Related to the cormorants, pelicans, and frigate-birds.

Garden Cities in England were founded by Ebenezer Howard (1850–1928), and his ideas were put forward in his book *Tomorrow—A Peaceful Path to Real Reform* (later re-issued as *Garden Cities of Tomorrow*). New towns should be so placed and planned as to get the best of town and country life, an adaptation of the model villages of certain industrial philanthropists such as Salt, Richardson, Cadbury, Leverhulme, and others. The Garden City Association (later the Town and Country Planning Association) was formed in 1899, and the first garden city was begun at Letchworth in 1904 and successfully established. Welwyn Garden City was also Howard's foundation, established in 1919.

Gardener-Bird, a bird possessing many of the characteristics of the bower-bird, and found only in Papua–New Guinea. *See also* **Bower Bird.**

Gargantua, the giant hero of Rabelais' satire, of immense eating and drinking capacity, symbolical of an antagonistic ideal of the greed of the Church. *See* **G44** (1).

Gargoyle, a projecting spout for carrying off water from the roof gutter of a building. Gargoyles are only found in old structures, modern water-pipe systems having rendered them unnecessary. In Gothic architecture they were turned to architectural account and made to take all kinds of grotesque forms—grinning goblins, hideous monsters, dragons, and so forth.

Garial *or* **Gavial,** the crocodile of the Ganges, feeding chiefly on fish. It has a long snout, and its overall length may exceed 20 ft.

Garlic, a bulbous plant of the same genus as the onion and the leek, and a favourite condiment among the people of Southern Europe. It possesses a very strong odour and pungent taste and its culinary use is agelong.

Garnet, a group of minerals; chemically they are orthosilicates of the metals calcium, magnesium, titanium. Garnets can be coloured yellow, brown, black, green or red; the blood-red garnet is an important gemstone.

Garrotte, a method of strangulation used as capital punishment in Spain, and consisting of a collar which is compressed by a screw that causes death by piercing the spinal marrow. Garroting was also applied to a system of highway robbery common in England in 1862–63, the assailants seizing their victims from behind, and by a sudden compression of the windpipe disabling them until the robbery was completed.

Garter. The Most Noble Order of the Garter was founded (*c.* 1348) by King Edward III., and is the premier order of knighthood in Great Britain. The traditional story associating the garter and the motto with the Countess of Salisbury, who it was said dropped her garter while dancing with the King, who remarked "honi soit qui mal y pense" cannot be accepted. The order was originally limited to the Sovereign and 25 knights, but the number has been extended, and it may now be bestowed on royal personages and leading representatives of the British peerage. The insignia of the order are the garter of dark-blue velvet with the motto in letters of gold, the mantle of dark-blue velvet lined with white silk, the surcoat and hood, and the gold-and-enamel collar. The garter is worn on the left leg below the knee and by women as a sash over the left shoulder. (*See* **Knighthood.**)

Gas is an elastic fluid substance, the molecules of which are in constant motion, and exerting pressure. The technique whereby gases are liquefied depends on increasing pressure and diminishing temperature. Each gas has a critical point; unless the temperature is brought down to this point no amount of pressure will bring about liquefaction. Last gas to be liquefied was helium (1908) which boils at −209° C. *See* Gas Laws, **N30.**

Gas from Coal for lighting and heating purposes is obtained from bituminous coal. Such a gas was produced and used for illuminating purposes by William Murdoch towards the end of the 18th century in Birmingham, and about 1807 the illuminant was introduced in London, one side of Pall Mall being lighted with it. It soon supplanted oil and candles for outdoor and indoor lighting, and is still, in spite of the advances of electric light, a common illuminant, its power having been greatly increased by the incandescent burner. It is widely used for space heating and cooking. (*See* **Underground Gasification.**)

Gas Turbine. This kind of engine has recently become a competitor of the internal combustion engine. Mechanical movement is produced by a jet of gas impinging on a turbine wheel. Gas turbines are being used in aeroplanes, locomotives, and ships. These engines are mechanically simple compared with internal combustion engines, and require less maintenance. It has been stated that the jet-propelled Comet cruises at 450 m.p.h. burning less than ½ lb. of kerosene per passenger mile.

Gastropoda, a class of molluscs which includes all such as possess a univalve shell—snails, whelks, limpets, etc.

Gate House, a structure built over and flanking a gateway, and common in ancient times at the more important entrances of a city, castle, monastery, abbey, or college. The Gate House of Westminster, built in 1370, was used as a prison. This was demolished in 1776, but one of its walls remained until 1836.

Gauchos are South Americans of Spanish descent, and of a wild and fearless disposition. They are mostly employed in the management of cattle, and are noted for their skill in the saddle, and for their lasso throwing. Their numbers grow less from year to year, and as the Pampas comes more under modern European control their existence as a distinct class will gradually dwindle away.

Gauge, a standard dimension or measurement, applied in various branches of construction. Thus, the Standard Railway Gauge is 4 ft. 8 in. in the United Kingdom, United States of America, Canada, France, Germany, Austria, Holland, Egypt, Belgium, Denmark, Italy, Hungary, Sweden, Switzerland, and Turkey. In India, Ceylon, and Spain the gauge is 5 ft. 6 in. In Soviet Russia and Finland, 5 ft., Ireland, 5 ft. 3 in. Narrow railway gauges of different standards are in use on very steep inclines in various countries. Other standard gauges are fixed in building, gun-boring, and other operations.

Gauls were inhabitants of ancient Gaul, the country which comprised what is now France, Belgium, and parts of the Netherlands, Switzerland, and Germany.

Gault, a stratum of blue clay between the Lower Greensand and the Chalk. A typical section of the Gault can be seen at Folkestone.

Gauntlet, a glove of armour, worn in the 12th and 13th centuries as a sort of mitten, and attached to the sleeve of the hauberk. In the 14th century gauntlets were made of mail, and later of hammered steel with separated and jointed fingers.

Gavel, enough grain in the straw to form a sheaf, into which it is converted by binding.

Gavelkind, an old English custom of land tenure in Kent and other places in England, whereby on the death, intestate, of a property owner, his property is divided equally amongst his children and not according to the law of primogeniture. It was abolished by the Law of Property Act, 1922, and the Administration of Estates Act, 1925.

Gayal, a kind of wild ox about the size of an English bull. A native of Eastern India, and easily domesticated.

Gaydiang, a junk-like Annamese vessel, with two or three masts and triangular sails, carrying cargo from Cambodia to the Gulf of Tonkin.

Gazelle, an animal of the antelope family, of small and delicate shape, with large eyes and short cylindrical horns. It is of a fawn colour, a native of North Africa, and easily domesticated.

Gecko, the name of a family of lurid-hued lizards common in or near the tropics. They are of nocturnal habits and feed on insects, and though by some accounted venomous, they are harmless.

Geiger Counter. The instrument most commonly used for making radioactive measurements.

Geissler's Tubes, invented by Geissler, contain rarified gases (at about $\frac{1}{100}$ atmosphere pressure), and when an electric discharge passes through them the gases glow brightly.

Gelalæan Era, an era introduced by and named after Gelal-u-Din, Sultan of Khorassan, and commencing March 4, A.D. 1079.

Gelatine, a transparent, tasteless, organic substance obtained from animal membranes, bones, tendons, etc., by boiling in water. It is of various kinds, according to the substance used in making it. Isinglass, the purest form of it, is made from air-bladders and other membranes of fish, while the coarser kind—glue—is made from hoofs, skin, hides, etc. Its constituents are carbon, hydrogen, oxygen, and nitrogen. Gelatine is applied to an immense variety of purposes, from the making of food jellies to photographic materials.

Gemini, one of the signs of the Zodiac lying east of Taurus and containing numerous stars, only two of which—Castor, the upper and brighter one, and Pollux, the lower one—are visible to the naked eye. The stars are named after twin divinities of classical mythology.

Gemsbok, a large South African antelope, with long straight horns and tufted tail. Light fawn in colour, it has a black streak across its face, and is very fleet of foot.

Gender, a distinction made in grammar between words to indicate the sex or lack of sex of the objects denoted by these words. While there are but two sexes, there are in some languages, like English and German, three genders: masculine, feminine, and neuter. In English, as a rule, words denoting inanimate objects are neuter gender (exceptions: sun (masculine), ship, engine (feminine), etc.), while in German, inanimate objects, besides being neuter, may be masculine or feminine gender. In French the neuter gender does not exist.

Genealogy is the science of family descent, treating of ancestors and their descendants in various branches in the natural order of succession. Pedigrees of the principal families in Great Britain are recorded at Heralds' College.

General, a military title next in rank to that of Field-Marshal, the highest officer in the army. Ranking below full General are Lieutenant-General, Major-General, and Brigadier.

Generation, a time-measure reckoned at about 30 years when children are ready to replace parents; also the body of persons existing at the same time or period.

Generation, Spontaneous. (*See* **Abiogenesis.**)

Genesis, the first book of the Pentateuch, compiled in the 5th century B.C., which carries the scriptural narrative from the Creation to the death of Joseph. The stories of the Creation, Garden of Eden, the Fall, and the Flood were largely derived from Babylonian mythology; the conditions described around the figures of Abraham, Isaac, Jacob, and Joseph have a genuine historical basis.

Genet, one of the smaller carnivorous animals, about the size of a cat, but with longer tail and spotted body. It is a native of Southern Europe, North Africa, and Western Asia, and is valued for its fine soft fur, and also for a perfume it produces.

Genes, the units of heredity. *See* **F31, 58** (2).

Genetics, the science of heredity. *See* **F31.**

Geneva Convention, an agreement made by the European Powers at Geneva in 1864, establishing humane regulations regarding the treatment of the sick and wounded in war and the status of those who minister to them. All persons, hospitals, hospital ships are required to display the Geneva cross—a red cross on a white ground. A second conference held at Geneva in 1868 drew up a supplementary agreement. An important result of this Convention was the establishment of the Red Cross Society in 1870.

Genouillieres, ancient metal caps for covering the knees of an armed man; an example may be seen on the Black Prince's monument in Canterbury Cathedral.

Genre, an art term used to describe a style of painting which deals with subjects of homely life, but also applied in France in connection with other kinds of paintings as genre du paysage (landscape painting), genre historique (historical painting), etc.

Gentian, the name for plants of the *Gentiana* genus, many of which have intensely blue flowers. The gentian-root of *G. lutea* is used in pharmacy.

Gentile, a term used in the Scriptures to designate any person who is not a Jew.

Gentlemen-at-arms, a corps of army officers of distinction under a captain whose duty it is to attend the Sovereign on ceremonial occasions. The corps was formed by Henry VIII. in 1509 as personal bodyguard. They come under the direction of the Lord Chamberlain.

Genus, a term applied in biology to designate any kind, sort, or class of species.

Geodesy, the science of calculating the configuration and extent of the earth's surface, and determining exact geographical positions and directions, with variations of gravity, etc. Land-surveying is a branch of geodesy.

Geography, the science which describes the earth's surface, its physical peculiarities, and the distribution of the various animals and plants upon it. It is usual to divide the subject into two main branches—physical geography, which deals with the composition of the earth's surface and the distribution of its living occupants, animate and inanimate; and human geography, which includes economic, political, and social geography.

Geology, the science which deals with the condition and structure of the earth, and the evidence afforded of ancient forms of life. The geological strata are classified in the following categories: *Primary* or *Palæozoic* (the oldest rocks including the Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian); *Secondary* or *Mesozoic* (Triassic, Jurassic, Cretaceous); *Tertiary* or *Cainozoic* (Eocene, Oligocene, Miocene, Pliocene, Pleistocene); *Post tertiary* (most recent rocks). *See* **F20.**

Geometrical Progression is a term used to indicate a succession of numbers which increase or decrease at an equal ratio—as 3, 9, 27; or 64, 16, 4.

Geometry is the branch of mathematics which demonstrates the properties of figures, and the distances of points of space from each other by means of deductions. It is a science of reason from fundamental axioms, and was perfected by Euclid about 300 B.C. The books of Euclid contain a full elucidation of the science, though supplemented in modern times by Descartes, Newton and Carnot. Of recent years non-Euclidean geometry has been developed.

Geophysics, the branches of physics which are concerned with the earth and its atmosphere. Meteorology, geomagnetism, aurora and airglow, ionosphere, solar activity, cosmic rays, glaciology, oceanography, seismology, nuclear radiation in the atmosphere, rockets, and satellites—all these are geophysical subjects. The object of the International Geophysical Year, 1957–58, was to investigate the physical phenomena occurring on and around the earth by means of carefully co-ordinated observations made simultaneously all over the globe. *See also* **F46.**

George-Noble, a gold coin, so called from St. George and the dragon depicted on its obverse. First issued in the reign of Henry VIII.

German Silver, an alloy of copper, zinc, and nickel, and used in the manufacture of table-ware, such as spoons, forks, etc.

Germanium. A silver-white hard brittle metallic element chemically related to silicon and tin. Discovered by Winkler in 1886. Its richest ore is germanite containing 6% of the metal. Coal is also a relatively rich source. *See also* **F66** (2).

Gesta Romanorum, a Latin collection of stories published in the Middle Ages, and of unknown origin. It was used by our earlier writers, who found many romantic incidents and legends which they were able to turn to good account. The collection circulated over Europe, and is believed to have been written by a monk, Pierre Bercheur, of the convent of St. Eloi, Paris.

Gestation, the carrying of young in animals during pregnancy, varies considerably in its length. In the case of an elephant, the period is 21 months; a camel, 12 months; a cow, 9 months; a cat, 8 weeks; a horse, 48 weeks; a dog, 9 weeks; and a pig, 16 weeks. Hens "sit" for 21 days; geese, 30; swans, 42; turkeys, 28; pigeons, 18.

Gethsemane, a secluded spot on the side of the Mount of Olives, half a mile from Jerusalem, said to be the scene of Christ's Agony in the Garden.

Geysers, hot springs of volcanic origination and action, are remarkable for the fact that they throw out huge streams of boiling water instead of lava as in the case of a volcano. The most famous geysers are those of Iceland, which number over a hundred, the principal one having an opening 70 ft. in diameter and discharging a column of water to a height of 200 ft. There are also geysers in the Yellowstone region of America, and some in New Zealand. Also a device now in common domestic use for heating running water quickly by gas or electricity.

Ghat, a river landing-place or stairway in India; a passage, or gateway. "Ghaut," another form of the word, means a mountain pass in the Mahratta tongue.

Ghee, a kind of butter, clarified by boiling, much used in the East Indies and made from coagulated milk. It will keep sweet for a long time when properly prepared.

Ghetto, the name given to the quarter in any city or town where Jews were formerly compelled to live, shut off by gates from the rest of the city. Not only were the quarters usually allocated badly situated, but the Jews had to pay a tax for the privilege of living there.

Ghost-Moth, an interesting nocturnal insect, (*Hepialus humuli*), common in England, possessing in the male a white collar and known for its habit of hovering with a pendulum-like action in the twilight over a particular spot where the female is concealed.

Giambeaux, metal armour for the legs and shins, worn by the warriors of Richard II.'s reign.

Gibbon, the name of a long-armed ape mainly inhabiting S.E. Asia. It is without tail, and possesses the power of very rapid movement among the trees of the forests.

Gilbertines were members of a religious order founded by St. Gilbert in the 12th century, which did not spread beyond England. The order included both men and women who lived in double houses which had no communication. The habit was black, covered with a white cloak.

Gin, a well-known spirit distilled from malt or barley and flavoured with the juniper berry. The principal varieties are the English and American, known as "Gin" or "Dry Gin", and the Dutch, referred to as "Geneva", "Schnapps" or "Hollands". The word "Gin" is an abbreviation of "Geneva", both being primarily derived from the French genièvre (juniper).

Ginger is obtained from a reed-like perennial plant grown in tropical countries. There are two varieties, black ginger and grey ginger. The former is obtained by peeling and drying the root, the latter by scalding and drying. Ginger is largely used as a condiment.

Giraffe, the tallest of existent animals, reaching a height of from 18 to 20 ft. when full grown. Its sloping back and elongated neck seem to be the natural evolution of an animal that has to feed on the branches of trees. It is a native of Africa, is of a light fawn colour marked with darker spots, and has a prehensile tongue.

Giralda, a beautiful and remarkable example of Arabian art, erected in 1195 at Seville, still in existence. Minarets similar to the Giralda are to be found at Morocco, Tunis, and Tetuan.

Girandole, a branching chandelier, or swing-armed candelabrum.

Girondins *or* **Girondists**, one of the prominent parties of the early period of the first French Revolution. They were moderate, and up to 1792 were a strong party. Their first leaders were from the department of Gironde, hence their name. With the Reign of Terror their influence came to an end, Robespierre and his party overthrew them, most of them being sent to the guillotine.

Girton College, founded at Hitchin in 1869, and removed to Cambridge in 1873, is one of the leading English university colleges for women.

Glaciers form in the higher Alpine ranges, and are immense consolidated masses of snow, which are gradually impelled by their force down the mountain-sides until they reach a point where the temperature causes them to melt, and they run off in streams. From such glaciers the five great rivers, the Rhine, the Po, the Rhône, the Inn, and the Adige, have their source. The longest of the Swiss glaciers is the Gross Aletsch, which sometimes extends over 10 miles. Some of the glaciers of the Himalayas are four times as long. The Muir in Alaska is of enormous magnitude, and that of Justeldals Brae in Norway is the largest in Europe.

Gladiators were professional athletes and combatants in ancient Rome, contesting with each other or with wild beasts. At first they were drawn from the slave and prisoner classes exclusively, but so much were the successful gladiators held in esteem that men came to make a profession of athletics, and gladiatorial training schools were established. When a gladiator was vanquished without being killed in combat, it was left with the spectators to decide his fate, death being voted by holding the hands out with the thumb turned inward, and life by putting forth the hands with the thumb extended. Gladiatorial shows were the chief public displays in Rome from the 3rd to the 4th centuries A.D.

Glasgow University, founded by Pope Nicholas V. in 1451, had a new charter granted to it in 1577 by James VI. of Scotland, and in 1858 and 1899 was remodelled by the Universities (Scotland) Acts.

Glass, a substance obtained from the fusion of silica (sand) with various bases, and is more or less transparent. There are numerous kinds of glass, but they group themselves under one or other of the following classifications:—Flint glass, or crystal, whose components are potash, silica, and oxide of lead; window glass, made from soda, lime, and silica; Bohemian glass, containing potash, lime, and silica; and bottle glass, composed of soda, lime, alumina, silica, and oxide of iron. Heat-proof glasses used for making cooking utensils contain boron. Glass was made by the Phœnicians, and was familiar in ancient Egypt. The Egyptians introduced it into Rome. In the Middle Ages Venice was famed for its glass manufactures, but after the 17th century Bohemia acquired pre-eminence. English glass reached its highest level of artistic design in the 17th and 18th centuries. Window glass was not used in this country for dwellings until the end of the Middle Ages.

Glass-Snake, a legless lizard, with a long, sinuous tail, which has the faculty of regrowth if broken off. Four species are known: in S.E. Europe, S.W. Asia, Indo-China, and N. America. Attains a length of about 2 ft., and its main colouring is green, with black and yellow markings.

Glauconite. A green mineral, chemically a hydrated silicate of potassium and iron. Commonly found in sands (hence these rocks are known as "greensands") and sandstones.

Glaucus is a curious genus of sea slugs (Nudibranchs) often called the Sea Lizard. It is without shell and has a soft body, with horny mouth and four tentacles. It is a native of the South Atlantic, and is not more than 1¼ in. in length.

Glee, an unaccompanied piece for three or more voices. Glee-singing was popular in England during the 18th and early 19th centuries and glee-clubs are still in existence.

Glencoe, Massacre of, occurred on Feb. 13, 1692. The victims were the Macdonald clan, who had failed to take the oath of allegiance to William III. The chief and thirty-seven of his clan were butchered at the instigation of Dalrymple. A clamour arose, William was forced to grant a commission of inquiry and, as a result, in 1695 Dalrymple resigned his office.

Globigerina, an oceanic unicellular animalcule with a perforated shell, and occurring in certain parts of the Atlantic in such vast numbers as to form a bed of chalk ooze with their empty shells.

Glockenspiel, an instrument composed of metal bars each of which is tuned to a note. The bars are struck by hand-hammers and give forth chiming sounds.

Gloria in Excelsis ("Glory to God in the highest") is the opening of the Latin hymn adapted from Luke ii. 4, and the most prominent hymn of the ecclesiastical rites in the Christian liturgies.

Gloria Patri, the lesser Doxology, with which chants are generally concluded in the English Church service—"Glory be to the Father, and to the Son."

Gloss, an explanatory statement or marginal note, often found in ancient manuscripts, and is sometimes more valuable than the text to which it refers.

Glove-Money, an extraordinary reward paid to officers of courts, and fees given to clerks of assize and judges' attendants by a County Sheriff when no offenders were left for execution; the white gloves presented to justices when there is a maiden session are a survival of this old legal usage.

Glow-Worm, a kind of beetle, possessing in the female the power of emitting a phosphorescent light underneath the extremity of the body. The male has the same power, but to a very limited extent, and has wings, while the female is wingless and looks like a larva throughout her life.

Glucinium *or* **Beryllium**, is a white metal prepared from beryl, and found also in the emerald and other rare minerals. Most of the salts of this metal have a sweet taste, hence the name.

Glucose, Dextrose *or* **Grape Sugar.** It is produced by hydrolysis from cane sugar, dextrine, starch, cellulose, etc., by the action of reagents. It also occurs in many plants, fruits, and honey. For brewing purposes glucose is prepared by the conversion of starch by sulphuric acid. Malt also converts starch into glucose.

Glutton *or* **Wolverine**, the biggest animal of the weasel order, inhabits the northernmost parts of Europe and America. In build it resembles the bear, and is rather larger than a badger. Its fur is of a brown-black hue, but coarse; the animal has great strength, and is remarkable for its voracity.

Glycerine *or* **Glycerol**, occurs in natural fats combined with fatty acids, and is obtained by decomposing those substances with alkalies or by superheated steam. It is colourless and oily and sweet, and is put to a variety of commercial uses, being widely utilised for medicaments, for lubricating purposes, and in the manufacture of nitro-glycerine.

Glyptodon, an extinct species of gigantic armadillo,

fossil remains of which have been discovered in S. America. It was some 9 ft. long, carried a huge tortoise-like shell, and had fluted teeth.

Gnat. (*See* **Mosquito.**)

Gneiss, a metamorphic rock containing quartz, felspar, and mica. It is banded, the light-coloured minerals being concentrated apart from the dark minerals.

Gnostics were an early Christian sect prominent from the 1st to the 6th centuries. They held that Christ was of divine origin, but they rejected the literal interpretation of the Scriptures; contending that God was unknown and beyond man's comprehension, and that knowledge rather than faith was the passport to Heaven.

Gnu, an animal of the antelope family, combining the characteristics of the buffalo in its head and horns, the ass in its neck and mane, and the horse in its long and bushy tail. There are two species, the common and the brindled, and they are about the size of an ass. They abound in Africa and congregate in herds.

Goat-Moth (*Cossus cossus*), a large moth of the *Cossidae* group, common in Britain, evil-smelling, and very destructive in the larval stage to trees of the poplar and willow genus, into the wood of which the caterpillar bores during its three years' period of development.

Goats are horned ruminant quadrupeds, indigenous to the Eastern Hemisphere, but now domesticated in all parts of the world. Though allied to the sheep, they are a much hardier and more active animal. The male has a tuft of hair under the chin. Many species, including those of Cashmere and Angora, are valuable for their hair, which is used for fine textile fabrics. The milk of the goat is nutritive and medicinal, and goat-skins are in good demand for leather for gloves, shoes, etc.

Gobelin Tapestry was originated by a family of dyers named Gobelin in the 15th century in Paris. The Gobelin establishment, which produced this beautiful tapestry, made of silk and wool, or silk and cotton, was taken over by the Government of Louis XIV., in 1662, and since then has been the French national factory for that class of fabric.

God is the term by which the idea of the one Supreme Being is expressed. The conceptions of God vary with different religions and different countries. Theism regards God as a personal being, and the author and ruler of the universe; Pantheism identifies God with the universe and not as a personal being.

Gog and Magog, two legendary City of London giants, supposed to be the offspring of certain wicked daughters of the Emperor Diocletian and a band of demons. They were brought captive to London and made to serve as prisoners at the Palace of Brute, which stood on the site of Guildhall. Effigies of the giants have stood in Guildhall since the time of Henry V. They were destroyed in the Great Fire of 1666, replaced in 1672, and used to be carried through the streets of London in the Lord Mayor's Show. The present figures, newly carved in lime wood by Mr. David Evans, replaced those carved in 1708 by Richard Saunders, which were destroyed in an air raid during the last war.

Gold. The greatest amount of gold is obtained by treating gold-bearing quartz by the cyanide process. The gold is dissolved out by cyanide solution, which is then run into long boxes filled with zinc shavings when the gold is precipitated as a black slime. This is melted with an oxidising agent which removes the zinc.

Gold-Beaters' Skin is the outside membrane of the large intestine of the ox, specially prepared and used by gold-beaters for placing between the leaves of gold while they beat them. This membrane is of great tenacity, and gets beaten to such extreme thinness that it is used to put on cuts and bruises.

Golden Age, according to the Greek and Roman poets, was the age of peace and innocence when mankind lived in a state of ideal prosperity and happiness.

Goldeneye (Garrot), a species of wild duck, widely distributed over Arctic regions. It is a passage-migrant and winter-visitor to the British Isles. Has nested in Cheshire. Distinguished by a large white spot in front of each eye on a dark ground.

Golden Legend, the title of a famous history of the Saints, compiled by Jacobus de Voragine, a Dominican monk, in the 13th century, translated and published by Caxton in 1483.

Golden Number, the number of any year in the metonic cycle of 19 years, deriving its name from the fact that in the old calendars it was always printed in gold. It is found by adding 1 to the number of the year A.D. and dividing by 19, the remainder being the Golden Number; or, if no remainder, the Golden Number is 19. The only use to which the Golden Number is put now is in making ecclesiastical calculations for determining movable feasts.

Golden Rose, the Pope's rose of wrought gold blessed and sent from time to time to the church or community his Holiness selects to honour.

Goldsmiths Company, one of the richest London City Companies; the official assayers of gold and silver, invested with the power of "hall-marking" the quality of objects made from these metals. First charter granted in 1327.

Gondola, the old regulation black boats so common on the canals of Venice, propelled by a gondolier with one oar who stands at the stern, his passengers being accommodated in a covered space in the centre.

Gonfalon, the pennon affixed to a lance, spear, or standard, consisting usually of two or three streamers, and made to turn like a weather-cock.

Gophers. Rodent mammals. The pocket gophers are stout-bodied burrowers common in the U.S.A. The slender burrowing gophers, also called "ground squirrels," occur in central and western U.S.A. The sisel or suslik is a related European species. They are a great pest among grain crops.

Gordon Riots of 1780 were an anti-popery agitation fomented by Lord George Gordon. Called also "No-Popery Riots."

Gorilla, the largest of the anthropoid apes, found in the forests of Equatorial Africa, and at maturity standing from 4 to 5 ft. high.

Goshawk (*Accipter gentilis*), a diurnal bird of prey, fearless and extremely agile; loves wooded country and is very destructive of poultry and game-birds. It resembles the peregrine falcon in appearance, but has shorter, rounded wings. This bird was a great favourite of falconers in mediaeval times. It is still a familiar sight in parts of Europe, was once common in England, where it is said to have bred again in recent years.

Gospels are those portions of the New Testament which deal with the life, death, resurrection, and teachings of Christ. They are the gospels of Matthew, Mark, Luke, and John, and the first three are called the *synoptic gospels* because of their general unity of narrative. That of John is of somewhat wider scope, and gives in addition to the story of the Passion an account of the ministry in Judea.

Goths. A Teutonic people who originally came from southern Sweden (Gotland) and by the 3rd cent. were settled in the region north of the Black Sea. They began to encroach on the Roman Empire and early in the 4th cent. split into two divisions: the Visigoths or West Goths, and the Ostrogoths or East Goths. The Ostrogoths were conquered by the Huns *c.* 370, while the Visigoths under Alaric devastated Greece and sacked Rome in 410. Eventually the Visigoths spread to France and Spain and their last king Roderick fell in battle against the Moors in 711. The Ostrogoths regained their independence on the death of Attila in 453 and under their king Theodoric the Great conquered Italy in 493. They lost their identity after Justinian regained Italy, 525–552.

Gourd Family *or* **Cucurbitaceæ.** This family of about 650 species of flowering plants includes the gourds, pumpkins, cantaloupes, cucumber, gherkin, water-melon. Most abundant in the tropics, the cucurbits are mainly climbing annuals with very rapid growth. The bathroom loofah is the skeleton of one cucurbit fruit, *Luffa cylindrica*. The squirting cucumber is another member of the family. (*See* **Ecballium.**)

Governor. A device attached to an engine, turbine, compressor, etc., which automatically controls the engine's speed in accordance with power demand. Most governors depend upon

the centrifugal action of two or more balls which are thrown outwards as their speed of rotation increases and actuate a throttle valve or cut-off. The centrifugal governor was invented by Thomas Mead, patented by him in 1787, and used on windmills. Watt adapted it to the steam engine.

Gowrie Conspiracy was an unsuccessful project for securing the person of, or assassinating, James VI. of Scotland, afterwards James I. of England.

Grail. (*See* **Holy Grail.**)

Gram *or* **Gramme,** the unit of weight in the metric system, defined as the 1000th part of a standard cylinder of platinum-iridium kept at Sèvres. Subdivision gives the centigram (100th part of 1 gram), milligram (1000th part) and so on. 1 ounce avoirdupois is equivalent to 28 grams approximately. (*See* **Metric System.**)

Grand Prix, the "French Derby," was established by Napoleon III., in 1863. It is the chief French race and is an international competition of three-year-olds.

Graphite *or* **Plumbago,** commonly called black-lead, is a form of carbon occurring in foliated masses in limestone, graphite, etc. It is soft, will make black marks on paper or other plain surfaces, and is mainly used for lead pencils. It is also a valuable lubricant. Pure graphite has found a new use with the construction of atomic piles. Important deposits occur in Siberia, Ceylon, Madagascar, Canada, and the U.S.A.

Grapnel, a modified kind of boat's anchor, with flukes for holding by. Also an arrangement of hooks or clamps for fixing to and holding one ship to another while being boarded in an engagement.

Graptolites, fossil animals which became extinct after the Silurian period. Structurally and in their way of life they were similar to the living hydrozoa; they grew attached to seaweed or the sea-bed. The specimens best preserved occur in shales.

Grasses *or* **Gramineæ.** This family of flowering plants, including about 4,000 species, is the most important economically. Ordinarily the farmer applies the term "grass" to the pasturage plants on which cattle, etc., feed, but botanically grasses take in the various cereal plants (wheat, barley, oats, rice, millet, etc.), and the bamboos.

Grasshopper. There are many species of these leaping insects which are related to the locusts. Most are vegetarians; a few eat flies and caterpillars also. The chirping sound they make comes by scraping the hind legs against the wings; in some species a noise is produced by rubbing the wings together.

Gravitation, the force of mutual attraction between massive bodies. Newton formulated the law of gravitation in these words: Any two particles of matter attract one another with a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them. *See* **F14, 47** (1).

Gravity Railway is a railway worked by the power of gravity alone. The road is constructed on inclined planes, usually so arranged that descending cars pull the cars from below to the higher level.

Graylag, the ordinary wild grey goose of Europe, the species from which domestic geese are derived; frequents fens and marshes; breeds in decreasing numbers in Scotland; distinguished by pinkish legs and feet and lack of black markings on bill.

Grayling, a fresh-water fish of the salmon family having a large dorsal fin, and averaging about 1 lb. in weight. It affords good sport to the angler.

Great Circle Sailing is the art of steering a ship in a line with a straight diameter of the earth.

Grebe, a diving bird of beautiful plumage found over a great part of the world on lakes and oceans. The two species familiar in Great Britain are the Dabchick or Little Grebe and the large and handsome Great Crested Grebe, which has a feathery tuft on each side of the head. Grebes have remarkable courtship displays. The breast feathers are of a downy softness and silver lustre, for which they were formerly much hunted.

Greek Church represents the churches in accord with the Greek patriarchal see of Constantinople, and marks the point of separation from the Roman Catholic Church which occurred in A.D. 1054 when Pope Leo IX., excommunicated the patriarch, and the countries comprised in Greek, Greco-Roman, Russian, and certain Oriental groups remained faithful to the Patriarchal cause. The Greek Church accepts the doctrine of transubstantiation, believes in the intercession of the Virgin and saints, and the power of priestly absolution; but rejects purgatory, Papal supremacy, and allows its priests to marry. Greatly weakened after Russian Revolution and in Turkey after 1923.

Greek Fire, a combustible, supposed to have been composed of sulphur, nitre, naphtha, and asphalt, used with destructive effect by the Greeks of the Eastern Empire in their wars.

Greek Kalends, equivalent to never, as only the Romans, not the Greeks had kalends.

Green Room, the common assembling room for actors and actresses behind the stage, so called from the first room of the kind being decorated in green.

Gregorian Calendar, introduced by Pope Gregory XIII. in A.D. 1582 to replace the inexact Julian calendar. Great Britain did not adopt it until 1752 when eleven days were dropped in the month of September. *See* **Calendar.**

Gregorian Chant, ritual music with a system of harmony suitable for church use. First established by Pope Gregory I. *See* **G35** (2).

Grenadier was originally a picked soldier, employed in throwing hand grenades.

Gresham's Law states that if good money, *i.e.*, money with the higher intrinsic value, and bad money are in circulation together, the bad money will tend to drive out the good money from circulation. For instance, the good money is more likely to be melted down or demanded in payment by foreign creditors.

Gretna Green, a celebrated village in Dumfries, just over the border from England, where runaway marriages were performed from 1754 to 1856, though only completely stopped during present century.

Greyhound, one of the oldest known varieties of dog, bred for the chase, and of great fleetness. Used in the popular sport of coursing and for dog-racing. Among its sub-varieties are the Scotch deerhound, the Irish boar-hound, and the Russian wolf-hound.

Griffe, the name given to a claw-like architectural decoration common in mediæval buildings, and placed at the base of columns.

Griffin, in ancient mythology, a winged creature with an eagle's head and body of a lion, found in ancient sculptures of Persia and Assyria. Its origin is traced to the Hittites. It had the same religious significance as the winged sphinx of Egypt. The griffin vulture is a bird named after the mythological creature, found in Europe, Africa and India.

Grille, a metal-work covering in the form of decorative bars, used to protect apertures in walls or doors.

Grilse, a young salmon, at that period of its development when the fish makes its first return to fresh water, usually in its second year.

Grimm's Law, formulated by Jacob Grimm, an eminent German philologist, lays down a principle of consonantal change in the Germanic languages. For instance, Lat. *pater*, Engl. *father*, Ger. *Vater*, Lat. *frater*, Eng. *brother*, Ger. *Bruder*; Lat. *decem*, Eng. *ten*, Ger. *zehn*.

Groat, an old English silver coin of the value of 4*d*. It was first issued in the reign of Edward III., but after 1662 only coined as Maundy money. The fourpenny piece was resumed, though not under the old name, in 1836, but in recent years has dropped out of the coinage.

Groats (*or* **Grits**) are the grain of oats deprived of the husks; and, crushed, become whole meal.

Grog, the beverage served out to sailors, and compounded of spirit and water in prescribed proportions. The name, it is said, was derived from the fact that Admiral Vernon, who introduced it into the English navy in 1745, wore Grogram breeches.

Grogram, a kind of rough fabric made of wool and some other fibre, such a silk, mohair, or cotton, formerly much used for commoner kinds of wearing apparel.

Groschen, a silver coin introduced into the German

currency about the 14th century but not now in use. It was a thirtieth of a thaler, or about 1⅛ of a penny, English.

Grotto, a natural or artificial cave. Some grottoes are of great beauty, and are much frequented. Among the most famous are the Blue Grotto of Capri and the stalactite grotto of Antiparos. The latter has been known since 1673 and is of singular picturesqueness.

Ground Wave, that part of the energy emitted by a radio transmitter which travels along the ground; as opposed to the sky wave which is reflected back to earth by the ionosphere. With the lower radio-frequencies, the ground wave can be picked up over several thousand miles; in the broadcasting band, over a hundred or so miles; it is virtually useless at high frequencies. *See also* **X3**.

Grouse, game bird of the northern latitudes where some 20 species occur. They are stout, compact, ground-dwelling birds, protectively plumaged (the willow grouse turns white in winter), the male usually being larger and more brightly coloured than the female. The red grouse of the British moorlands has been introduced into Belgium and W. Germany. Of the same family are the blackcock, ptarmigan, capercaillie, American prairie-hen, and the common partridge. Grouse shooting begins in Britain on Aug. 12.

Gruyère, a special kind of cheese, first peculiar to the small town of that name in the canton of Freiburg, Switzerland, but now made in other parts of Switzerland and in France. It contains gas-filled cavities which give it a honeycombed appearance.

Guanaco, a large species of llama, common to South America, and utilised as a beast of burden.

Guano, the excrement of sea-birds, found in large quantities on the rocky islands of the western coasts of South America and Nauru Is. It forms a useful fertilising agent, being rich in phosphate and ammonia, and first came into use in 1841, since which time Peruvian guano has been a recognised article of commerce. Beds of guano of from 50 to 60 ft. in thickness are not uncommon. Fish guano and bat guano from caves in South America and the Bahamas are also used as fertilisers.

Gudgeon, a small fresh-water fish of the carp family.

Guelph and Ghibelline, italianised forms of the German words "Welf" and "Waiblingen," the names of two rival princely families whose conflicts made much of the history of Germany and Italy during the Middle Ages. The feuds between these two factions continued in Italy during the campaigns of Emperor Frederick I., and later developed into the fierce struggles of the 13th century between Emperor and Pope. In Italy the Ghibellines supported the side of the German emperors and the Guelphs the cause of the Pope. The present Royal Family of England is descended from the Guelphs, through the ducal House of Brunswick (the name of Windsor was assumed during the first world war).

Guildhall, the place of assembly of the members of a guild, and at one time, when guilds were in full strength, was practically the Town Hall. The London Guildhall is to-day the hall of meeting for the City of London Corporation.

Guilds for the fostering and protection of various trades have existed in England since Anglo-Saxon times, and from the 12th to the 16th centuries exercised great influence and enjoyed many privileges. There were trades' guilds and craftsmen's guilds, and in all large cities and towns there was a guild hall. Their successes in the Middle Ages led to many monopolistic abuses, and in the end it became necessary to free the country from their restrictive power. Seventy-nine guilds, including the Mercers, Grocers, Drapers, still exist and enjoy considerable revenues, but they are now only private bodies and have little direct influence upon the course of trade.

Guillemot, a genus of sea-birds of the auk family, common in Northern Europe, two species—the Common Guillemot and the Black Guillemot—being natives of our own sea coasts, nesting on the cliffs. Brünnich's Guillemot, an Arctic species, is a rare straggler in the British Isles.

Guillotine, the apparatus used in France for the execution of the death penalty. It consists of an oblique-edged knife, fixed between two grooved posts, which is heavily weighted and falls forcibly on the neck of the victim, severing head from body. A French physician, J. I. Guillotin, proposed in the Constituent Assembly of 1789 that it should be used instead of an axe or sword. It was invented by Dr. Antoine Louis, and was called at first "Louison" or "Louisette."

Guinea, an English gold coin of the value of twenty-one shillings, current from 1663 to 1817, and deriving its name from the first guinea coinage having been struck from gold obtained on the coast of Guinea.

Guinea-Pig, a rodent of the cavy family about 10 in. in length and with a tail so short that it does not project outside the body. It makes an excellent pet, though easily frightened. Its ancestors were species of the wild cavy of S. America said to have been domesticated by the Incas of Peru.

Guinea Worm, a large roundworm (nematode) which is parasitic in man. Occurs in tropical Asia and Africa.

Guitar, a six-stringed instrument with a hollow resonant body, the strings being plucked by the fingers. The instrument seems to have originated in Spain, but there is a variant known at the Hawaiian Guitar. A recent development is the Electric Guitar, in which the mechanical vibrations of the strings are converted into electromagnetic vibrations, amplified, and reproduced by a loud-speaker.

Gulden, a former gold coin of Germany, the Low Countries, and a former silver coin of Austria, worth about 1*s*. 8*d*. English. The silver gulden is still current in Holland.

Gules, a heraldic term, denoting a rose of red tincture, indicated by vertical lines drawn or engraved without colour.

Gulf Stream is confined entirely to the western side of the N. Atlantic and is the warm-water current flowing through the Straits of Florida from the Gulf of Mexico parallel to the American coast up as far as Cape Hatteras. From there it continues north-eastwards as a slower, broader, cooler (yet even so, relatively warm) drift of water, merging with the North Atlantic Drift and losing its identity about 40° N. Lat., 60° W. Long. It is a common error to attribute the warmth of the British Isles and Western Europe generally to the Gulf Stream but this has no influence whatever except in so far as it feeds the North Atlantic Drift. Both the Gulf Stream and the North Atlantic Drift owe their movement to the direction of the prevailing winds, and it is the south-westerly airstream coming from warmer regions and passing over the surface waters of the Atlantic Drift that brings the warmth inland to influence the climate of Western Europe.

Gull. An extremely well-known, long-winged sea-bird with rather short legs and webbed feet. In almost all adults the body and tail are white whilst the back and most of the wings are grey or black. In the majority of cases the plumage of juveniles is partly or entirely dusky. Gulls are omnivorous, and are very useful as scavengers. They follow ships and quickly seize upon any refuse which may be thrown overboard. There are 44 species, which vary in size from moderately small to large. With certain exceptions, such as the Kittiwake in the North Atlantic, they are not found very far from land. They are sociable and mostly breed in colonies on cliff-ledges, on islands, beaches and sandhills, and among vegetation in swamps, sometimes a long way from the sea. The nest is usually substantial, and the eggs generally number from two to three. Of the 29 species breeding in the northern hemisphere, 14 occur in the British Isles. The pure white Ivory Gull is the most northerly of birds. Sabine's and the Swallow-tailed Gull have forked tails. Ross's Gull has a black ring round the neck and one species, Franklin's Gull, migrates from the North, where it breeds, to pass the winter in the Southern hemisphere.

Gulliver, the hero of Swift's satire, *Gulliver's Travels*, who, in Lilliput and Brobdingnag, passed through a series of adventures which

were so contrived as to reflect the humour, follies, and shortcomings of Swift's day. Apart from its satire, it forms one of the best books ever written.

Gums are glutinous compounds obtained from vegetable sources, soluble in cold or hot water, but not in alcohol. There are innumerable varieties. Gum Arabic is exuded from a species of acacia grown in Senegal, the Sudan, Arabia, India and other countries, and is a valuable commercial product, used in dyeing, ink-making, as a mucilage, and in medicine. India-rubber is an elastic gum. Gums are also made from starch, potatoes, wheat, etc., from seeds, bark, roots, and weeds. Many so-called gums are resins.

Gun-Cotton, a powerful explosive manufactured by subjecting a prepared cotton to the prolonged action of a mixture of three parts sulphuric acid and one part of nitric acid. It burns without explosion on ignition, but by percussion explodes with a force five times greater than that of gunpowder.

Gun-Money, the name given to debased coins issued by James II. in Ireland in 1689 and made partly of metal from old cannon.

Gunny, a coarse cloth made in India from jute and hemp, used chiefly for bags and sacking, though sometimes also for clothing by the very poor. Gunny cloth is largely manufactured in Dundee.

Gunpowder, also called "black powder," the oldest of explosive mixtures, consists of saltpetre, sulphur, and charcoal, intimately mixed, the proportions being varied for different intended uses.

Gunpowder Plot was a conspiracy by a desperate band of Roman Catholics in the reign of James I. to avenge the harsh treatment to which Catholics were subjected. Barrels of gunpowder were secreted in the vaults underneath the Houses of Parliament, and it was proposed to fire these when the King and his Ministers assembled on Nov. 5, 1605. The plot was betrayed and Guy Fawkes and his co-conspirators were arrested and executed. The date serves to perpetuate the ancient custom of burning the effigy of Fawkes, a custom in which young people are the most enthusiastic participants, with bonfires, fireworks, etc.

Gunter's Chain, a surveyor's chain, 22 yd. long divided into 100 links, invented by Edmund Gunter (1581–1626), Professor of Astronomy at Gresham College, for the measurement of areas. 1 acre contains 100,000 square links.

Gurnard, a sea-fish, with large, bony head and diminutive body, of which there are some forty species. They are plentiful in British waters.

Guy's Hospital, founded by Thomas Guy in Southwark, London, in 1725.

Gybing, in navigation, means the moving of any boom-sail from one side of a mast to the other.

Gymnasium, originally the name given in ancient Greece to the public places where Greek youth used to exercise and receive instruction. Plato, Aristotle, and other great teachers lectured there. The Greek institution was never very popular with the Romans, and it was not until the 18th and 19th centuries that the cult of combining physical with intellectual activity again found a place in educational systems. In Germany the name was applied to the classical grammar school; in this country and America to the halls where gymnastics were practised.

Gymnosperms. In the pine and related plants the seeds are exposed and not contained in an ovary; because of the nakedness of the seeds, these plants are called gymnosperms. The gymnosperms, the most primitive of seed-bearing plants, include the Cycads, Ginko (maiden-hair tree), Conifers, and the Gnetales. Fossil gymnosperms were abundant by Carboniferous times. *See* **F29** (2).

Gypsies, a nomadic race, believed to be of Indian origin; their language, Romany, certainly seems related to Hindustani. They are spread over many parts of the world, but are most common in Europe, having appeared in Western Europe in 1417, finding their way to England at the beginning of the 16th century. They give evidence of their Eastern origin in their dark skins, large black eyes, black hair, and pearly white teeth. They are born wanderers, and pass from place to place following certain small occupations such as tinkering, basket-making, and the like.

Gypsum, a whitish mineral consisting of hydrated sulphate of calcium. The finest gypsum is alabaster. When heated gypsum is converted into the powder called Plaster of Paris; the water it loses can be taken up when the plaster is wetted, and the reconversion of Plaster of Paris into gypsum accounts for the way in which the former sets hard. The name "Plaster of Paris" came from the location of important gypsum quarries in the Montmartre district of Paris. It was found after the flood disasters of Jan. 1953 that gypsum could undo the effect of sea-water. By spreading it for the rain to wash into the soil, thousands of acres of farmland in Holland and Britain were made productive again.

Gyromancy, divination by walking in circles, was one of the ancient superstitions. The person for whose benefit the art was invoked walked round and round in a circle (about which certain signs had previously been placed) until he fell from giddiness. From the manner of his fall in relation to the signs, the interpretation was formulated.

Gyroscope, an application of the principle of the spinning top to a single-rail railway, the steering of ships, and the steadying of torpedoes. A high-accuracy gyroscope combined with a highly sensitive accelerometer in what is known as an inertial navigation system was used by the *Nautilus* when it made its journey under the North Pole in 1958.

H

Habeas Corpus, the name given to a writ ordering the body of a person under restraint or imprisonment to be brought into court for full inquiry into the legality of the restraint to be made. The first Habeas Corpus Act was passed in 1679, though nominally such a right had existed from Magna Carta, but some of the more despotic kings had disregarded it. In times of public peril the privilege of *habeas corpus* is sometimes temporarily suspended, many instances occurring in the history of Ireland and during the First and Second World Wars.

Haber Process, the important industrial process for synthesising ammonia from atmospheric nitrogen. Nitrogen and hydrogen are made to combine at high pressure (200 atmospheres or upwards).

Habrocoma, a genus of South American rodents, possessing four toes to each fore-foot, having large ears, and a fine, soft chinchilla-like fur.

Hackling-Machine, an apparatus employed in removing burrs and other foreign substances from raw flax prior to spinning. It consists of a pair of rollers covered with brushes and hackles.

Haddock, one of the best-known fishes abounding in northern seas and averaging about 4 lb. in weight. Largely used for curing, and sold as "finnan haddies."

Hade of veins, a mining term indicating the particular inclination that any vein, seam, or strata may have from the perpendicular; thus, in Weardale the veins mainly "**hade**" to the north.

Hadrian's Wall. (*See* **Roman Walls.**)

Hæmatite, peroxide of iron, one of the principal iron ores, containing about 70% of the metal. It is usually found in kidney-shaped masses, and is specular, red or brown, in thin fragments, but greyish in bulk.

Hæmocyanin, the respiratory pigment of crustaceans and molluscs. It functions like hæmoglobin, from which it differs in containing copper instead of iron and being blue when oxidised instead of red.

Hæmoglobin, the pigment containing iron which gives red blood corpuscles their colour. It is a respiratory pigment, having the property of picking up oxygen when the blood passes through the lungs to produce the compound known as oxyhæmoglobin. In other parts of the body the oxyhæmoglobin breaks down, liberating oxygen, which is used in the oxidation process (respiration) that the body tissues carry on.

Hafiz, besides being the pseudonym of a famous

Persian poet, is a title conferred upon any Mohammedan who has committed the whole of the Koran to memory.

Hafnium, a metallic element discovered by Coster and Hevesy in 1922 and important in the atomic-energy field. It occurs in most zirconium minerals to the extent of about 5 per cent.

Hag-fish, a parasite sea-fish with soft backbone and eel-like form; found within the bodies of other fish, and called sometimes the "borer," or "the glutinous hag-fish."

Hagiarchy, the rule or order of Saints.

Hagiology, a branch of literature that is wholly given up to the history of the saints, and the setting forth of the stories and legends associated with their names.

Hail, hard, roughly spherical, balls of ice, consisting of white cores covered by layers of both transparent and opaque ice, frequently falling during thunderstorms. They usually do not exceed 1 in. in size, but hailstones larger than apples and weighing more than 2 lb. have been observed. The general theory of a hailstone is that near the top of a cumulonimbus cloud a raindrop becomes frozen, grows in size by condensation and through collisions with snow particles, and eventually becomes so weighty as to overcome the ascending air currents in the cloud. Falling, it first encounters supercooled water drops, immediately freezing on it, increasing the white core, and then at lower levels ordinary water drops, freezing more slowly, producing a layer of clear ice. Before the hailstone arrives at the ground gusts and lulls may transport it several times up and down both regions, adding alternate coatings of soft white and hard clear ice.

Haileybury College, in Hertfordshire, originally established in 1809 for the education of boys for service under the East India Company. Since 1862 it has been a public school, receiving its charter in 1864.

Hake, a fish of the cod family, found in large numbers in the seas of Europe, but not in high favour for the table with fastidious feeders.

Halberd, a kind of spear much used as a military weapon in feudal times. Its blade was sharp-edged, and it bore an axe or projecting knife a few inches from the point. Halberdiers often formed the bodyguard of kings and notables.

Halcyon, a term associated in olden times with the kingfisher and days of soothing calm, "halcyon days" being a frequently used expression. The legend was that the kingfisher laid its eggs on the surface of the sea at the time of the winter solstice when the sea was specially calm.

Halibut, one of the largest of the flat fishes, averaging when full grown from 4 to 6 ft. in length, and highly esteemed for the table. Specimens of still larger size occasionally occur. It is plentifully distributed. Its two eyes are on the right side of the head.

Hall-mark. A mark or group of marks, impressed by an assay office on gold or silver articles guaranteeing the standard of fineness of the precious metal used in them. These marks, which have been applied to silver made in London since the beginning of the 14th century and perhaps earlier, make it possible to establish the year and place of assay as also the name of the maker. English pieces of silver usually have not less than four marks, viz., (1) town mark; (2) maker's mark; (3) date letter; (4) sterling mark.

The town mark is rarely changed; in London a crowned leopard's head was used from the earliest days until 1820 with only minor modifications, except for the period 1697–1720 when a lion's head erased was substituted; since 1820 the crown has been omitted.

Until the late 17th century a symbol was often used as a maker's mark, from 1696 to 1720 the first two letters of the maker's surname, and subsequently the maker's initials. Owing to the destruction of the earlier mark plates at Goldsmiths' Hall no maker's name prior to the late 17th century can be identified with certainty.

The London date letter is changed at the end of May each year, so each letter covers seven months of one year and five months of the following. The London date cycle has usually consisted of twenty letters: the alphabet of each cycle is of different style, and the letters are enclosed in shields of different shape.

The sterling mark, the lion passant, was introduced in 1544 and continued in use until 1697, when the higher Britannia standard was introduced in order to discourage the practice current amongst goldsmiths of melting down coin of the realm to make plate. The leopard's head crowned and the lion passant were then replaced by a figure of Britannia and a lion's head erased. Though the regulation imposing the higher standard was withdrawn in 1720, a small amount of Britannia standard silver continued to be made and still is made.

From 1784 until 1890 a plate tax was levied on all silver assayed in Great Britain and an additional duty mark, the sovereign's head, was used during this period. A Jubilee mark bearing the head of George V and of Queen Mary was used in between the years 1933 and 1935, and in 1953 a coronation mark with the head of Queen Elizabeth was introduced.

The tables of hall-marks in Gen. Comp. give the London date letter cycles from 1598 to the present day. The form of town mark and sterling mark used during each cycle is given at the head of each column. Where a major alteration took place in either of these marks during a date-letter cycle, the alternative forms are also shown. The date of the change can be established by reference to the notes above. At the bottom of each page the marks used by the major provincial, Scottish and Irish assay offices are shown. Owing to lack of space, the complete date-letter cycles are not shown, but two examples only from the 17th, 18th or 19th centuries. Where a provincial assay office was established in the 17th century or earlier, the marks of one year in the 17th and 18th centuries respectively are shown, where the office was not established until the 18th century, the marks of one year in the 18th and 19th centuries are given.

Halloween (Oct. 31), the eve of All Saints' Day, a time associated, especially in Scotland, with certain pleasing superstitions attractively set forth in Burns's famous poem "Hallowe'en." It is the night when young men and maidens are supposed, by observing certain rites, to have their future wives and husbands disclosed to them.

Halo, a luminous circle usually of 22° radius, surrounding sun or moon, produced by the refraction and reflection of light by ice crystals of high cirrus cloud. It is a very common occurrence, in the British Isles almost one day in three. The inner side is red and the outer a whitish-yellow colour. "Mock suns," *i.e.*, patches of light at the same elevation as the sun are much rarer occurrences, sometimes being of great beauty and brilliance. (*See* **Coronæ**.)

Halogens, the group name for the four non-metallic elements, chlorine, bromine, iodine, and fluorine. The term "halogen" means "salt-producer."

Halteres, the vestigial rear-wings of the two-winged flies or *Diptera* (*e.g.*, the house-fly). The equilibrium in flight of these insects depends on the halteres, which are commonly called "balancers."

Hampton Court Conference, presided over at Hampton Court Palace by James I. in 1604 and which brought about his authorised translation of the Bible, had an important bearing on the religious differences of the time. James refused to grant tolerations to the Puritans. This sowed the seeds of civil war. Following the conference three hundred English Puritan clergy were ejected from their livings.

Hanaper Office, a former Chancery office, deriving its name from the fact that its writs and papers were kept in a hanaper (hamper). The Chancellor's officer thus came to be known as the Hanaper. The Comptrollers of the Hanaper were abolished in England in 1842.

Hand, a measure of four inches, the average size of the palm; used in reckoning height of horses.

Handfasting, an informal marriage custom once prevalent in Scotland, whereby a man and woman bound themselves to cohabit for a year and a day, and at the end of that period either confirmed their contract by a regular marriage or separated.

Handspike, a wooden bar shod with iron to raise weights, used on shipboard and by artillery.

Hansard, the title given to the official reports of Parliamentary debates, so named after Luke Hansard who in 1774 became partner in a firm of printers to the House of Commons. His son T. C. Hansard was first the printer and then the publisher of an unofficial series of parliamentary debates inaugurated by William Cobbett in 1803. In 1909 production was taken over by H.M. Stationery Office and today's volumes contain full substantially verbatim reports of what is said in both Houses of Parliament.

Hanseatic League was a confederation of North German towns established about 1241 for purposes of mutual protection in carrying on international commerce. The League became so powerful that it was able to dominate the foreign trade of Norway, Sweden, Denmark, and even to some extent of London. A branch was established in London and had its guild hall in Cannon Street for hundreds of years. The League existed down to the middle of the 17th century. Hamburg, Lübeck, and Bremen are to-day the only cities which, as free ports, still by commercial courtesy retain the name of Hanse towns.

Hansom, a two-wheeled one-horse cab, invented by Joseph A. Hansom in 1843. It was, until the introduction of the motor-cab (or "Taxi"), the cab in most ordinary use in London and many other cities and towns in the United Kingdom. Lord Beaconsfield styled it the "gondola of London." It is constructed to seat two persons, and the driver sits on a "dickey" behind, level with the roof of the cab.

Hara-kiri, the custom of suicide by compulsion, or "happy despatch," once common in Japan, but no longer permitted. The condemned person gave himself the first cut, and if his courage then failed him, the fatal blow was dealt by a friend.

Hare, the leading member of the Lepus genus, and common in Northern Europe. Noted for having four upper front teeth, one pair behind the other, long ears, short tufted tail, and a cleft upper lip. It is a very swift animal, and intelligent in eluding pursuit, therefore much hunted, greyhounds being used to chase it, the sport being called "coursing." The hare makes a nest of grass, called a "form." It is prohibited by law to sell a hare or leveret during March, April, May, June, and July.

Harleian MSS. comprise some thousands of volumes of MSS. and documents, collected by the first Earl of Oxford (1661–1724) and his son Edward. After the death of the latter, his widow handed the MSS. over to the nation for £10,000, a sum that did not represent a quarter of their value, and they are deposited in the British Museum.

Harlequin, the buffoon of ancient Italian comedy. As adapted to the British stage, however, harlequin is a pantomime character only, in love with Columbine, appearing in parti-coloured garments and carrying a wand, by which he exercises a magic influence in thwarting the fantastic tricks of the clown and pantaloon.

Harmattan, a dry wind which may blow between January and May across the Sahara to the Gulf of Guinea. Although affording relief from the tropical heat, vegetation withers because of its extreme dryness and much irritation is caused by the clouds of fine dust which it carries.

Harmonic Motion, regular periodic motion of the kind exemplified by a ball bobbing up and down at the end of a spring, and by the piston in a steam engine. It may be simple (simple harmonic motion) or composed of two or more simple harmonic motions. In simple harmonic motion the acceleration is proportional to the distance of the moving body from its original rest position.

Harmonics. Flute-like tones which can be produced by touching the strings of a violin in a certain way. The effect is due to the suppression of the fundamental frequency at which the string would normally vibrate. In consequence only the harmonics or overtones (notes one octave or more above the fundamental which combine to give the characteristic timbre of the instrument) are heard.

Harmonica *or* **Mouth Organ,** a small instrument consisting of reeds enclosed in separate chambers through which air is blown or sucked by the mouth. Recent improvements and elaborations have made of it a versatile solo instrument in the hands of an expert.

Harmonium *or* **American Organ,** a small organ of one or two manuals consisting entirely of reed stops. There is no pedal organ, the feet being used to operate the bellows.

Harp, a musical instrument of ancient origin consisting of many strings stretched on a frame. The player stands beside it and plucks the strings with his fingers. Used orchestrally in early Italian operas (17th century).

Harpoon, a kind of barb-headed spear used for attacking whales. These used to be thrown by hand, but the modern harpoon is an instrument of ingenious mechanism, with shaft, slot, and ring, and is fired from a gun.

Harp-seal, the ordinary Greenland seal, with a dark harp-shaped marking on its back, hence its name. It abounds in Newfoundland waters and further northward towards the Arctic.

Harpsichord, a keyboard instrument with a compass of up to six octaves in which stretched strings are plucked by quills. The harpsichord was an instrument of great importance from the 16th to the 18th centuries, but it was eventually eclipsed by the pianoforte, in which the plucking action (*cf.* **Harp**) was replaced by a striking action (*cf.* **Dulcimer**).

Harpy Eagle, a large bird of prey named from the winged monsters of Greek mythology, inhabiting the forest regions of Central and South America. It has a handsome grey plumage and large crest. It attacks and kills animals much larger than itself, and was called by the Aztecs "winged wolf".

Harrier, a bird of prey of the falcon family; of the various species distributed over the world, three breed in Britain: the moorland Hen harrier, the Marsh harrier, and Montagu's harrier. They are slender birds with long tails and pointed wings. They nest on the ground and eat small mammals, frogs, lizards, and small birds.

Harrow, an agricultural implement with a series of strong teeth underneath which, when pulled over it, the ground is broken up. Iron is now largely used both for teeth and frame.

Harrow School, founded 1571, is a famous boys' school with great traditions.

Hartebeest, common African antelope of a grey-brown colour, with ringed and knotted horns bending backward and tapering to sharp points; gregarious, of large size, and capable of domestication. There are several species. Its flesh is not unlike beef in flavour.

Harvard University, the first American University, established at Cambridge, Massachusetts, in 1636, by John Harvard, a settler from Cambridge, England.

Harvest Bug, a very small insect, of a dark red colour, which appears in large numbers in the fields in autumn, and is peculiarly irritating to animals and man by the tenacity with which it attaches itself to the skin and burrows underneath. Probably the larvæ of spinning mites (Trombidoids).

Harvest Moon, the full moon that occurs nearest to the autumn equinox, in September. It rises for several nights running about the same time, and yields an unusually brilliant series of moonlight nights.

Harvestman *or* **Phalangid,** animals related to the spiders. Usually with small oval bodies and extremely long thin legs. Harvestmen with shorter legs may be confused with spiders; the abdomen, however, is always segmented, a point of distinction from the spiders.

Hashish, an Arabic word for the narcotic substance prepared from the hemp plant (*Cannabis sativa*). It is known by a variety of names, *e.g.*, bhang in India and marijuana in America.

Hatchment, in heraldry, is a square board, in vertical diagonal position, placed outside a house or on the tomb at the death of a member of a family and so arranged that it indicates the sex and condition of the deceased.

Hatchways, places or openings in the centre of a ship's decks, through which goods are lowered to or lifted from the hold.

Hauberk a name first given to a portion of mail armour worn over the neck and shoulders, but

later applied to a coat of mail extending below the knees.

Hawfinch, a well-known European bird of the finch family, having a variegated plumage, a sturdy bill, and black-and-white tail. In England it is seldom found away from the Midland and Eastern Counties.

Haw-haw, a fosse or ditch sunk between slopes for defensive purposes, and not perceptible until closely approached.

Hawk. This name is applied to almost any diurnal bird of prey other than eagle, falcon, or vulture, but in its strict sense applies only to the *Accipiter* genus—the small Sparrow Hawk and the larger Goshawk, round-winged, long-tailed birds with barred under-parts. They prey upon small birds captured in flight.

Hawk-moths, large species of moths, thick of body and strong of wing, which fly with rapid swooping motion, hence its name. There are numerous handsome species in Britain.

Hearth-Money was a tax laid on hearths (in all houses paying the church and poor rates). Charles II. introduced it in 1662, and it was repealed in the reign of William and Mary.

Heat, a form of energy possessed by a body in virtue of the motion of its molecules. Heat can be conducted to other bodies and raise their temperature, or it can be radiated as waves into space. When a body changes its state, energy is involved. Thus when a liquid changes into vapour, as in evaporation, there is a fall of temperature, the energy absorbed being known as the latent heat of vaporisation. Conversely, when a gas changes into a liquid, as in condensation, the temperature rises, the energy released being known as the latent heat of condensation. Water has a great capacity for heat, the oceans being huge storehouses, a factor of the utmost importance in meteorology. The specific heat of a substance is the number of calories of heat required to raise the temperature of 1 gram of the substance through 1° C. In the case of gases the specific heat has two values, one at constant pressure and one at constant volume. *See also* **F15.**

Heath, a flowering plant of that section of the family *Ericaceæ* called *Ericeæ.* Heaths are widely distributed over uncultivated spaces of Europe and Africa. In Britain they are represented by heather (of which there are several species) and ling (*Calluna*), which cover thousands of acres of moorland. Some of the African or Cape heaths are very beautiful and much prized by florists. One species of heath (*Erica arborea*) which grows in S. Europe and N. Africa has close-grained woody rootstock used for making briar pipes.

Heat Wave is a spell of very hot weather, due chiefly in this country to a warm southerly current of air caused by the presence of an anticyclone over western or central Europe at the same time as a depression is stationary over the Atlantic. In the heat wave of May 29–June 3, 1947, temperatures of at least 85° F. were registered each afternoon in London. High humidity increases the discomfort.

Hebrews, Epistle to the, one of the books of the New Testament, to which no direct authorship can be assigned. Its chief mission was to proclaim Christianity as the continuation and fulfilment of the older Jewish faith.

Hecatomb, the name given to the public sacrifice of a hundred oxen in ancient Greece. In later times the word has been used to express any wholesale sacrifice of human beings or animals.

Hegira, an Arab term signifying departure or flight, and used in reference to Mohammed's departure from Mecca for Medina, A.D. 622, from which date the Mohammedan era is reckoned.

Helicopter, heavier-than-air aircraft which obtains its lift from blades rotating above the fuselage in windmill-fashion. The first successful helicopters were the Focke-Wulf 61, a German machine (1936), and the VS-300, designed by Igor Sikorsky, flown in 1937. Helicopters can hover, and rise and descend vertically, in addition to being capable of horizontal flight.

Heliotrope, a favourite sweet-scented flowering plant, common in tropical and sub-tropical countries; the Peruvian heliotrope is the "cherry pie" of our summer garden borders.

Helium, a gaseous element first discovered by means of the spectroscope in the sun's atmosphere. This discovery, made in 1868 by the astronomer Sir Norman Lockyer, was followed in 1895 by Sir William Ramsay's proof that the element existed on earth. He found it in the uranium ore, clevite. Later it was established that helium is formed by the radioactive decay of many elements which emit α-particles (nuclei of helium atoms) and is contained in all radioactive minerals. The largest source of helium is natural gas, the richest in helium being the gas from certain wells in Utah, U.S.A. Next to hydrogen, helium is the lightest gas known, has a lifting power equal to 92% of hydrogen and the advantage that it is inert and non-inflammable. It is used in the U.S.A. for inflating airships. Ordinary air contains 1 part in 200,000 of helium. It was the last gaseous element to be liquefied, this being achieved by Onnes in 1908 in Leyden.

Hell, according to the teaching of the earlier Christian fathers, is a place of eternal torment, to which the spirits of the wicked are doomed after mortal death. The Inferno, as imagined by Dante, is even now believed in by many; but in the general broadening of philosophic inquiry in modern times, the idea of this material hell has been greatly modified. The most orthodox of preachers in these days would hesitate to proclaim his belief in the hell of burning fires as accepted so generally a few generations ago.

Hellebore, a plant of the *Ranunculaceæ* order. The best-known British examples are the green and stinking varieties. There is also a garden kind which flowers in December called the Christmas Rose. Hellebore yields a bitter substance which forms a drastic purgative, but is now little used.

Hellenism is the pursuit of the Greek ideal of physical and intellectual culture. Matthew Arnold's doctrine of "sweetness and light" had its foundation in Hellenism.

Helmet, originally a soldier's protective head covering, now a term applied to defensive headgear generally. In mediæval times helmets were for the most part of metal, and varied in shape from reign to reign. Roman gladiators wore helmets that covered the face entirely, and the helmets worn at tournaments in the 15th and 16th centuries were so closed in that the wearers could only see through the perforations of the visor. The stiff hats worn by soldiers, policemen, and firemen generally are now styled helmets.

Helots, bondmen of ancient Sparta upon whom devolved the most menial occupations without other recompense than food and lodging.

Hemiptera, the order of insects to which belong the true bugs. Their wing structure is in most species incomplete, hence the term hemiptera. This order includes the familiar water insects, the water boatman and water skater, also the aphids, cicadas, leaf hoppers, scale insects.

Hemlock, a plant of the *Umbelliferæ* family, growing in all parts of Britain, and containing a strong alkaloid poison. Used medicinally, this alkaline substance is of considerable service, being a powerful sedative. According to Pliny, hemlock was the poison used by the Athenians in putting criminals to death.

Hemp, name of a plant native to Asia, now cultivated widely for the valuable fibre contained in the stalk or in some species in the leaves. Hemp fibre has been replaced by cotton for textiles and jute for sacks and is now chiefly used for cordage and twine. It contains a resinous substance from which the narcotic hashish is made. The seed yields a valuable oil. The term hemp is also used for other fibre plants, including manila hemp from the Philippines, sunn hemp from India, sisal from W. and E. Africa and phorium from New Zealand.

Henbane, a plant found in Britain and other parts of Europe and Northern Asia. It belongs to the potato family *Solanaceæ,* grows mostly on waste ground, and bears yellow-brown flowers veined with purple. The leaves yield a poisonous alkaloid substance which, medicinally prepared and administered, is of great use. Tincture of henbane is often preferred to laudanum.

Heptameron, a book of stories, written or compiled by Queen Margaret of Navarre in imitation of Boccaccio's *Decameron*, and supposed to have covered seven days in the telling.

Heptarchy, a word derived from the Greek *hepta*, seven, and denoting the seven kingdoms (*archai*) into which Anglo-Saxon England was supposed to have been divided before 900. The seven presumably were Kent, Essex, Sussex, Wessex, Mercia, East Anglia, and Northumbria.

Heracleum, a plant of the *Umbelliferæ* family, common in southern and central Europe, though only one species, the cow parsnip, grows in England. It has a bitter root, and from the juice of the stem an intoxicating liquor is occasionally prepared.

Herald, an officer of state empowered to make formal proclamations and deliver messages from the sovereign or other high personage whom he served. In the developments which took place in armorial bearings, the herald was the functionary charged with the duty of their proper depiction.

Heraldry, the art or science of genealogy and armorial bearings, was mainly the outcome of the love of outward distinction which prevailed in mediæval times. "Heraldry," says Stubbs, "became a handmaid of chivalry, and the marshalling of badges, crests coat-armour, pennons, helmets, and other devices of distinction grew into an important branch of knowledge." The *shield*, or *escutcheon*, is the ground upon which armorial signs are traced, the colour of the shield being called the *tincture*, the signs recorded the *charges*. There are seven *tinctures*—*or* (gold), *argent* (silver), *gules* (red), *azure* (blue), *vert* (green), *purpure* (purple), and *sable* (black). The *charges* are classed as "Honourable" and "Subordinate" ordinaries, comprising lines and geometrical forms; and "Common" ordinaries, which latter includes all representations of natural objects. There is also a system of external signs, such as crowns, coronets, mitres, helmets, mantlings, wreaths, and crests, each having its distinctive significance. For other distinguishing marks see **Hatchments, Badges, Quartering, Rampant, Pean.**

Heralds' College or **College of Arms**, was incorporated by Richard III, in 1483. Its head is the Earl Marshal (an office hereditary in the family of the Dukes of Norfolk), and there are three King-of-Arms, six Heralds, an extra Herald, and four Pursuivants. The business transacted is wholly connected with the tracing of genealogies and the granting of armorial bearings. In Scotland the Heraldic functions are performed by the Lord Lyon King-of-Arms, and in Ireland by the Ulster King-of-Arms.

Herbarium, a systematically classified collection of preserved plants. One of the largest herbaria in the world belongs to the Royal Botanic Gardens at Kew.

Herbivora, animals subsisting upon grass, herbs, or other plants.

Heredity is the study of the transmission of physical and mental characteristics from one generation to another. Gregor Mendel (1822–84), a great experimenter in the field of inheritance, considered the sex cells to be the bearers of hereditary characteristics, by which they are handed on. The modern theory is that hereditary factors are situated in the minute bodies known as genes, which form the constituent parts of chromosomes, found in the centre of the nucleus of each cell. In general, psychological characteristics are due more to social environment than to inheritance. *See* **F30** (2), **58** (2).

Heretics, a term applied to those who choose their own creed instead of adopting one imposed by authority. In the past heretics were severely dealt with, thousands being burned at the stake.

Heriot, a fine or acknowledgment of service due to a manorial lord and paid on the decease of the tenant, originally in the form of military equipment, afterwards money or beast.

Hermaphrodite, human beings, animals, or plants possessing both male and female generative characteristics. True hermaphrodites very rarely occur.

Hermit, one who retires into seclusion for the purpose of religious contemplation and a desire to live apart from the world. Hermits were regarded with reverence in mediæval times and were free to wander about. Peter the Hermit instigated the first Crusade.

Hermit Crab, a kind of crab having a soft fleshy body, without shell-protection. It possesses itself of the empty shell of some mollusc, into which it backs itself, and this usurped shell it carries about with it thenceforward, or until it has outgrown its dimensions, when it seeks a larger one. The common Hermit Crab of Britain usually resorts to a whelk shell.

Heron, a large wading bird with long curved neck and pointed bill, is a member of the *Ardeidæ* family, of which there are many species. Egrets and bitterns are included as herons. Herons are to be met with in marsh lands and near rivers and lakes, where they feed on fish and frogs. They nest in trees in large numbers, these colonies being called heronries. The common heron is native to England, and other species from the Continent are frequent visitors.

Herring, a common sea-fish abounding in northern seas and always to be found in large numbers round the British coasts. The herring fishing is the most important fish industry in this country, a very numerous fleet being engaged in it. The fishing season proper lasts from May to October, the enormous shoals being followed as they move from place to place. The spawning season is about the end of August. One female herring will yield from 20 to 50 thousand eggs, which sink to the sea-bed, where they develop.

Hexagon, a figure consisting of six sides and six angles, called a regular hexagon when all the sides and angles are equal.

Hexahedron, a solid body having six sides, particularly exemplified in the cube, or regular hexahedron.

Hexapla, a 3rd-century edition of the Old Testament in parallel Hebrew and Greek characters, by Origen.

Hexateuch, the title given to the first six books of the Old Testament, comprising the Book of Joshua in addition to the five books of the Pentateuch.

Hibbert Lectures, on theology by eminent authorities, founded in 1878 by the bequest of John Hibbert, a West Indian merchant.

Hibernation, expresses the dormant condition in which numerous mammals, reptiles, amphibians, insects, plants, etc., pass the winter. Before hibernation sets in, the animals fatten themselves up, but in spite of this there is considerable loss of weight sustained during hibernation. Animals of the torrid regions pass through an analogous period (aestivation) during the hot season, when the sources of food are dried up.

Hickory, an American tree of the walnut family, remarkable for its very hard, solid, heavy white wood, and bearing an edible, four-lobed nut.

Hickory-shirt, an American term signifying a shirt made from checked cotton stuff.

Hierarchy, a term applied to ecclesiastical or Church government, and involving a graded organisation with a supreme head.

Hieroglyphics are the earliest form of pictured symbolic expressions, and are supposed to have been introduced by the ancient Egyptians. They consist of rude depictions of animals, plants, signs, and objects, and in their later examples express, in abridged form, ideas and records from which significant historical information has been gleaned. The deciphering of Egyptian hieroglyphics long formed an ardent study, but gradually the key to the riddle was discovered, and most of the ancient records can now be understood. Besides the Egyptian there are also Hittite, Minoan and Mayan hieroglyphic scripts. (*See* **Rosetta Stone.**)

Hieronymites were hermits following the rule of St. Augustine with additions taken from the writings of St. Jerome, founded in the 14th century on the Peninsula. They went to Spanish and Portuguese America and helped to Christianize the American Indians. The order still survives in Spain.

Hindi, the great Aryan vernacular language of Northern India. In the Indian Constitution, adopted in 1950, it was laid down that Hindi in the Devanagari script should within 15 years replace English as the official language of the Indian Union.

Hinduism. The original inhabitants of India (the Dravidians) were primitive tribes who worshipped many nature gods. Some time about 2000 B.C. India was invaded from the North by the Aryans, a light-skinned and civilised people: the word Hindu is believed to be a Persian word used by the Dravidians to describe their conquerors. "Hinduism" is not only the religion but also the social institutions of about three-quarters of the population of the country. The original religion of the Aryans described in the religious books known as the Vedas mingled with the polytheism of the Dravidians to form a most complex mixture now known as Hinduism. At the highest level, known as Brahmanism, belief is in a subtle and sophisticated form of monotheism (Brahma is a universal and all-embracing spirit), but there is a tolerant acceptance of more primitive beliefs. Thus Vishnu (a conservative principle) and Siva (a destructive principle) are accepted as aspects of the deity. Krishna is said to be an incarnation of Vishnu, somewhat as Christ is in the Christian world accepted as an incarnation of God. There are, however, many other gods, and the religion embraces many primitive and crude beliefs.

Hindustani, the *lingua franca* of India, a Sanskritized Hindi vernacular introduced by the British in 1837 to replace the official Persian. It is written in Devanagari (Sanskrit) characters. The Persianized Hindi vernacular is known as Urdu.

Hippodrome, in ancient Greece, was a building set apart for horse and chariot races, and was often the scene of great spectacular performances.

Hippogriff, a fabulous animal, like a horse in body, but with the head, wings, and front legs and claws of an eagle. The monster frequently appears in the romances of the Middle Ages.

Hippopotamus, the largest living representative of the hog family, and widely distributed over Africa, where it is known as the "river-horse." It is of immense bulk, attaining a length of 12 ft. and a weight of 4 tons and stands about 5 ft. high. Its skin is hairless and about 2 in. thick, and it has a pair of tusks often weighing as much as 6 lb. It spends most of its time in the water, and lives entirely on vegetation, both aquatic and terrestrial. The pigmy hippopotamus, which occurs in forests and swamps in W. Africa, is only half the size.

Histology is that part of anatomical science which deals with those details of the human structure that can only be investigated with the aid of the microscope.

Historiography, the writing of history.

Hittites, an ancient race (often mentioned in the Old Testament) who inhabited Asia Minor and N. Syria from the third to the first millennium B.C. Excavations have revealed that they attained a high level of civilisation round about 1350 B.C. They were rivals of Egypt, disputing with Pharaoh the mastery of the Middle East.

Hobby, a bird of the falcon family, 12–14 in. long. Local breeding visitor to England and Wales, April–Sept.; irregular visitor to Scotland and Ireland.

Hog, the common name of animals of the Suina family, including the wild boar, pig, and sow. The wild boar, *Sus scrofa*, is the common ancestor. The skin of the hog is covered with bristles, the snout truncated, and each foot has four hoofed toes. Hogs are omnivorous feeders and eat almost anything that is given them.

Hogmanay, the Scottish New Year's Eve festival and a national holiday of the country. The custom of demanding Hogmanay bread is still upheld in many parts of Scotland.

Hogshead, a cask of varying capacity, also a specific measure. In the old English measure a hogshead was 52½ imperial gallons, or 63 old gallons of wine. Of beer 54 old gallons make a hogshead.

Holland, the name given to a fine kind of cloth made from flax, originally manufactured only in Holland. Brown Holland is the kind not fully bleached.

Hollands, Schiedam, or Schnapps, a kind of gin made mostly in Holland from rye and malt, with a flavouring of juniper berries.

Holly, a hardy evergreen shrub, largely grown in England. Its bright dark green prickly curved leaves and its clusters of red berries are familiar in all parts of the country, and used as house decoration between Christmas Eve and Twelfth Night. Its wood is white and hard, valued for carved work, while its bark yields a gummy substance which is converted into birdlime.

Holograph, a letter, manuscript, or document written throughout by its author.

Holy Alliance, an alliance ostensibly for conserving religion, justice and peace in Europe, but used for repressing popular tendencies towards constitutional government. Formed by Alexander I. of Russia, Francis I. of Austria and Frederick William III. of Prussia, at Paris on Sept. 26, 1815. Subsequently joined by all the sovereigns of Europe, except the Pope and the King of England. It ended after the 1830 revolution in France.

Holy Coat of Treves, a garment preserved in the Cathedral of Treves and said to have been worn by Christ. It was brought from Jerusalem by the Empress Helena in the fourth century.

Holy Grail, the cup from which Christ drank at the Last Supper, and supposed to have been preserved by Joseph of Arimathea. Many poets and romancers have made the "Quest of the Holy Grail" the subject of their imaginings, Tennyson making fine use of it in his "Idylls of the King."

Holy Rood, an annual Roman Catholic festival held on September 14th to celebrate the Elevation of the Cross in commemoration of its re-erection in Jerusalem by the Emperor Heraclius in 628 after it had been lost for nearly 300 years and had fallen into the hands of the Persians. Also included in the Church of England calendar.

Holyrood, the ancient royal palace at Edinburgh, dating from the 15th century, and inhabited by many Scottish sovereigns, notably Mary Stuart, the rooms occupied by her (including the one in which Rizzio was murdered) being still shown. It is now known as Holyrood House and is still used as a royal residence.

Holy Water, water blessed by a priest and kept in small fonts at the entrance to Roman Catholic churches, and used by worshippers going in, and out, or by priests in sprinkling.

Holy Week is the week preceding Easter Sunday, and includes the days of the Sufferings of Christ, ending on Good Friday.

Home Rule, the term applied to a separate Irish Parliament, which was the object of two Bills introduced by Mr. Gladstone in 1886 and 1893, both of which were rejected, and led to the establishment of a Liberal Unionist party of seceding Liberals. Mr. Asquith introduced a new Home Rule Bill on Feb. 12, 1912. In September strong counter demonstrations, headed by Sir Edward Carson, took place in Ulster; the Bill passed the Commons but was rejected by the Lords. On the outbreak of war party politics were set aside, and ultimately the Bill was allowed to pass, its operation to be delayed until after the war. In 1920 another Bill was passed in lieu of that of 1914, providing for a Northern Ireland Parliament, sitting at Belfast and a southern Parliament sitting at Dublin. In 1921 a Bill was passed establishing the Irish Free State, later known as Eire. The Republic of Ireland Act, Nov. 1948, established the Irish Republic as a sovereign independent state outside the British Commonwealth.

Homer (Omer), an ancient measure of capacity used in Syria, Palestine and Babylonia.

Homily, something between a discourse and a sermon; not so discursive as the one, or so elucidatory as the other.

Honey, the sweet syrup formed by bees from the nectar of flowers, the sucrose in the nectar being converted into a mixture of the simple sugars, glucose and fructose.

Honeydew, a viscid secretion, from plant lice (aphids), found on leaves, chiefly in hot weather, and looking like dew.

Honey-eater, an Australian bird (of which there are many species) provided with a long curved bill and tufted tongue. It lives by sucking the "nectar" from the flowers which abound in rural parts of Australia and New Zealand.

Honours of War, a privilege sometimes conceded to a defeated force of marching out of the place surrendered with colours flying and drums beating.

Hookah, an Oriental pipe for tobacco smoking, the smoke being drawn through the water of a goblet (commonly a coconut shell) by means of a long flexible tube.

Hook-money, an old silver currency of Ceylon, in use in the 17th century, consisting not of coinage, but of hooked pieces of actual silver.

Hookworm. A minute roundworm (*nematode*) parasitic on man, causing the disease called also hookworm or ankylostomiasis. It passes through a larval stage in the soil and then penetrates into its human host through the skin, particularly the skin of the feet. It is then carried in the bloodstream to the lungs, whence it passes to the gut via the pharynx. A heavy infection results in acute anæmia and severe debility. The disease is widespread, but most prevalent near the Equator.

Hoopoe, a remarkably handsome bird with vivid black and white-barred wings and tail and black-tipped crest which opens like a fan. Ranges over Europe, Asia, and Africa. It has bred in England and Wales and occurs in the British Isles in small numbers at all seasons. Other species are confined to Africa, Madagascar, and India.

Hoplite, the name given to a heavily armed foot soldier in ancient Greece, carrying a shield and javelin, and wearing a helmet and armour.

Hops, the female "cones" of the hop plant used in brewing; their essential oils give beer an aromatic flavour, and their tannin and resin act as a preservative as well as accounting for the bitter taste desired. The hop is a perennial climber belonging to the mulberry family. The male and female organs are on separate plants; as only the female flower-heads are commercially useful, female plants predominate in a hop garden, only a very few male plants being grown so that the female flowers can be fertilised.

Horizon, the limit of vision, the apparent line where sea and sky, or land and sky meet. This is termed the *sensible* or visible horizon. An ordinary person at the height of 5 feet can see for 3 miles, at 20 feet 6 miles, at 50 feet 9¼ miles, and at 1,000 feet 42 miles. The figures are approximate.

Horn *or* **French Horn**, a brass instrument of the trumpet family (*i.e.*, played by three valves) whose tube is very thin and long (Horn in F = 12 ft.). In consequence the tube is curled in a complicated manner. Owing to the sweet tone it is capable of producing, the Horn sometimes plays as part of the wood-wind.

Hornbill, large bird found in Africa and oriental regions, remarkable for its having an immense horned upward-curved helmet, growing over its downward curved beak. It inhabits tropical regions, and feeds on fruits. When the female has laid her eggs in the hollow of a tree, the male bird stops up the entrance, and keeps her imprisoned until the hatching is completed and the young ones are able to fly. There are several species.

Hornblende, a hard common mineral, a silicate of calcium, magnesium, iron and aluminium, of a dark green colour. It is a constituent of numerous rocks, including diorite, syenite, and hornblende schist.

Horn Book, a children's alphabet and primer which has a cover of this horn. It was in use until about a hundred years ago.

Horned Viper, a curious African genus of *Viperidæ*, with a small pointed bone over each eyebrow; a venomous species, found in Egypt, is thought by some to be identical with the "adder" mentioned in Genesis xlix. 17.

Hornet, a general name for many of the bigger wasps. It usually nests in hollow trees, and despite its rather fiercesome appearance does not sting unless unduly provoked.

Hornpipe, an old English single-step dance, which used to be executed to the music of an ancient hornpipe, hence its name.

Hornywink, a popular name for the lapwing.

Horology, the science of time-measurement, including the construction and management of clocks, watches, etc. Instruments of this kind are not known to have existed before the 12th century, and until the introduction of the pendulum in the 17th century, clocks were ill-regulated and inaccurate. The time-recording mechanisms of the present day include (*a*) the *clock*, which shows the hours and minutes by hands, and strikes the hours, and sometimes quarters; (*b*) the *timepiece*, which is not generally a fixture and shows the time, but does not strike; (*c*) the *watch*, which is a pocket time-keeper; (*d*) the *chronometer*, which indicates the minutest portions of time; (*e*) electric timepieces, mains electric clocks; (*f*) the highly accurate quartz-crystal and atom clocks used for astronomical purposes. *See also* **Clocks.**

Horoscope, an astrological term, indicating the reading of the signs of the planetary bodies, according to the methods of the astrologers, at the date of a personal nativity, or other given date. In ancient times there were astrologers attached to the various courts, and their "castings" and predictions had many believers.

Horse Chestnut, one of the large forest trees, with ample branches, and full foliage, and much esteemed for parks and ornamental grounds. The bark and fruit seeds yield substances of commercial value, but the timber is not worth much. The tree came originally from Asia about the 16th century.

Horse Guards, the building in Whitehall which until 1872 was the headquarters of the Commander-in-Chief of the British Army. The archway is still sentinelled by mounted guards.

Horse Latitudes are the belts of calms between the regions of the trade winds and the westerlies of higher latitudes. At one time when ships transporting horses were becalmed in these belts the horses were thrown overboard.

Horse, Master of the, the Court official having charge of the royal stables, the provision of horses, carriages, and motor-cars for the royal family. The duties are actually carried out by the Crown Equerry.

Hospice, a place of refuge and rest for travellers and pilgrims. The most famous is that of the St. Bernard Pass, where dogs are kept for the succour and help of belated wayfarers.

Hospitallers, Knights, were of the order of St. John of Jerusalem, at first devoted to the aid of the sick, but afterwards military monks, who became prominent figures in the Crusades of the 12th century. They adopted the Benedictine black habit with the eight-pointed cross worn by the modern St. John's Ambulance Brigade. In 1309 they took Rhodes, but were expelled by the Ottomans in 1522. In 1530 the emperor Charles V gave them the island of Malta, which, as Knights of Malta, they held until 1798, when they were dislodged by Napoleon. The Knights still survive as a sovereign order, with headquarters in Rome. (*See* **Templars** and **Teutonic Order.**)

Hospitals. The earliest hospital is supposed to have been at Cæsarea in the 4th century. In the 7th century the Hôtel Dieu was founded in Paris; in the 9th century there were 24 hospitals in Rome. Some of the earliest hospitals of Great Britain are in London; St. Bartholomew's 1123, Bethlehem 1247, St. Thomas's 1213, Westminster 1720, Guy's 1724, London 1740. The British hospitals have in the past been largely dependent on voluntary contributions. There are excellent equipped medical schools attached to most general hospitals, and expert research workers are engaged on the investigation of diseases. (*See* **The National Health Service, P62.**)

Hôtel des Invalides, the famous military hospital and soldiers' home in Paris, founded in 1670, and one of the attractions of the city in later years, as it contains the tomb of Napoleon.

Hottentots, name given to certain African natives by Dutch settlers in the 17th century. They used to occupy the greater part of Cape Colony, and though driven out a number still survive in S.W. Africa. Appear to be related to the Bushmen, though their culture is more advanced. In addition to herding, they practise some farming and know how to smelt iron.

Hounds are dogs that were originally bred and trained for hunting, such as the greyhound, foxhound, bloodhound, wolfhound, deerhound, beagle, harrier, etc., but now often kept also as domestic dogs. The greyhound, deerhound, and wolfhound hunt by sight, the others, with the bloodhound first in order, track by scent.

Hour-glass, a glass instrument tapering to the middle to a narrow orifice, through which a

sufficient quantity of fine sand gravitates to mark an hour of time. When the sand has run through from one end, it can be reversed and made to count the hour in the opposite direction. The same kind of glass with smaller supplies of sand will indicate shorter periods, as an egg-glass, which runs its course in three minutes—time to boil an egg by.

Houris, according to the Koran, are beautiful nymphs of paradise set apart to attend upon the "faithful" Mohammedans as they enter the celestial abode.

House Flies abound in all countries and are exceedingly prolific. Their eggs are hatched within 24 hours of being deposited, and full maturity is attained in a month. They feed mainly on decayed animal and vegetable matter.

Hovas, the dominant tribe in Madagascar until the French took possession of the island in 1895.

Howdah, a railed, canopied seat fitted on to the back of an elephant for conveying people in. The name is also given to a somewhat similar contrivance for the backs of camels.

Howitzer, a cannon, short and light in proportion to its bore, used for throwing shells and case-shot and requiring a comparatively small charge.

Howler Monkey, a species of South American monkey noted for a laryngeal conformation which enables it to emit a loud reverberant noise something between a yell and a howl, as the name suggests. The peculiarity is developed most strongly in the males, which are the largest American species.

Hoy, a small sloop-rigged vessel usually engaged in light traffic, such as conveying passengers and goods from the shore to steamers, or *vice versa*.

Huanuco-bark, a medicinal bark, brought from the Peruvian town of that name, and derived from the *Cinchona micrantha* tree.

Huguenots, a name applied to the French Protestant communities of the 16th and 17th centuries. Henry of Navarre, by the Edict of Nantes in 1598, granted them religious freedom, but more than a quarter of a century before—Aug. 24, 1572—thousands had been put to death in the massacre of St. Bartholomew. The revocation of the Edict of Nantes by Louis XIV. in 1685 drove thousands into exile in England, Holland, Germany, and America.

Humanism, represents a system of education based not only on the Greek and Latin classics but also on the civilisation of the Renaissance.

Humble-bee or **Bumble-bee**, the common name of the insects of the genus *Bombus*, of the Hymenoptera order. They live in small communities comprising males, females, and neuters, their habitations being underground. They do not have one queen bee only like the hive bee, but several females occupy the same nest, and these alone live through the winter, breeding and forming new colonies in the spring. Although this large bee buzzes loudly, it does not sting.

Humidity, the state of the atmosphere with respect to the water-vapour it contains. "Absolute humidity" is defined as the density of the vapour present, while "relative humidity," more frequently employed, indicates the degree of saturation, *i.e.*, the ratio of the actual vapour pressure to the saturation vapour pressure at the particular temperature, expressed as a percentage.

Humming Birds are so called because of the humming noise made by the vibration of their wings in flying. They are of radiant plumage, and in size they are among the smallest birds. There are from four to five hundred species, and they are confined wholly to North and South America, being most numerous in the tropical latitudes. They have long, slender bills and tubular tongues which reach down into flowers to suck up the nectar on which they feed.

Hummum, the original name for what is now called the Turkish Bath in this country. One of the first of these baths to be established in London was the Hummums in Covent Garden.

Hundred, the ancient divisional name given to a portion of a county for administration or military purposes. It is supposed to imply the territory occupied by a hundred families; or the space of a hundred hides of land, or the capacity of providing 100 soldiers. Each hundred has its hundred court, with powers similar to those of a manor court, but this was abolished in 1867 by County Court Act.

Hundred Days, the interval of time between Napoleon Bonaparte's entry into Paris after his escape from Elba and his departure after his abdication, extending from March 20, 1815 to June 28. During this period occurred the battle of Waterloo, June 18.

Hundredweight in Great Britain is 112 lb. avoirdupois; in the United States it is an even 100 lb.

Hundred Years' War, a term applied to the almost incessant contest between England and France, lasting from 1338 to 1453, including such famous battles as Crécy, Poitiers, and Agincourt, and engaging successively Edward III., Henry V., and Henry VI., among English kings.

Huns, a fierce Asiatic race which swept over eastern Europe in the 4th century. Under Attila about the middle of the 5th century they obtained control of a large portion of central and eastern Europe, forcing even Rome to pay tribute. Their defeat at Châlons-sur-Marne in 451 and the death of Attila in 453 terminated their empire.

Hunterian Museum, a celebrated collection of anatomical specimens originated by John Hunter, the distinguished surgeon and physiologist, towards the end of the 18th century in London, and now in the possession of the Royal College of Surgeons. Dr. William Hunter, the brother, founded a Hunterian Museum at the University of Glasgow.

Hurdy-Gurdy, an Italian rustic so-called musical stringed instrument of the lute order, the sounds of which are produced by the action of a rosined wheel turned by the left hand, the notes being made by the fingering of the right hand.

Hurricane. (*See* **Cyclone** *and* **Wind.**)

Hussites, followers of John Huss, the Bohemian reformer and disciple of Wyclif, who was burned at the stake in 1415. After their leader's death, the Hussites became a formidable body, and took up arms on behalf of their faith, their religion being strongly imbued with political feeling. In spite of persecution they survived until the Reformation.

Hyæna, a carnivorous quadruped of which there are three species: striped, or laughing hyæna common to North Africa, India, Syria, and Persia, and noted for the peculiar cry from which its name is derived; the brown hyæna, with long shaggy hair, a native of Southern Africa; and the spotted hyæna, also confined to Africa. They have great jaw-power, and are of nocturnal habits.

Hydra, an aquatic animal of simple structure, whose body is in the form of a cylindrical tube, with a disc-shaped base by which it attaches itself to any shifting substance. Its mouth is surrounded by tentacles by which it catches its food. The Hydra has the power of reproducing lost parts. *See also* **F24** (1).

Hydrates are compounds containing water of crystallisation.

Hydraulic Press, perfected by Joseph Bramah, the inventor, in 1795, is a useful apparatus, the pressing power of which is obtained by the action of water. Two plates, the upper one movable and attached to a large piston, the lower one fixed, are contained within two uprights. The movable piston works in a cylinder of water in connection with a small force-pump, and the pressure is applied by moving a level which brings a well-known hydrostatic law into operation, and presses the material between the two plates to the required degree. The hydraulic press is largely used for compressing articles for packing, and for extracting purposes.

Hydraulic Ram, a form of automatic pump, used to raise water to a height by the action of its own falling velocity.

Hydraulics, the science of applied hydrodynamics, or water-machine engineering, ranging from pumps to marine engines.

Hydrocarbons are compounds of carbon and hydrogen. They include the *paraffins*, which are saturated compounds (*e.g.*, methane); the ethylene, acetylene and other series which are unsaturated; compounds with ring structures, *e.g.*, benzene, naphthalene, and anthracene. Petroleum is composed almost entirely of hydrocarbons.

Hydrochloric Acid, a colourless gas, consisting of hydrogen and chlorine, and resulting in con-

siderable quantities as a by-product of the soda-ash or salt-cake manufacture. Its solution forms the common hydrochloric or muriatic acid of commerce. It is present to the extent of nearly half a per cent. in the digestive juice secreted by the stomach.

Hydrocyanic Acid, cyanide of hydrogen or prussic acid; very poisonous, and of the odour of bitter almonds. Discovered by Scheele in 1782.

Hydrodynamics, the science of fluids in motion.

Hydrofluoric Acid is obtained by distillation of fluorspar with sulphuric acid, and is a compound of fluorine and hydrogen. Its action is highly corrosive, it is a valuable agent in etching on glass, and is a rapid decomposer of animal matter.

Hydrogen, a colourless gaseous element and the lightest of all substances. Cavendish in 1766 was the first to recognise that it was an element. It is 14·4 times as light as air, and is found in a free state in volcanic regions. It can be obtained by the action of metals on acids, and when burned in air combines with oxygen to form water. Commercially it is used to produce the very hot flame of the oxy-hydrogen blow-pipe for cutting metals; to fill balloons and airships; to harden certain oils and render them suitable for margarine- and soap-production. *See also* **Deuterium.**

Hydrography, the science of water measurement, as applied to seas, rivers, lakes, currents, rocks, reefs, etc., and embracing the whole art of navigation.

Hydrometer, an instrument for measuring the specific gravity of liquids, especially for ascertaining the strength of spiritous liquors and solutions. It is usually in the form of a glass bulb, to the lower end of which a smaller bulb, containing mercury, is attached, which forces the instrument to sink into the liquid which it is to test. The larger bulb has a scale fixed to it, and the indication on this scale of the sinking point shows the specific gravity. There are many varieties: Twaddell's—a pear-shaped bulb containing mercury: Beaumé's, of similar construction, but applicable to liquids both heavier and lighter than water: Sykes's, largely employed for determining the strength of alcohol: and Nicholson's, used for taking the specific gravities of solids.

Hydropathy, the method of treating disease with water, either by bathing or drinking. Natural springs of special chemical and therapeutic properties, such as sulphur springs, and other mineral sources, have been used since prehistoric times for this purpose. It is probably one of the most ancient methods of cure. Recently the beneficial effects of pure water treatment have been advocated. Hydropathic establishments have been set up in many health resorts.

Hydroponics, the culture of plants without soil. The plants are grown with their roots dipping into a solution of nutritive mineral salts; or they may be rooted in sand which is watered with such a solution.

Hydrostatics, the science of the pressure and equilibrium of liquids that are non-elastic.

Hydrozoa are, zoologically, a low order of water animals of the *Cœlenterata* sub-kingdom to which Hydra (*vide*) belongs. In one order of the Hydrozoa, free-swimming colonies showing marked division of labour between the individual units occur; this order includes the Portuguese man-of-war. *See* **F24** (**1**).

Hydrus, a constellation of the southern celestial hemisphere commonly called the Southern Snake.

Hygrometer, an instrument for measuring the amount of water vapour in the atmosphere. A simple form of hydrometer, known as the wet-and-dry bulb, consists of two vertical thermometers affixed to a frame. One bulb is exposed to the air, and the other is covered with muslin which dips into a water-bath to keep it moist. If the air is saturated, it takes up no moisture from the wet bulb and the two thermometers read the same. If the air is not saturated, evaporation takes place from the wet bulb, latent heat is absorbed from the air, and the temperature of the wet bulb is lower than that of the dry bulb. Relative humidity and dew-point of the air can then be derived from suitable tables. Hygrometers depending upon the expansion of human hair and gold-beater's skin and the deposition of dew on a polished surface, when cooled sufficiently, are also in general use. (*See* **Humidity.**)

Hymenoptera, the order of insects to which bees, wasps, hornets, ants and sawflies belong. They are notable for having four wings, the hind pair smaller than the front pair, to which they are attached by a row of hooks. They have mouths and tongues which enable them to bite, or to bite and suck, and the females possess an ovipositor used both for depositing eggs and stinging. There are about 70,000 species in this order.

Hypnosis. Hypnosis, also known as Mesmerism, is an increased degree of suggestibility which sometimes leads to superficially puzzling phenomena. It must have been known in the East for many centuries, but was rediscovered towards the end of the 18th century by the Viennese Anton Mesmer, after whom it was named Mesmerism. The discovery created a sensation all over Europe at the time; for Mesmer was, although brilliant, somewhat of a charlatan and made the most fantastic claims. In his salons in Paris he claimed to cure all sorts of diseases by the new method, and since many illnesses are, in fact, neurotic in origin, numerous patients were cured. Mesmer believed that his cures were due to what he called "animal magnetism"—a physical influence passing from the operator to the patient, but this is now a discredited belief. As the British physicians Elliotson and Braid and the Frenchmen Charcot and Bernheim showed, hypnosis is a purely psychological state of increased suggestibility due to the influence of the operator on the patient in the emotional sense. There is nothing mystical about it. Nevertheless, the states which can be produced by hypnosis are astonishing enough: the patient can be put to sleep or can be made unable to feel pain so that a limb can be removed while he is in this state; he can be paralysed so that he is unable to move, and even blisters can be produced on the skin by the suggestion that it is being burned with a hot piece of metal.

Hypocaust, an arched fire vault or chamber through which heat is distributed to rooms above. Used in the baths of ancient Rome.

Hypostyle, an architectural term, designating a colonnade or pillared hall, such as in the famous hall of Karnak. *See* **G16** (**1**).

Hypsometer, an instrument formerly used by mountaineers to find the height above sea-level by indirectly measuring the atmospheric pressure by determining the boiling point of water at the particular height. Based on the fact that as pressure decreases with height so the boiling point is lowered. Superseded by the aneroid barometer.

Hyrax, an animal of the order *Hyracoidea*, possessing a cleft upper lip like the hare, molar teeth shaped similar to those of the rhinoceros, and in other respects showing ordinary rodent characteristics. It has a brown fur, and is confined to Africa, Syria, and Arabia.

I

Ibex, wild goats of several species found in the mountain regions of Europe, Asia, and Africa. The male has exceedingly large curved ridged horns. The species that lives in the Alps is called the steinbock or bouquetin.

Ibis, belongs to a family of birds related to the stork. The sacred ibis of ancient Egypt is now extinct in Egypt but is found in the lakes and swamps of the Sudan near the Upper Nile. It has white and black plumage and a long curved beak. Other species are found elsewhere, the Glossy Ibis (black plumage glossed with purple and green) occasionally visiting England.

Ice is frozen water. It is a colourless, crystalline and brittle solid. Being only 92% as dense as water, it floats on the latter; the expansion which occurs as water changes into ice causes the fracture of water-pipes, though the fracture only becomes obvious when the ice melts and leaks out through the crack. The temperature at which ice forms is 0° C., 32° F. Ice can be melted by pressure, and the ease and smoothness

with which one is able to skate on ice depend on this phenomenon.

Ice Ages. It is known from the evidence of the rocks that there have been three major glacial periods in the geological history of the earth, separated by long periods of time: the earliest in pre-Cambrian times, 600–700 million years ago, the second in late Palæozoic times, 250 million years ago (in the southern hemisphere), and the third (The Great Ice Age) in the Pleistocene period, when an ice-sheet covered northern N. America and northern Europe. From the evidence of fossils world climates appear to have been temperate during the inter-glacial periods. *See* **F9** (1), **19** (2), **32** (2).

Ice Age, Great, began at the end of the Pliocene period more than half a million years ago when immense glaciers and ice sheets extended over large areas of the continents. There were four cold periods known as the First, Second, Third, and Fourth Ice Ages, separated by interglacial periods when the climate was warmer. During the Pleistocene Ice Age, as the Great Ice Age is sometimes called, the ice sheets in the British Isles reached as far south as the Thames valley.

Icebergs are detached masses of glacier which subside into the sea and float as wind or current may take them. About one ninth of an iceberg is above sea-level. The North Atlantic is the chief home of icebergs, which reach the ocean from the ice-clad plateaux of Greenland. Some of these floating masses of ice are of enormous proportions, and constitute in the spring and early summer seasons a great menace to the safety of ships, as was disastrously shown in the *Titanic* catastrophe of 1912. For some years past these menaces to N. Atlantic shipping have been kept under close observation by vessels specially detailed for this work.

Ice-breaker, a special heavy bow-plated ship for forcing a way through ice and used especially at ports of the Baltic Sea and the Great Lakes region of Canada which freeze during the winter months. The Soviet atomic ice-breaker *Lenin*, the first of its kind in the world, launched in Dec. 1957, is designed to cut a channel through ice of any thickness. Her icebreaking performance will allow the sea-route to the north of Siberia to be kept open throughout the year.

Icelandic Literature, the Old Norse, which includes numerous works of poetry, mythology, and history of interest and importance. (*See also* **Edda.**)

Iceland Moss, a kind of lichen (*Cetraria*) which grows in great quantities in the mountain regions of Iceland and other Northern countries. It posseses certain nutritive qualities and is of some value in medicine.

Iceland Spar, a colourless form of calcite (calcium carbonate), frequently found in association with metallic ores; it has the power to produce strong double refraction of light so that two images are seen of an object viewed through a piece of Iceland spar.

Iceni, an ancient British race who in early times lived in Norfolk and other parts of Eastern England. Their most famous ruler was Queen Boadicea, who led her people against the Romans in A.D. 61.

Ice Plant, also called "dew plant" and "diamond plant." A South African mesembryanthemum commonly grown in British gardens. Its name is derived from the fact that the leaves are covered with small glistening bladder-shaped hairs that look like ice crystals.

Ice Saints, St. Mamertus, St. Pancras and St. Servatius, so called because of the legendary cold on these Saints' Days, namely, May 11–13.

Ichneumon, the Egyptian mongoose, popularly known as "Pharaoh's Rat." It is of great use in checking the multiplication of reptiles. It is frequently domesticated.

Ichneumon Fly, a numerous group of hymenopterous insects abounding in many lands, and all having the peculiarity of depositing their eggs in the bodies of other insects. It destroys swarms of caterpillars, which become the unwilling hosts of its progeny.

Ichthyology, the department of zoological science which concerns itself with the structure and variation of fishes, their habits and distribution.

Ichthyornis, a fossil bird with teeth discovered in the cretaceous strata of Kansas. About 8 in. in height.

Ichthyosaurus was a gigantic marine reptile of the Mesozoic age. The fossils are mostly found in the lias formation. Some were not less than 30 ft. in length.

Iconoclasts were originally an Eastern sect of the 8th and 9th centuries, whose object was to prevent the worship of, and to destroy, images used in religious rites. Also any Protestant who took part in or supported the destruction of images in churches in the 16th and 17th centuries. The term has been applied in modern times to enemies of religious beliefs generally.

Idealism. Idealism is the belief that there is no matter in the universe, that all that exists is mind or spirit. Most philosophers have held that there were two principles, mind and matter; a few that the only reality was matter (*see* **Materialism**). Kant, Descartes, Locke, and even Plato believed in both spirit (mind) and matter; for, if Plato is often considered to be an idealist, he did believe that the universe contained physical objects, although spirit alone was the "real" world. Berkeley (1685–1753), a great British divine and philosopher, later Bishop of Cloyne in Ireland, was an idealist who believed that the universe was an idea in the mind of God, but the great period of pure idealism was 19th-century Germany. Fichte, Schelling, Hegel, Lotze, Schopenhauer, and Schleiermacher are its main philosophers. Fichte believed that the whole universe was God (that is to say, he was a Pantheist—one who believes that God is everything). Schelling thought that the universe was a world-spirit, which, however, only became self-conscious in man. Lotze believed that the universe was alive and was mind; Schleiermacher that God was the source of all life, but was more than the universe. Hegel, the greatest of the idealists, believed that the universe was a process of thought in continual evolution; in nature the process is unconscious, but in man the process becomes fully self-aware.

Ides, in the ancient Roman Calendar, the 15th of March, May, July, October, and the 13th of all other months; always the eighth day after the Nones.

Idiograph, a mark, signature, or flourish peculiar to any individual; a trade mark is an idiograph.

Idiom, an expression characteristic of a country, district, dialect or language, which usually gives strength and force to a phrase or sentence. The idioms of a language are its distinctive marks, and the best writers are the most idiomatic.

Idolatry, the worship of idols, images, inanimate objects, animals or symbols. A kind of idolatry existed in all primitive modes of existence, and instances are numerous in the earliest records. In their most symbolised form images have a considerable part in the rites of the Roman Catholic Church.

Idols are images or effigies which are made objects of worship and are usually of wood or stone, but sometimes of ivory or more precious materials, and attain their symbolic significance after being put in the places destined to receive them, when they are made objects of veneration by some religious dedication.

Idris, a famous giant belonging to the myths of Wales, commemorated by a chair of rock on the top of the Cader Idris mountain in Merionethshire.

Idyll, a poem or story of a simple or pastoral kind dealing with rural characters and events for the most part, but sometimes used in a broader sense, notably in Tennyson's "Idylls of the King," which are of a distinctly imaginative form.

Ignatian Epistles, letters bearing the name of St. Ignatius, the authenticity of which is now generally accepted, and in their several forms exercised great influence in mediæval times. Fierce controversy raged around them in the 17th century, because of their strong support of episcopacy, and a good deal of doubt was thrown upon their genuineness.

Igneous Rocks are such as have been molten under conditions of great heat at some stage in their history: *e.g.*, granite, basalt. *See* **F8** (2).

Ignis Fatuus *or* "**Will-o'-the-wisp,**" a phosphorescent light which may often be seen on summer and autumn evenings hovering over marshy

ground or graveyards. Its nature is hardly understood, though it is generally believed to be the result of the spontaneous combustion of the gases from decaying organic matter. In olden times when marshy grounds were more common than now, this "dancing light" was very frequently visible and was regarded with superstition.

Ignorantines, a Roman Catholic Order founded in 1679 at Rheims, reorganised by Jean Baptiste de la Salle and intended for special ministration among the children of the poor. The name "Ignorantine" was given to them because the admission to the order of priests with a theological training was forbidden.

Iguana, large South American lizards, with a long tail, a scaly back and head, a thick fleshy tongue and a prominent dew-lap in the throat. Specimens of the different species average 4–5 ft. in length, and they live mostly in trees, though they are equally at home on land or in the water. The flesh of some species is good eating, as are also the eggs.

Iguanodon, a genus of extinct dinosaurs, whose fossils are found in the jurassic and cretaceous rocks. Iguanodons were 15–25 ft. long, and walked on their hind legs, the front legs being small and adapted for grasping the branches of trees on the leaves of which they fed.

Ilex, mentioned by classical authors, is the holm- or holly-oak, which flourishes round the Mediterranean. To botanists Ilex is the genus to which the holly and maté plant belong.

Iliad, the great epic poem of ancient Greece attributed to Homer (*c.* 700 B.C.). It consists of ancient folk tale and saga, welded into an artistic unity, having as plot the carrying off of Helen by Paris to Troy and the subsequent siege of Troy. *See* **G20 (1)**.

Illuminated MSS. of great value and beauty of decoration exist in most public museums and in many private collections, some of them being of great antiquity, especially those of ancient Egypt executed on papyri. Greek and Latin specimens are also numerous, and the British Museum contains fine examples of all these kinds and also an extensive collection of mediæval English MSS.

Illuminati, the name by which certain religionists of the 16th, 17th, and 18th centuries were known. They claimed the possession of superlative knowledge in everything pertaining to religious doctrines, rites and ceremonies, but were not at any time a very numerous body. An Order of the Illuminati was formed at Ingolstadt which was a secret society, and professed to free religion and politics from superstition and despotism. It has some similarity to freemasonry.

Ilmenite, a mineral widespread in igneous rocks: chemically it is an oxide of iron and titanium. Rich deposits have recently been found in the Allard Lake area of Quebec; the Travancore sands are also a source of ilmenite.

Imagination is the creative power and faculty enabling the mind to picture to itself scenes, events, and persons of which a person may hear or read, and in its more intense form constitutes the genius by which the poet, the novelist, the historian, the painter, and the musician attain their idealisations.

Imam, a Mohammedan religious title borne only by princes or leaders of the faith.

Imbrex, an architectural term given to the covering tile of the ancient roof.

Immaculate Conception, the dogma that the Virgin Mary was absolutely pure and sinless from the womb, after being a fierce subject of controversy for many centuries, was on Dec. 8, 1854, expressly proclaimed by Pope Pius IX. to be an established doctrine of the Roman Catholic Church. Dec. 8 is the festival day of the Immaculate Conception in the Roman Church, and Dec. 9 in the Greek Church.

Immortelles are wreaths, crosses, or other designs made from what are called everlasting flowers, which are obtained from certain plants of the Composite order, and retain their colours and compactness for a long time. Immortelles are largely used as mementoes for decorating graves, especially in France.

Impeachment, a special arraignment, usually before Parliament or other high tribunal, of a person charged with some offence against the State. The custom in England was for the impeachment to be made in the House of Commons, and the trial to be before the House of Lords. The first instance occurred in 1376 when Lord Latimer was impeached. With present parliamentary procedure, impeachment is no longer necessary, since the Cabinet is responsible for the individual actions of its ministers, who, acting as a team, must carry the Commons with them, or resign, when it falls to the Leader of the Opposition to form a new Cabinet. Other famous impeachments were those of the Lord High Chancellor Francis Bacon (1621), Earl of Strafford and Archbishop Laud (1640), Warren Hastings (1788), the last being that of Lord Melville (1805). Under the constitution of the United States public officials may be impeached by the House of Representatives and tried by the Senate. The most famous case was that of President Andrew Johnson.

Impluvium, a basin or tank in the hall or atrium of an ancient Roman house, serving the purpose of receiving the rain that dropped through the open space in the roof.

Impressment, the forced seizure of persons for service on board British war-ships, sanctioned by laws still unrepealed, but not resorted to in this country since the Napoleonic wars.

Imprimatur, originally an official licence to print, and an important formula in the early days of printing. The term is now used in the wider significance of authority, stamp, or endorsement.

Impromptu, a piece of music for orchestra or solo instrument of informal construction and composed without preparation.

Inbreeding, mating of closely related animals and plants. Close inbreeding has long been held to be harmful, but this is not necessarily so, for if practised with selection, stock can be purged of the undesirable qualities and the race improved.

Incas, an Indian people who inhabited ancient Peru, founded a great empire, and reached a high level of civilisation; overthrown by the Spaniards in 1533. *See* **G10**.

Incense, an aromatic resinous substance which, under combustion, exhales a pungent odour, and is used, mixed with certain fragrant perfumes, in the celebration of Mass in Roman Catholic churches. Olibanum or frankincense is ordinarily the leading ingredient. It is not used in the orthodox service of the English Church except by the more pronounced Ritualists.

Incisors, the sharp-edged cutting teeth at the front of mammalian jaws.

Income Tax, a tax of so much in the pound sterling of income from whatever source, all persons resident in Great Britain and Northern Ireland, and all persons not resident in, but deriving income from property, trade, or employment in Great Britain and Northern Ireland being liable to assessment. Income is classed under five schedules: (*a*) from the ownership of land, buildings, etc.; (*b*) from the occupation or use of land; (*c*) from Government or public stocks; (*d*) from trade, profession, or vocation, remittances from abroad, bank interest, etc.; (*e*) from salaries, wages, pensions, emoluments, directors' fees, etc.

The income-tax year is from April 6 to the following April 5. Rates of tax on taxable income for the year 1960–61 are as follows:—on the first £60, 1*s.* 9*d.* in the £; on the next £150, 4*s.* 3*d.*; on the next £150, 6*s.* 3*d.*; and on the balance 7*s.* 9*d.* in the £. *Taxable* income is found by deducting from *Total* income certain allowances.

(1) *Earned Income* allowance of two-ninths to £4,005 and one-ninth to £9,945, up to a max. of £1,550.

(2) *Personal* allowance of £140 to single persons and married women in employment; to married man living with his wife, or if wife though not living with, is wholly maintained by means of a voluntary allowance, £240. If the wife is maintained under a Court Order or under a binding legal agreement the allowance is reduced to £140.

(3) *Child* allowance of £100 for each child under

11; £125 over 11; and £150 over 16 if still being educated; provided child does not earn more than £85 a year.
(4) *Dependent Relative* allowance of £75 for each relative or wife's relative maintained whose own income does not exceed £135. Relief reduced by £1 for every £1 by which relative's own income exceeds £135.
(5) *Widow and Widower* allowance of £40 (certain restrictions).
(6) *Daughter's Services*, necessary owing to old age or infirmity, allowance of £40.
(7) *Housekeeper* allowance of £75 (certain restrictions).
(8) *Age* allowance of two-ninths of unearned income where taxpayer (or his wife) is over 65 and total income does not exceed £800.
(9) *Life Insurance*. Subject to certain restrictions, an allowance for the premiums paid for life-insurance of tax-payer and his wife, but not on life of his child or any other person, to a maximum of two-fifths on premiums over £25.
(10) *National Insurance* flat rate of £15 for adult employees.

Age Exemption: no tax payable by single persons aged 65 or over if income does not exceed £275; £440 for married couples where either is 65 or over. Appropriate marginal allowances.

Pensions qualify for the earned income relief of two-ninths.

Surtax is paid on all incomes exceeding £2,000 (after deduction of certain allowances) on a sliding scale, increasing from 2*s*. in the £ with the size of the income.

Independence Day, commemorates the adoption of the Declaration of Independence on July 4, 1776. July 4 is celebrated as a holiday in the United States.

Independent Television Authority was set up in August 1954 under the Television Act, 1954, to provide television services additional to those of the B.B.C. Its statute runs for 10 years. The Authority consists of a Chairman (Sir Ivone Kirkpatrick, G.C.B., G.C.M.G.), a Deputy Chairman and eight members. At the head of the Authority's permanent staff is the Director-General, Sir Robert Fraser. Privately financed companies provide the programmes, advertisers pay the programme companies for their advertisements, and the Authority itself acts as controlling body.

Index Expurgatorius is an index, prepared under the authority of the Roman Catholic Church, of such books as may not be read by the faithful at all, and such as can only be read in part: that is, with what are considered objectionable passages expunged. The first Expurgatorial List was issued by Pope Paul IV. in 1559 and all later lists have been under direct papal authority.

India Office Library (since 1947 called the **Library of the Commonwealth Relations Office (Division B)**). This is an orientalist library, which specialises in Indian studies. It was founded in 1801 by the East India Company, and contains 20,000 manuscripts in European languages and in Sanskrit, Persian, modern Indian, and other oriental languages, and a quarter-of-a-million printed books, of which three-quarters are in oriental languages. There are also collections of drawings, photographs, and other objects of oriental interest. It is accessible to *bona fide* students.

Indian Ink, a pigment made from lampblack and gum or glue, originally prepared in China and Japan. It is dried and marketed in small sticks and used mainly by artists for shading and lettering.

Indian Mutiny. This turning-point in the history of modern India occurred in 1857–58. The ostensible cause was the serving out to the native troops of cartridges greased with animal fat, for contact with this was forbidden both by the Hindu and Mohammedan faiths. A rebellious feeling, however, had long been developing, and when the Sepoys at Meerut in May 1857 refused to obey the English officers, overpowered and put them to death, the mutiny spread like wildfire. The rebels took Delhi and Lucknow, and for many months terrible massacres and atrocities were committed; men, women and children were slain in thousands. Order was re-established in the autumn of 1858 when the governing power was transferred from the East India Company to the Crown.

Indian Summer is applied to a warm spell of weather occurring in the late autumn.

Indicators, substances which by a marked change in colour are used to indicate the course of a chemical reaction. Litmus paper, for instance, is red with acids and blue with alkalis. In biological work some radioactive substances are used as tracer elements.

Indictment, a formal document of accusation setting forth the criminal charge or charges upon which a person has to be tried before a proper tribunal. It represents the "finding" of the grand jury, and is framed on the "true bill" returned by that body.

Indigo, the substance obtained from the plant *Indigofera tinctoria*, a native of S. Asia, India being the chief producing country. The colouring matter is the result of the decomposition and fermentation of a glucoside contained in the plant. This is afterwards dried and becomes the caked indigo of commerce. Natural indigo has been eclipsed by artificial indigo, a coal-tar dye which came into commercial production at the end of the last century, which is cheaper and more uniform in quality.

Indium, a scarce lead-coloured metal found in zinc blende in Saxony and certain other ores. This element was discovered in 1863 by Reich and Richter. *See also* **F66**.

Individualism, a theory of government which favours freedom of action on the part of the individual without the interference of the state; opposed to state-planned economy and collectivisation. The extreme form of individualism is anarchism.

Indo-European, a term used to designate the great Aryan family of languages, which embraces Indo-Iranian, Celtic, Greek, Italic, Slavonic, and Germanic. Basque, Magyar, Turkish, and Finnish do not belong to this family.

Indra, an ancient Hindu god, personifying the sky; the supreme object of worship in Vedic times.

Indulgence. In the Roman Catholic Church the remission granted by ecclesiastical authority to a repentant sinner of the temporal punishment still due after the guilt of sin has been forgiven by God. The indiscriminate sale of Indulgences by Tetzel and other Papal agents in the 16th century was one of the grievances which led to the Reformation.

Indulgence, Declaration of, was the proclamation by which James II. suspended the penal laws against Roman Catholics and Dissenters. It was issued in 1688, but the clergy as a body refused to obey, and the trial of the Seven Bishops and their acquittal by a jury followed. An invitation was thereupon sent to William of Orange to become King.

Industrial Psychology. Industrial psychology is the application of the principles of psychology to industry with a view to increased production on the one hand and increased well-being of the worker on the other. Although such an attitude must have existed in a general way for many centuries, the first important experiments in this field were carried out by an American, Frederick Winslow Taylor (known by his associates as "Speedy" Taylor). Born in Philadelphia of Quaker stock at the end of last century, Taylor became chief engineer at the Midvale Iron Works, where he soon became convinced that the traditional ways of doing things were often inefficient. His working principles were: (1) To employ only the best workers. (2) To discover by experiment the simplest motions for carrying out a given job. (3) To stimulate incentive by giving a higher wage for higher production. In this way he was able to raise the amount of iron handled by a worker from 12½ tons a day to 47½ tons. Since then, most industrial psychologists have concerned themselves: (1) with the study of individual differences—finding the worker most suited to the job, and (2) studies of fatigue and the effect of improved lighting, heating, etc., on the worker—*i.e.*, the betterment of working conditions. Prof. Mayo, however, showed at Chicago in 1938 that *what* was done to help the worker was often less important than *how* it

was done, that a happy and satisfied working group did better work than one based on purely technical conditions of efficiency. Today people often blame mass-production methods in industry for making work dull, frustrating, and uninteresting; but this is not the reason for industrial frustration at all. It is rather that workers have not been treated as intelligent beings who need to know *what* they are doing, *why* they are doing it, and to *what* end. Work is frustrating, not in terms of what it actually is, but in terms of what it means, or does not mean, and what is frustrating about the industrial situation is not that it implies dull work or hard work or work under bad conditions, but that it often seems to imply meaningless work. One of the greatest discoveries of 20th century medicine has been the rediscovery of the patient. This is of importance because its significance extends far beyond the bounds of medicine into psychology, sociology, and all the social sciences. *See also* **P5 6**.

Inertia, a term used in mechanics for the property of matter by which it offers resistance to a change in its state of rest or in its state or direction of motion.

Inertial Navigation, an automatic method of dead-reckoning which at present finds its chief application in guided missiles, submarines, and aircraft. Navigation by this means is carried out with reference to inertial space (*i.e.*, space which is stationary with respect to the fixed stars) and not to the surface of the earth as in normal navigation (latitude and longitude). This is done by means of high-accuracy gyroscopes combined with highly sensitive accelerators in an apparatus known as the Ship's Inertial Navigation System. The American nuclear-powered submarine *Nautilus* pioneered the new north-west passage under the polar ice pack by this method of dead-reckoning in Aug. 1958.

Inescutcheon, a small scutcheon borne heraldically within the shield of ordinary dimensions.

Infallibility, the Roman Catholic doctrine that accords the Pope divine immunity from error, in the execution of all that pertains to his pontifical functions. It was first proclaimed as dogma of the Church by the Vatican Council in 1870.

Infante was the title of any son but the eldest of the king or queen of Spain or Portugal. *Infanta* was similarly the title of any daughter except one that might be heiress to the throne.

Infantry, the portion of an army which consists of foot soldiers equipped with "small arms."

Inflorescence, a cluster of flowers upon a shoot. Many arrangements of the flowers are possible and there are many kinds of inflorescence; *e.g.*, the spike, catkin, umbel, capitulum (in composites).

Infra-Red Rays *or* **Radiation**. This is the range of rays which come between the visible red rays and the ultra-short Hertzian radiation. The wave-lengths involved range from about 0·00076 millimetre (7,600 Angstrom units) to 0·4 millimetre. Infra-red rays penetrate haze; hence landscapes obscured by haze or cloud can be photographed using plates sensitive to infra-red. Many substances strongly absorb these rays and thereby become hot; this happens in toasting bread. Many industries use infra-red lamps for drying paints and lacquers.

Infula, a sacred fillet, of woollen material, worn on the head by priests anciently, and by magistrates and rulers on solemn occasions, also by persons fleeing for protection to sanctuary. The infula later became a pendant to the mitre of bishops.

Ingoldsby Legends, a series of whimsical metrical tales full of droll humour written by the Rev. R. H. Barham, and first published in *Bentley's Miscellany* in 1837.

Ink, a liquid pigment ordinarily made from an infusion of nut-galls, copperas, and gum arabic. Shumac is substituted for nut-galls for inferior inks. An acid is sometimes added to prevent oxidation, and for the blue-black inks a small quantity of solution of indigo serves for colouring. Copying ink contains glycerine or sugar, which keeps the ink moist. Lampblack used to be the leading ingredient in printer's ink but now new methods of manufacturing have been developed. Marking ink is composed of a solution of nitrate of silver, gum, ammonia, and carbonate of soda. For red, blue, and other coloured inks, colouring solutions are used. The earliest examples of ink writing (on wooden tablets) ever found in Britain were recovered from the well of a Roman villa (3rd century A.D.) during excavations in 1954 at Chew Stoke, Somerset.

Ink Sac, a glandular organ found in squids and other cephalopods which contains an inky solution. When roused the animal discharges the contents of the ink sac into the water, to make a cloud through which its enemies cannot see. The pigment, sepia, comes from the ink sac of the cuttlefish.

Inlaying is the introduction of one class of substance into another in some artistic or other design, such as silver let into zinc, copper, or lead, and called *bidri*; the insertion of gold and silver into iron or steel, which is *damascening*; the mingling of brass with tortoiseshell, *buhl work*; the inlaying of woods, *marquetry*; of stone, *pietra dura*; and of the arrangement of small pieces of stone, for floors, walls, etc., *mosaic*.

Innocents' Day, a festival day in Roman, Greek, and Anglican Churches in commemoration of the killing of the children of Bethlehem by Herod, Dec. 28.

Inns of Court, the four bodies in London which enjoy the privilege of calling candidates to the bar after they have studied for a certain number of terms and passed certain examinations. The Inns are: the Inner Temple, the Middle Temple, Lincoln's Inn, and Gray's Inn.

Inquisition, a Roman Catholic ecclesiastical court which became a formidable weapon of the Church in the 13th century under Pope Innocent III. in dealing with charges of heresy. It was effectively set up in the various Catholic countries of the Continent, obtaining its fullest and most sweeping organisation in Spain in the days of Ferdinand and Isabella, when Torquemada was made Grand Inquisitor, and used its powers with terrible severity. (*See* **Auto-da-fé**.) In the 18th century its influence began to wane, and although the Congregation of the Holy Office still exists at Rome, its jurisdiction is limited to the suppression of heretical literature.

Insectivora are mammals which live almost exclusively on insects and worms. This mammalian order comprises hedgehogs, moles, shrews, etc.

Insectivorous Plants, a group of flowering plants found in all parts of the world which by means of special mechanisms entrap insects; enzymes in the plant enable the insects to be digested. The most common British species are the Sundew and the Bladderwort.

Insects. This huge class of invertebrate animals includes about 700,000 species. Insects are ubiquitous except in the sea, only a very few species being adapted to marine existence. Characteristic features are: the body is divided into three parts, head, thorax, and abdomen; the head carries a pair of antennæ, the thorax three pairs of legs, and usually two pairs of wings. The most primitive insects constituting the sub-class *Apterygota* are wingless. The other sub-class, *Pterygota*, is divided into the *Exopterygota* (*Hemimetabola*), which have a simple metamorphosis; and the *Endopterygota* (*Holometabola*), with a complex metamorphosis. The fifteen orders of the *Exopterygota* are: *Orthoptera, Isoptera, Plecoptera, Embioptera, Dermaptera, Ephemoptera, Odonata, Psocoptera, Anoplura, Thysanoptera, Hemiptera*. The *Endopterygota* comprises nine orders: *Neuroptera, Mecoptera, Trichoptera, Lepidoptera, Coleoptera, Strepsiptera, Hymenoptera, Diptera, Aphaniptera*.

Insignia, marks or badges of office or honour, such as stars, ribbons, crosses, medallions or other designating objects, worn by members of special Orders or holders of prominent offices.

Institut de France was formed in 1795, and after various modifications was in 1832 organised on its present basis. Its five academies are—the Académie Française, Académie des Inscriptions et Belles-Lettres, Académie des Sciences, Académie des Beaux-Arts, Académie des Sciences Morales et Politiques. It is restricted to 40 members.

Instruments, Musical. Musical instruments may be classified in a number of ways, but in general they fall into one of the three main classes, String, Wind, and Percussion, according to how the sound is produced. **Stringed Instruments** are those which produce the sound by the vibration of a string: (*a*) by plucking, as in Harp, Lyre, Psaltery, Zither, Lute, Guitar, Balalaika, Ukelele, Harpsichord; (*b*) by friction (bowed), as in Crwth, Rebec, Viol, Violin, Marine Trumpet, Hurdy-Gurdy; (*c*) by striking (hammered), as in Dulcimer, Pianoforte, Clavichord; (*d*) by wind (blown), as in the Aeolian Harp. **Wind Instruments** are those in which the air in the instruments is set in vibration: (*a*) by blowing into a tube (flue-voiced), as in Recorder, Pandean Pipe, Flute, Organ; (*b*) by means of reeds (reed-voiced), as in Oboe, Clarinet, Saxophone, Bagpipe, Cor Anglais, Bassoon, Organ reed-stops; (*c*) those in which the sound is produced by the vibration of the player's lips against the mouthpiece (lip-voiced), as in Bugle, Horn, Trumpet, Tuba, Trombone, Saxhorn, Flügelhorn, Cornet. In a modern orchestra these are known as the *Brass*: instruments of the flute, oboe, and clarinet families as the *Woodwinds*. Then there are the **Percussion Instruments**, which include the Drums, Cymbals, Tambourines, Castenets.

Insulation, the condition in which an electrified body is prevented from communicating electricity to contiguous bodies by the interposition of a non-conducting material. Glass, shellac, ebonite, and gutta-percha are all non-conductors, and wires obtain insulation by wrappings of cotton or silk.

Insulin, the hormone secreted by the islet tissue of the pancreas, from which it was isolated in 1922 by Banting and Best. Dr. F. Sanger of Cambridge University was awarded the 1958 Nobel Prize for his work in determining the chemical structure of insulin. *See* **P39** (1), **50** (1).

Intaglio, engraving or carving on a sunken ground, a method frequently adopted in the ornamentation of stones and rings.

Intelligence. Intelligence has been variously defined as "the ability to see the relationships between things" and "the ability to profit from experience." The idea of intelligence testing was first devised by the French psychologist Binet at the beginning of this century. He was asked by the French government to invent a test which would weed out backward children in state schools, and thus save public money and avoid holding back the work of the class by teaching children who were incapable of learning at a given standard. Binet solved the problem by giving a large series of practical questions and finding how many could be solved by the majority of children in a particular age-group. The questions were arranged so that in one group the majority of problems could be solved by most children of ten, in another by most children of twelve, and so on. If a child of thirteen could solve correctly only those problems devised for a child of ten, his Mental Age was said to be ten, and his Intelligence Quotient was 10/13 multiplied by 100, of roughly 77%. His intelligence, in other words, was only 77% of the normal. More modern intelligence tests have been devised which to some extent discount the influence of learning, since "intelligence" refers to innate ability—the capacity to learn rather than learning itself. The following facts have been discovered about intelligence: (1) Men and women do not differ in average intelligence. (2) Different races do not vary in average intelligence. (3) Delinquents are more often of lower intelligence than others. (4) Intelligence is inborn, and does not increase after age 14. *See also* **F43**.

Interdict, a Roman Catholic ecclesiastical prohibition, directed either against a country, community, or Church, or against persons. It is a weapon that is now rarely used, but in former times was often exercised with great power and severity.

Interlude, any short stage piece, or brief musical composition, for performances between more important pieces. In the strict musical sense an interlude is an *instrumental* composition played between the acts.

International Date Line, a line along the 180° meridian, marking the difference in time between E. and W. For the westward-bound traveller crossing the line the date would be put forward one day, for the eastward-bound, back one day. To avoid difference of date in adjacent land areas, the line deviates from the 180° meridian where this crosses land.

Interval, in music indicates the differences in pitch between two notes. This is often expressed numerically. Thus the interval between C and the E above it is a major third, that between C and E flat is a minor third, that between C and G is a fifth, that between C and A is a sixth, and so on.

Introit, the psalm or hymn in common use in the Anglican Church, which is sung as the clergy enter the church to commence the divine service of Holy Eucharist.

Invention of the Cross, a Roman Catholic festival, held on May 3 to celebrate the finding of the alleged True Cross at Calvary by the Empress St. Helena in 326. Also included in the Church of England calendar. (*See* **Holy Rood.**)

Invertebrata, the primary division of the animal kingdom used to be into vertebrates—animals with backbones—and the invertebrates. This classification is now obsolete (*see* **Animal Kingdom**), and the Invertebrata is now defined as the portion of the animal kingdom containing all but the phylum Chordata. *See* **F23**.

Investiture, the ceremony of conferring honour, office, or possession—the investment of the recipient with badge, token, or public recognition.

Invultuation, a form of magic or witchcraft that prevailed in olden times, consisting of pricking a wax or clay image of a person whose death was desired, invoking simultaneously the aid of evil spirits, the belief being that the spell would have a fatal effect.

Iodine, a substance formerly exclusively obtained from the ribbon-wrack seaweeds. These were burnt and the ashes (kelp) extracted with water. After concentrating the iodides, these were distilled with manganese dioxide and sulphuric acid to yield iodine vapour which was condensed in stoneware bottles. Nearly all iodine now in use is derived from the iodine salt present in Chili saltpetre (sodium nitrate). Iodine is used in photography, as an antiseptic solution in alcohol or potassium iodide (tincture of iodine), and in medicine. Courtois discovered iodine in 1812.

Ions, atoms which are no longer electrically neutral but either positive or negative according to whether they have lost or gained electrons (**F11** (2)). Thus, the hydrogen atom without its electron is a hydrogen ion or *proton* and the helium atom without its two electrons is a helium ion or *alpha-particle*. When an electric force is applied to certain solutions, the ions into which molecules of the dissolved substance are broken up are attracted to the oppositely charged electrodes, their movements constituting an electric current through the solution. In the same way gases, including air, conduct electricity by virtue of free ions (*see* **F46** (1). Combustion, radioactivity, and ultra-violet and cosmic radiations produce ionisation.

Ionic Order of architecture is one of the five classic orders, its leading characteristics being the volute of its capital, which has on each side distinctive curved or scrolled ends.

Ionosphere, the atmospheric region which lies between about 60 m. and about 300 m. above the surface of the Earth. The air in this region is a partial conductor of electricity, a property imparted to it by the action of the sun. The ionosphere is divisible into several layers, each with distinctive properties. The Heaviside layer, named after Oliver Heaviside who postulated its existence on theoretical grounds in 1892, reflects long radio waves. The higher Appleton layer, known after its discoverer, Sir Edward Appleton, reflects short radio waves. *See* **X3**, **F46** (1), **48** (2).

Ipecacuanha, a flowering plant of the madder family, a native of the Brazilian forests.

Iridium, a white and very hard metal discovered by Tennant in 1804. It occurs naturally as an alloy with platinum or osmium; tips for fountain-pen nibs have been made from the former native alloy. The standard metre is

composed of platinum-iridium alloy, as are parts of scientific apparatus and surgical tools that must be non-corrodible.

Iris, the typical genus of the botanical order *Iridaceæ*, with tuberous rhizomes and sword-shaped leaves, many of the family having beautiful flowers. About 100 species of Iris are recorded from the northern temperate zone, but only two species occur wild in Britain—the yellow flag and the gladdon. Orris root, used in perfumery, comes from another iris species.

Irish Moss, a kind of seaweed (*Chondrus*) found on certain parts of the Irish coast, and collected, dried, and bleached for use as cattle food or for making a nutritious jelly.

Iron is extracted by smelting from different ores, hæmatite, magnetic iron, and spathic iron, coal or coke being now universally used for smelting purposes. The kinds of iron produced are cast iron and wrought iron. Alloys of iron are called steels.

Iron Age, the period when primitive man made and used weapons and implements made from iron. It came after the Stone and the Bronze Ages.

Ironclads, ships of war cased in iron or steel plates of sufficient thickness to resist projectiles. They were first introduced (1858) in the French Navy, and in 1860 the first British ironclad, the *Warrior*, was launched.

Iron Cross, a Prussian order instituted in 1813 for distinguished services in war.

Iron Crown, the crown of the ancient kings of Lombardy and emperors of Germany, and noted for its iron band, said to have been forged from one of the nails of Christ's cross. Napoleon I. insisted on being crowned with it, and in 1866 it was presented to Victor Emmanuel at Turin.

Iron Curtain. In a speech at Fulton, U.S.A., on March 5, 1946, Sir Winston Churchill used this phrase to describe the dividing line behind which, he said, lie all the capitals of the ancient States of Central and Eastern Europe—Warsaw, Berlin, Prague, Vienna, Budapest, Belgrade, Bucarest, and Sofia. These famous cities and the populations around them, said Sir Winston, lie in the Soviet sphere and are subject "to a very high and increasing measure of control from Moscow."

Ironsides were Cromwell's special troopers, so called because of their solidity and firmness in battle.

Irredentists, a political party organised in Italy about 1878 with the object of incorporating with Italy neighbouring regions. Also a person, group, or party advocating policies for the restoration to their country of territory formerly belonging to it but later lost.

Irrigation, an artificial method of providing water for the growth of plants on lands where the natural supply of water is deficient. The science has made immense progress during the last fifty years, and has been the means of bringing into profitable cultivation vast tracts of territory in India and Western America which had previously been arid wastes. The systems are various and are utilised according to the special conditions of the land to be irrigated, but the success which has attended these experiments has been very gratifying. In fact, irrigated lands are often more productive than lands which receive a fair amount of moisture from the elements; the irrigation supply can be distributed and regulated exactly according to requirements. Irrigation also serves the purpose of supplying *warmth* in winter; *e.g.*, in the English water-meadows, and in the more highly developed Italian *marcite* and winter-meadows, where the water is mostly applied in winter when there is plenty of rain. There are several other functions of irrigation; *e.g.*, washing out of excess salts.

Isinglass, a gelatinous substance manufactured from the swim bladders of certain fish, the best kinds coming from Russia and Brazil. Coarser varieties are made from hides.

Islam, the religion of which Mohammed was the prophet, the word signifying submission to the will of God. An adherent of Islam is called a Moslem or Muslim. It is one of the most widespread of religions; its sacred book is the Koran.

Isobars are the lines drawn on charts linking together points of equal barometric pressure.

Isolationists, the body of opinion in the United States advocating non-interference in European affairs. Its strength has much declined in the light of contemporary events.

Isopoda, the crustacean order to which the wood-lice belong.

Isotherms are lines drawn on charts through points of equal temperature.

Isotopes. When one talks of an element, say, uranium or lead, the name of the element is a generic name for a collection of uranium species and lead species. The different species are called isotopes. For any particular element, the number and arrangement of electrons around the nucleus are the same in all the isotopes, so all the isotopes have the same chemical properties. Soddy has described isotopes as "elements, the atoms of which have similar outsides but different insides." For example, in the nucleus of the uranium isotopes, U 235, U 238, and U 239, there are respectively 143, 146, and 147 neutrons. The isotopes have different atomic weights, in this instance respectively 235, 238, and 239. Britain is the largest exporter in the world of radioactive isotopes. *See* **F10** (**2**), **60** (1).

Isthmian Games were held in alternate years by the ancient Greeks on the Isthmus of Corinth, in honour of Neptune, and were of the same class as the Olympian Games. Wreaths were the only prizes.

Itch-mite, a minute mite which burrows beneath the skin and produces scabies.

Ivory, the dentine substance of which the tusks of the elephant, hippopotamus, walrus, etc., are composed. The tusks of the African elephant sometimes weigh as much as 100 lb., and reach a length of 8 or 9 ft.

Ivory Gull, a small, beautifully shaped sea-bird with striking all-white plumage and black legs which breeds on the rocky shores of the Arctic, being found farther north than any other bird; it occasionally wanders south in the winter.

Ivy, the well-known climbing shrub, chiefly evergreen; furnishing a sudorific, the berries having also emetic properties.

J

Jabiru, the Brazilian name for the giant stork of South America.

Jacamar, from *Jacameri*, the Brazilian name for a smallish bird with long, sharply pointed bill and brilliant plumage which inhabits the tropical regions of South America east of the Andes. These birds are seen sitting motionless on trees, darting off at intervals to catch insects on the wing.

Jacana, a tropical bird (the water-hen of Brazil and the warmer parts of America) of wide range, beautiful of plumage, with slim body and narrow wings, and long, pointed beak. It feeds on seeds and insects, inhabits marshy lands, and is related to the plovers.

Jack, a small schooner-rigged vessel, used in the Newfoundland fisheries; a pike; an oscillating lever; a device used in roasting meat.

Jackal, a small wild dog related to the wolf and resembling a fox. The Common Jackal is found in S.E. Europe, India, and Ceylon; other species inhabit Africa and Egypt. The jackal is a well-known scavenger.

Jackdaw, one of the smaller members of the Crow family. This European bird is typically black with grey collar. It is easily tamed, makes an amusing pet, and delights in making off with and taking to its nest bright objects, such as silverware.

Jack Ketch, a by-name for the common hangman, and said to have been the real name of the public executioner of the time of James II.

Jacobins, a French revolutionary club or party, formed in 1789, and accustomed to meet at a Jacobin convent, hence the name. It became a controlling force in the Revolution, especially in the movement which led to the Terror. Robespierre was its chief spokesman.

Jacobites, adherents of the Stuart cause after the abdication of James II. First James himself, then his son (the Old Pretender), and later his grandson (the Young Pretender) tried to fan the flame of rebellion in Scotland and Ireland, but after the defeat at Culloden in 1746 the cause was lost.

Jacquerie, a revolt of French peasants in 1358 against the tyranny of the nobles. So named from the contemptuous title, "Jacques Bonhomme," given by the nobles to the peasantry.

Jade, a green mineral found in China, America, and New Zealand, and used for making vases, bracelets, and other ornamental articles. There are many varieties, and there is evidence that the stone was in common use in prehistoric times for weapons and utensils.

Jaggernaut, or **Juggernaut**, the name of the great Indian idol at Puri, which once a year is brought forth from its temple, placed on an enormous car, and conveyed at the head of a mighty procession through the streets. Multitudes of pilgrims assemble on these occasions, and it used to be the practice for many fanatics to throw themselves beneath the wheels of the car and allow themselves to be crushed to death.

Jaguar, a South American carnivorous animal resembling the leopard, but much larger and more powerful.

Jains, a religious community in India numbering about 1,500,000. Jainism, which arose rather earlier than Buddhism in revolt against Hinduism, is based on *ahimsa*, non-injury to all living things; wealth and possessions are discarded. The founder was Mahavira, born *c.* 599 B.C. The Jain temples are among the most beautiful in India.

Jamb. the upright sides of a door, window, fireplace, or other aperture, supporting the lintel, entablature, or mantel and shelf.

Janeite, a devotee of Jane Austen and her writings.

Jangada, a rude sort of boat or catamaran carrying a large sail, used off the coasts of South America.

Janissaries, a former band of Turkish foot soldiers who acted as the Sultan's bodyguard, and were noted for their turbulence and cruelty. They existed from the 14th century to 1826, when they were finally disbanded after the people had risen against them and massacred many thousands.

January, the first month of the year, named after Janus, the two-faced god of the Romans. It was the *Wolf monath* and *Aefter Yule* of the Saxons.

Jarrah Wood, the wood of the mahogany gum tree of Western Australia, one of the hardest of all woods.

Jasmine, a graceful climber belonging to the olive family with odoriferous blossom, originally a Persian plant, but now acclimatised in many varieties in almost all parts of the world. Two species of jasmine (the common jasmine and the Spanish jasmine) yield oils used in perfumery.

Jasper, a precious stone of the chalcedony variety, opaque, and coloured red, brown, yellow and sometimes green. It was greatly esteemed by the ancients, the Bible having numerous allusions to it.

Jaunting Car was a two-wheeled vehicle peculiar to Ireland, containing a lengthwise seat on each side and a seat in front for the driver.

Javelin, a spear thrown by hand and one of the common weapons of war from the days of ancient Rome to the Middle Ages. Today, athletic field events include the javelin throw.

Jay, a gaily-coloured bird of the Crow family, of many species—the Blue jay of N. America, the Canada jay, sometimes called "whisky jack," the Siberian jay, and the British jay, fawn-coloured with black and whitish crest and bright blue feathers in the wings. It lives in woods and like the magpie, takes the eggs and young of small nesting birds.

Jazerine, an antique military or protective jacket, strengthened by small overlapping pieces of steel or other metal internally, worn generally by the Italian nobility during the Middle Ages.

Jazz, a rhythmical syncopated music probably originating among the Negro population of the Southern States of the U.S.A. It became popular during the first world war and, in a commercialised form, has held the popular field ever since. Modern dance music and popular songs are based on the jazz idiom, which has also had a profound effect upon contemporary music of a more serious kind.

Jean, a stout kind of twilled cotton cloth much worn in olden times, and resembling fustian. Blue *jeans*, adopted by American city youngsters from farmworkers, are now the fashion elsewhere and worn not only as overalls by workmen but by both sexes in leisure time.

Jebusites, are often referred to in the Old Testament. They were a Canaanite nation, who held Mount Zion, and were in frequent conflict with the Israelites, until finally defeated by David.

Jehovah, one of the Hebrew names of the Deity, the etymology of which is obscure. The English translators of the Old Testament rendered it "the Lord." The Jews, however, regard the word as too sacred for speech, and use the equivalents *Adonai* or *Elohim* instead of it.

Jelly-fish. The jelly-fishes, which have gelatinous bodies fringed at the margin with delicate tentacles, constitute the coelenterate order *Scyphozoa*. The mouth, with a squarish opening, is seen on the underside, and there are four horseshoe-shaped sex organs.

Jenny, the name given by James Hargreaves to the spinner frame invented by him in 1766, which greatly improved and extended cotton-spinning operations.

Jerboa, small jumping mammals of the Rodent order. These mice-like animals have long tufted tails and very long hind legs, the front legs not being used for locomotion. The African jerboas have three toes, the Asiatic jerboas five.

Jereed, a wooden javelin, used in Turkey and Persia in tourneys and marksmanship competitions. It is about five feet long, and great skill may be attained in flinging it at a moving object or fixed target.

Jeremiad, any utterance or writing in which sorrow or complaint is the chief characteristic, so named as recalling the style of the "Lamentations of Jeremiah," in the Old Testament.

Jerusalem Chamber, a room in Westminster Abbey, deriving its name from the circumstance of its having originally been decorated with a view of Jerusalem. Henry IV. died in this chamber, and the Committee for the Revision of the Bible met there in 1870 and later.

Jesuits, members of the Roman Catholic teaching order founded by Ignatius Loyola in 1534. The education of the young and of society itself was an important part of their programme. A long and vigorous course of study is prescribed before they are admitted into the privileges of full membership. They are required to take the vows of voluntary poverty, perfect chastity, perfect obedience, and complete submission to the Pope. The Society played an important part in politics.

Jet, a deep black fossil substance admitting of a high polish and much used for jewellery, ornaments, and trimming. It is a form of lignite, the most important British deposit being found near Whitby, where jet manufacture has been an established industry for a long period.

Jet Engine, an aeroplane engine which derives its thrust from the high velocity of the gases it ejects. The essential units in a jet engine are a rotary compressor and a gas turbine, the latter driving the compressor. The first reliable, high-performance jet propulsion engine for aircraft was invented by Air Commodore Sir Frank Whittle.

Jetton, a kind of metal counter formerly used in card-playing. Examples survive in many museums.

Jet Stream, a meteorological term coined in 1946 to describe the relatively narrow belt of strong winds (100–200 m.p.h.) at levels in the atmosphere from 3 to 7 miles. These winds are important in forecasting weather, and can be a valuable aid to aircraft. From the ground, where there may be little wind, the jet stream can sometimes be seen as high cirrus cloud moving across the sky at high speed.

Jewish Calendar is supposed to date from the Creation, which according to their reckoning occurred on Oct. 7, 3761 B.C.

Jews, descendants of the ancient Hebrews or Israelites, who settled in what is now called Palestine about the 15th century B.C. Before the Nazi persecutions and massacres—the greatest tragedy of Jewish history—world Jewry numbered over 15 million. About 5 million lived in the United States and 10 million in Europe (Poland 3 million, Russia 3 million, Central Europe 2 million, Germany 500,000, England 300,000, France 170,000, Holland

120,000). Some 6 million Jews perished in the course of the Nazi persecutions. A movement to restore Jews to Palestine was founded in 1897, known as the Zionist movement (*q.v.*). From 1923, when the Treaty of Lausanne formally ended the war between the Allied Powers and the Ottoman Empire, until 1948, Palestine was administered by Great Britain under a mandate. Efforts to reconcile Jews and Arabs proved unsuccessful and Great Britain in 1946 decided to submit the problem to the United Nations for solution and terminated the mandate on May 13, 1948, when the Jewish National Council proclaimed a Jewish State of Israel. When the Israeli state was created the population was about 650,000 Jews and 1 million Arabs. In 1951 the population figure was 1,578,000 (90 per cent. Jews). (*See* **Anti-Semitism.**)

Jew's Harp. The name is believed to be a corruption of "jaws harp." This instrument consists of a metal frame with a central tongue of spring steel. The frame is pressed against the teeth, and the tongue of the harp is twanged with the finger, the mouth acting as a resonating chamber. By altering the shape of the mouth the resonant frequency and therefore the note can be varied.

Jib, the front triangular sail of a ship, resting on a stay, and in large vessels projecting from the end of the jib-boom. There is also a flying jib outside this.

Jig, a rapid dance for one or more persons, much indulged in in Ireland and the English and Scottish provinces, a survival of old English days.

Jihad, a religious war of Mohammedans against unbelievers. Fanatics attempted to set one on foot in India in 1877, and simultaneously another was proclaimed at Constantinople against the Russians, but it came to naught.

Jimson Weed, corruption of Jamestown Weed, a synonym for the Thorn Apple.

"**Jingos**," an English political term which came into vogue in the "seventies" and "eighties," when Russia seemed to be threatening an advance on Constantinople. A music-hall song of the day, sung by Macdermott, the refrain of which was "We don't want to fight, but by *jingo* if we do," etc., emphasised the feeling of the party and gave the cue for their being called "Jingos"

Jinnees are supposed to be spirits of evil, assuming various shapes, human and animal, and exercising good or evil influence, according to their origin or mission. In the *Arabian Nights* and other Eastern literature Jinnees or genii are numerous.

Jinriksha, a hooded, two-wheeled vehicle drawn by one or two men, and used in Japan, India, and other Eastern countries.

Joachimites were adherents of the Italian religionist Joachim, who was abbot of San Giovanni del Fiore at the beginning of the 13th century, and maintained that three reigns would complete the history of the earth; the first was the reign of the Father, from the Creation to the birth of Christ; the second that of the Son, from the birth of Christ to 1260; and the third that of the Holy Spirit, from 1260 to the end of the world.

Jockey Club, the governing body that, although possessing no legal status, frames rules and laws by which horse-racing and turf matters generally are regulated. The club-house is at Newmarket.

John Bull, the typical figure of an Englishman, bluff, big, and burly. Arbuthnot's *History of John Bull* is supposed to have originated the character.

John Company, a familiar appellation of the East India Company.

John Dory, a well-known sea-fish of which there are six species. It is of a golden-yellow colour (*jaune doré*), has a high dorsal fin with long filaments projecting from the spines, and is much valued as a table fish. It is sometimes found in British waters, but the Mediterranean is its chief habitat.

John o' Groat's House, W. of Duncansby Head, Caithness, popularly named as the northernmost point of Scotland. According to legend the house, which has now disappeared, was built in octagonal form by a Dutchman Jan de Groot who came to live there in the 16th century. The site is marked and an inn was erected near it in 1876.

Jongleurs were minstrels and jesters who wandered from town to town singing songs and giving entertainments in mediæval France and Norman England. *See* **G39 (1)**.

Joss, the popular name of a Chinese idol, the place where it is kept being called a joss-house.

Jougs, an ancient Scottish instrument of punishment, in the form of an iron collar, which was fitted to the neck and held to the wall or to a tree by a chain; a variety of pillory of a barbarous character, employed at times in the repression of female recalcitrants.

Joule, a unit of energy equal to 10^7 ergs, or about $\frac{3}{4}$ of a foot-pound. Named after the British scientist, J. P. Joule (1818–89). It may be defined as the work done in one second in maintaining a current of one ampere against a resistance of one ohm.

Jousts were military tiltings in the nature of tournaments, where the contestants strove against each other on horseback with blunted lances. It was the sport of nobles in feudal times.

Jowter, a Cornish and West of England term for a fish-hawker who plies his trade on horseback.

Jube, in church architecture, the rood-loft over the entrance to the choir from the chancel.

Jubilee (or **Jubile**), the year following the seventh seven-year period. A year of perfect rest (Lev. xxv). In the Roman Catholic Church the Jubilee Year is every 25th year from Christmas to Christmas (originally 100 years), during which time plenary indulgence is obtainable. Introduced by Boniface VIII. Feb. 22, 1300. In recent years the word Jubilee has been applied to any form of 50th year celebration.

Judge Advocate General is an officer whose duty it is to advise the Crown on Courts Martial and on subjects connected with military law.

Julian Calendar, named after Julius Cæsar, who in 46 B.C., finding the Roman year 90 days in advance of the real time, was the first to adopt the calculation of time by the solar year, the average length being fixed at 365¼ days. There was still an overplus of a few minutes every year, and this was rectified by the Gregorian Calendar, introduced in Italy in 1582 and adopted in England in 1752, from which date what is called the "New Style" begins.

Julus, a genus of millipedes with cylindrical bodies and two pairs of legs to each segment, the latter being 40 to 50 in number. In South America specimens 5 or 6 in. long are frequent, but those found in England are small.

July, the seventh month of the year, named after Julius Cæsar. It was the *Maed monath* (Mead-month) of the Saxons.

July Revolution, the French revolution of 1830 whereby Charles X. was deposed and Louis Philippe made king. The latter was deposed by the revolution of 1848.

Jumart, a fabulous monster which often cropped up in early English literature, supposed to be the offspring of a bull and a mare, or of a horse and a cow.

Junco, the name given to a genus of snowbirds, confined to the American continent.

June, the sixth month of the year, containing 30 days and deriving its name from Juno. It was the *Sear* (Dry) *monath* of the Saxons.

Jungle-Fowl, birds related to the peacocks and peacock-pheasants. At least four species are known from the jungles of India, Ceylon, and Java. The domestic chicken has been derived from the Red Jungle-Fowl (*Gallus bankiva*).

Juniper, the Nova Scotian name of the American larch; also all the trees of the *Juniperus* genus; from the unripe fruit of some species of which is distilled the stimulant and diuretic oil of juniper.

Junk, a flat-bottomed Chinese sea-going boat, carrying large masts, and employed on the coasts and seas of China and Japan.

Junkers, name of the ruling class of Prussia, military in spirit, who were the party of reaction and defenders of the landed interests. Supported Bismark prior to the Franco-Prussian war and helped bring Hitler to power. They have been expropriated and broken.

Junket, a sort of sweetmeat, consisting sometimes

(as in Devonshire) of curds and cream, sweetened and flavoured at will, made with rennet.

Junta, a Spanish word designating a legislative or other distinguished assembly entrusted with the passing of laws or the deciding of policy. A grand council of state.

Jupiter, the largest body of the planetary system except the sun, from which orb it is distant 483 million miles. Its mass is over 300 times that of the earth, while in bulk it is 1,300 times as large. It has 4 major (discovered by Galileo in 1610) and 7 minor satellites, the former being visible with field glasses. Also the supreme deity of the Romans, identified with the Greek Zeus.

Jurassic Formation, a series of rocks (the evidences of which are most marked in the Jura Mountains) coming between the Cretaceous and Triassic groups and including the Oolite and the Lias. It is a formation rich in fauna, abounding in echinoids, lamellibranchs, ammonites, and belemnites; large reptiles, marine and land, are common, as are the plants called cyads. In Britain the Jurassic outcrop extends from the Dorset coast to the Yorkshire moors.

Jury, a body of men chosen and sworn to hear and pass verdict upon evidence brought forward at a trial, inquest, or inquiry. Its origin is obscure, but it was in existence in the 13th century. The trial jury consists of twelve jurors, except in the county court, where small civil cases are sometimes tried by the judge and a jury of five. The jurors are the judges of fact upon the evidence laid before them. Since the passing of the Sex Disqualification (Removal) Act, 1919, women may serve as jurors throughout the United Kingdom.

Jurymast, a word of doubtful origin, but indicating an improvised mast put up in place of one lost or broken.

Jute, the name given to the fibre of a plant grown largely in Pakistan in the Ganges delta and used for the manufacture of coarse cloths, cordage, etc. Calcutta is the biggest jute-manufacturing centre of the world, as Dundee was in the 19th century.

Jutes, a Low German race who in the 5th century invaded the south-eastern part of England, establishing themselves in Kent and making Canterbury their capital.

Juvenalia, games of young people instituted in Rome's imperial days by Nero.

K

Kaaba, the inner shrine of the Great Mosque at Mecca, only thrown open to the faithful three times a year. It contains in its south-eastern corner the famous sacred "black stone," said to have fallen from heaven with Adam.

Kaffirs, Bantu-speaking negro tribes of the Union of South Africa, whose occupations are cattle-raising, farming, and hunting.

Kago, a rude Japanese palanquin suspended from a pole borne on the shoulders of two carriers, the person carried resting in a sort of bamboo hammock.

Kagu, native name for a curious bird related to the sun-bittern and the only member of the Rhinochetinæ family, found inhabiting New Caledonia when that island was colonised by the French.

Kain, a tribute or duty formerly taken—in kind, as poultry, etc.—by landlords in Scotland and elsewhere as part of the rents due to them from their tenants.

Kaiser, the German form of the word Cæsar, emperor, borne up to 1918 by the then sovereigns of Germany and Austria. Charlemagne was the first prince to assume the title of Kaiser.

Kakapo, the Maori name for the New Zealand owl-parrot, a peculiar and interesting species, possessing wings but not able to use them for flight, of brown mottled plumage, nocturnal in its habits, and nesting in burrows. The bird, once abundant, is rapidly becoming extinct.

Kalan, a local name for the sea-otter which is only found in the seas of Kamchatka and North-West America. It is larger than the beaver, and weighs from 70 to 80 lb.

Kalmuks, a branch of the Tartar or Mongol race who in the 17th century migrated to Europe. Many of them returned to China in 1771. The descendants of the last of these nomads to enter S.E. Russia are now organised as the Kalmyk Autonomous Soviet Socialist Republic.

Kalpis, an ancient three-handled Grecian water vase of large size, decorated with classical figures in red on a dark ground.

Kangaroo, pouched (marsupial) mammals of Australia and adjacent islands. There are over 20 species, the smaller ones being known as "wallabies." Kangaroos leap in a succession of springy bounds 10–20 ft. long, the forefeet not touching the ground. They can reach a height of over 6 ft. and a weight of 200 lb. First seen by white men when Capt. Cook's expedition visited Australia in 1770. Related genera include the tree kangaroos, rat kangaroos, and the Tasmanian Jerboa kangaroo.

Kaolin *or* **Kaolinite**, a fine clay much used in the manufacture of high-class pottery. It results from the decomposition of felspar, and is found in China, Japan, Devon, Cornwall, at Limoges, and in certain parts of the United States.

Karma, the Buddhist theory that a man's actions control his destiny after death, as the natural effect of a natural cause. The idea of successive existences is bound up with the doctrine, and forms a fruitful subject of ethical speculation.

Katydid, large long-horned insects of the grasshopper family, common throughout the United States east of the Rockies. Their name comes from the sound these insects make.

Kauri Pine, a large coniferous tree yielding a fine copal resin which ranges from Malay to New Zealand. The New Zealand Kauri, *Agathis australis*, is found only in N. Island. Some of the best Kauri gum comes from fossilised pines and is dug out of the soil far from any living trees.

Kava, a refreshing drink made from the pounded root of the pepper plant (*Piper methysticum*) and the national drink of Tonga.

Keep, the central tower or chief stronghold of an ancient castle, sometimes called the donjon.

Kelpie, a water-sprite of Scottish fairy-lore, whose appearance assumed various forms, and foreboded drowning to the person who saw it. In Australia the Kelpie is a valuable sheepdog.

Kentish Fire, a noisy, long-continued kind of cheering and clapping of hands which originated in Kent at the Protestant meetings held in 1828–29 to oppose the Roman Catholic Relief Bill.

Kentish Rag, a kind of fossiliferous clayey limestone found in Kent. Used in building.

Keratin, a hard protein material of which horns, nails, claws, hoofs, and reptiles' scales are made.

Kermes, a crimson dyestuff, less brilliant than cochineal, but more lasting. It is made from the bodies of the females of a small oak-inhabitting insect (*Coccus*) found in immense numbers on the coasts of the Mediterranean.

Kerosene, an illuminating oil distilled from petroleum and shale. Also called paraffin.

Kersey, a coarse kind of woollen cloth, originally made at Kersey, in Suffolk, and much used in the Middle Ages for ordinary men's clothing.

Kestrel, the most common British falcon, well known for its habit of hovering for minutes at a time with vibrating wings and then swooping down to attack mice and insects. The male has spotted chestnut-brown back, greyish head and tail, which has a broad black band near tip.

Ketch, a sailing vessel formerly in considerable vogue, with two tall masts fore and aft, and clear amidships.

Kew Gardens, officially known as the Royal Botanic Gardens, are among the most celebrated gardens in the world. They were started in 1759 by Princess Augusta of Saxe-Gotha, widow of Frederick, Prince of Wales, and mother of George III. They remained private property until 1841, when control passed to the Commissioners of Woods and Forests. They now cover 300 acres and are administered by the Min. of Agriculture, Fisheries, and Food. Since 1841 the gardens have been open to the public, and form one of the most attractive resorts near London.

Key, a musical term indicating the central dominating note that gives the melodic order in which the tones of a tune or composition are arranged. It is the starting-point, and different starting-points demand different scales. The natural key of C, for instance, requires no flats or sharps; all other keys require the use of sharps or flats to bring the notes of their scales into proper relation.

Keys, House of, is the Manx representative assembly. (*See* **Tynwald**.)

Keystone, the stone which occupies the centre and highest point of an arch and is usually the last to be inserted.

Khaki, a clay-coloured cloth adopted for uniforms in the British Army in the time of the war with the Boers, and used in the first and second world wars. First used by Indian regiments.

Khan, a title formerly of importance in Eastern countries, and given to princes and governors of states, but now of too common use to be much more than a mere courtesy designation. Also the name of a caravanserai.

Khedive, the title borne by the viceroys of Egypt from 1867, after Ismail Pasha's arrangements with the Sultan establishing hereditary succession in his family. It was abolished by the British in 1914.

Khonds, a race of aboriginal East Indians occupying the jungles and lower regions of Orissa, and formerly noted for their frequent human sacrifices, which, however, have been prohibited since 1842.

Kilderkin, once a common liquid measure in England, representing 18 gallons.

Kilogram, a unit of mass equal to 2·2 lb. One kilogram equals 1,000 grams.

Kilowatt, a unit of electrical power; equals 1,000 watts, and is equivalent to about 1⅓ horsepower. An average electric fire "burns" 2 kilowatts of electricity. Electric power of 1 kilowatt used continuously for an hour represents an energy consumption of 1 kilowatt-hour; this is commonly called 1 "unit" of electricity.

Kilt, a short pleated plaid skirt-like garment forming part of the Highland costume, and reaching from the waist to the knees. In olden times it was simply the lower part of the belted plaid.

Kindergarten, a system of infant education ("garden of children") invented by Friedrich Fröbel in 1837 and introduced into England in 1854, based on the activity of the pupils themselves by means of toys, games, and singing—things in which children take delight naturally. The system is now well established in nearly all countries, having been developed on very successful lines in the primary schools of England.

King Crab, remarkable crustaceans inhabiting the sea coasts of America, Japan, India, and Malay Peninsula, carrying a shield-shaped shell, and having a long pointed spine projecting from the posterior. The body comprises three separate sections articulated together. These crabs—in America known commonly as the horseshoe crab because of their shape—are from 18 in. to 2 ft. in length. Fossil king-crabs are found as far back as the Silurian. There are about six living species.

Kingfisher, a well-known family of brilliant-plumaged birds, found in all continents, comprising some 250 species and sub-species. The British kingfisher, *Aceldo atthis*, haunts the rivers and streams, and is one of the most beautiful of native birds, having iridescent blue-green, salmon pink, and rich chestnut in its plumage and bright-red feet. All kingfishers have long, dagger-shaped bills. In the Malayan region, New Guinea, the Moluccas, and Australia the varieties are very numerous. The quaint *Laughing Jackass* of Australia is among the largest of the kingfisher family. The European kingfisher is the bird of the Greek legend of the Halcyon.

King-of-Arms, the name of the chief officials of the Heralds' College. There are several in England—the principal being those of the Garter, Norroy, Clarencieux. (*See* **Heralds' College**.)

Kinkajou *or* **Jupura**, a carnivorous animal of the raccoon family, having a yellow brown fur. It is common in the forests of Central and South America, lives mostly in the trees, feeding on birds, fruit, insects, etc. Its tail is prehensile.

Kiosk, a word of Russian or Turkish origin meaning a small open pavilion of light construction much used in Eastern countries as a place of shade and rest. Similar structures are common in the streets of Paris as news and advertisement stands, and in London as telephone offices.

Kirimon (*Kiri no go Mon*) and **Kikumon** (*Kiki no go Mon*), the two Japanese imperial crests, the first a design of leaves, stems, and flowers of the Paulownia plant, and the other representing the sixteen-petalled chrysanthemum.

Kirk, the Church of Scotland. Kirk-Session is a "court" of the Presbyterian churches, consisting of the ministers and elders.

Kismet, a word signifying fate, destiny, or doom, frequently employed (or its equivalent) in most Oriental countries, and also in considerable use in European literature and speech.

Kit-Cat Club, a famous club formed in the early part of the 18th century, and having among its members many notable people, including Addison and Steele. It derived its name from the pastrycook who served it with pies—Christopher Cat—and has had its existence commemorated in a special size of portrait called a "Kit-Cat," because of the fact that the portraits of the members of the club were all done (by Sir Godfrey Kneller) to this size—36 in. long by 28 in. wide. Its summer meetings were held at the Upper Flask Inn, Hampstead.

Kitchen Middens, the name designating certain large mounds, presumably the sites of prehistoric villages, distinctive features of which are stone-hearths. These mounds contain large quantities of fossil remains of edible molluscs, bones of birds, animals, and fishes, fragments of implements, etc. They exist in the largest numbers on the east coast of Denmark, and here and there on the coasts of Scotland, Ireland, England, and N. America, and belong, it is supposed, to the early Neolithic Age.

Kite, name of several birds of prey, widely distributed, related to the hawks and eagles, graceful in flight, and distinguished by their long wings and deeply forked tails. The red kite, light chestnut brown, once the most familiar bird of prey in Britain, seen scavenging the streets of London, is now the rarest, and found only in Wales. The Egyptian kite and the pariah kite of India, notorious for their daring thefts, are closely related to the black kite, a smaller European species, with less forked tail and blackish-brown plumage.

Kittiwake, a beautiful white and pearl-grey gull with black legs, dark eyes, and greenish-yellow bill. Its range is wide, and includes the British Isles, where it is a local resident. The flight of this only truly oceanic gull, which excepting in the breeding-season, is generally found offshore is graceful, swift, and buoyant. A triangular black patch, noticeable on the ends of the wings when open, is characteristic of the species, as is the call kitti-wake, from which the bird derives its name. It nests in colonies on the ledges of caves and steep cliffs.

Kiwi, flightless, stoutly-built birds of New Zealand, now very rare and carefully protected by the Government. They are little larger than a domestic hen, and lay astonishingly large eggs for their size. Incubation and care of chicks fall to the male bird. They have rudimentary wings concealed by the plumage, and the feathers are hair-like. They are nocturnal in habit.

Knighthood is a degree of honour or title common in Europe since the Middle Ages, and was at first exclusively a military order. In Great Britain the four main orders of knighthood are those of the Garter, the Bath, the Thistle, and St. Patrick; in addition to which there are several other orders, such as the Order of St. Michael and St. George, the Star of India, etc. There are also Knights Bachelors, such as are not associated with any special order. The title is not hereditary, and therefore ranks below that of a baronet, though both are entitled to the prefix "Sir."

Knot, a nautical measure of speed (1 sea mile per hour), and formerly measured by a log-line, divided by knots at equal distances $\frac{1}{120}$ of a geographical mile. The number of knots travelled by the ship in half a minute corresponded to the number of sea miles it travelled per hour. A sea mile is equal to about 1⅙ of a statute mile.

Knout, formerly a Russian instrument of punishment, consisting of a whip of many thongs, used upon Russiam criminals since the 15th century. A hundred and twenty strokes were considered equivalent to a sentence of death, half that number sufficing to kill in many instances. Czar Nicholas I., however, changed the form of the knout, and made it a much milder instrument.

Knuckle-duster, a formidable apparatus contrived for the purpose of protecting the knuckles and to add force to their use; frequently employed by garotters and other lawless ruffians.

Koala, the Australian arboreal marsupial mammal that looks like a toy teddy-bear, with ashy-grey fur, bushy ears, and rudimentary tail. It feeds on the leaves and shoots of certain eucalyptus trees, and is not more than 2 ft. in length.

Kohl, a powder prepared from antimony or burnt almond shells, and in common use by the women of the East for darkening the eyelids.

Koran, the sacred book of Islam and the most influential book in the world next to the Bible. According to Islamic belief, the words were revealed to the prophet Mohammed by God through an angel Gabriel at intervals over a period of 20 years, first at his native Mecca, and then at Medina. The book is divided into 114 *suras* or chapters; all but one begin with the words "In the name of Allah, the Merciful, the Compassionate." It is written in classical Arabic, and Moslems memorise much or all of it. The first English translation made direct from the Arabic was by George Sale, London, 1734.

Koreish, an ancient Arab tribe whose members kept guard over the sacred stone of Mecca before the rise of Mohammed. They opposed his view and compelled him to quit Mecca but they were ultimately defeated by Mohammed and his followers.

Kos, a Jewish measure of capacity, equivalent to about 4 cu. in.

Koto, a musical instrument in general use in Japan consisting of a series of 13 silken strings stretched across a curved wooden surface, and played with the fingers. Each string is 5 ft. long, and has a separate bridge so fixed as to give the vibration necessary for the note it has to produce. It is a sort of horizontal harp, and in the hands of an expert player is capable of giving forth excellent music.

Koumiss, a beverage made from mare's milk fermented, and often served up with cooked grain; a common refreshment of the Arabs of Africa and some of the tribes of Asia, particularly the Tartars.

Krall, a hut or collection of huts in an African village.

Kraken, a fabled Scandinavian sea monster, around which many legends and superstitions have been formed in Norway. It is generally described as a sort of sea-serpent, and was so large and weird of form as to be mistaken, so the tradition runs, by fishermen for an island.

Kremlin, a large fortified citadel in Moscow, containing the cathedral in which the Czars were crowned, an imperial palace, and important garrisons and arsenals. At the foot of the Ivan Tower rests, in a cracked condition, the famous great Ivan Bell, weighing 200 tons. The Kremlin is now the headquarters of the Soviet Russian Government.

Krishna, one of the Hindu deities, and a chief character in the Mahabharata epic.

Krypton, one of the rare gases, occurring in the air to the extent of 1 part in 20 million. It was discovered in 1898 by Ramsay and Travers.

Ku-Klux-Klan, a secret political organisation in the Southern States, active after the close of the Civil War and having for its chief aim the establishment of white control. Suppressed in 1871 by the Enforcement Act (popularly known as the Ku-Klux Act or Force Bill) after numerous outrages had been committed. Revived between the two world wars as a sadistic anti-Negro, anti-Jewish, anti-Catholic society, spreading to the North as well as the South.

Kümmel, a German cordial, flavoured with cumin, carraway seeds, or fennel.

Kuomintang, the Chinese "People's National Party," founded by Sun Yat-Sen in 1912 after the successful National Revolution of 1911. Sun Yat Sen sought to establish a democratic Republic modelled on western parliamentary democracy and in his famous "Testament" laid down the principles upon which the constitution of China was to be based. After his death in 1925 Chiang-Kai-shek emerged as leading man in China. Beginning as a Russian-inspired revolutionary movement, the Kuomintang developed into a reactionary oligarchy and collapsed in 1949 when the Nationalist forces suffered military defeat by Communists.

Kussier, a Turkish musical instrument consisting of five strings stretched over a sort of kettle-drum.

Kusti, the sacred cord or girdle of the Parsees, consisting of 72 threads—the number of the chapters of the Izashue—and two branches, each branch containing six knots, together standing for the 12 months of the year.

Kutch, the packet of vellum leaves in which gold is placed for the first beating; the gold-beaters' skin packet into which the leaf is placed for the second beating is known as the "shoder."

Kutia, a special Russian dish eaten after a funeral ceremony at church or cemetery, and composed of boiled rice or other cereal mixed with honey and raisins, the ingredients being supposed to possess some symbolical significance.

Kvass, a common Russian fermented beverage made from an infusion of flour or meal or dough of rye, wheat, or malt. A superior kind is made from fruits.

Kylix, the name given in ancient Greece to a graceful double-handled drinking-cup, in general shape something like a modern champagne glass.

Kyrie Eleison ("Lord, have mercy"), the name of a common form of prayer in the Anglican, Roman Catholic, and Greek Churches; also applied to the English Church responses after the recital of the commandments.

Kyrle Society, named after Pope's "Man of Ross," John Kyrle, founded by Miss Miranda and Miss Octavia Hill in 1875, and having for its object, the decoration of workmen's clubs, hospitals, etc. and the promotion among the poor of a taste for literature, music, and outdoor recreation.

L

L.S.D., from the Latin libra (a pound), solidus (a shilling), and denarius (a penny), introduced by the Lombard merchants.

Labarum, the standard of Constantine the Great, adopted after his conversion to Christianity, marked with his seal, and represented upon the coinage.

La Belle Sauvage, a site on the north side of Ludgate Hill, famous for the inn that stood there from the fifteenth century to the early nineteenth. The site was blitzed during the second world war.

Labourers, English Statute of, was passed 1350–51, with the object of compelling labourers to accept a certain rate of wages and not leave their employers' service, the Plague having rendered labourers so scarce that they were in great demand and had been insisting on higher pay. These enactments were bitterly opposed and led to the "Peasants' Revolt," headed by Wat Tyler.

Labradorite, a felspar of a pearly lustre on cleavage, found in masses in igneous rocks, the best samples of which come from Labrador.

Labyrinth, or **Maze**, a combination of roads and passages so constructed as to render it difficult for anyone ignorant of the clue to trace the way to the central part. The Egyptian labyrinth near Lake Mœris had 3,000 rooms, half of them subterranean and the remainder above ground. The labyrinth in Crete, according to Greek myth, was built by Dædalus to house the Minotaur. There was one at Lemnos, renowned for its stalactite columns; and another at Clusium constructed by Porsenna, King of Etruria, about 520 B.C. The labyrinth in which Fair Rosamond was concealed was at Woodstock. Hampton Court maze dates from the 16th century.

Labyrinthodonts, gigantic fossil amphibians which get their name from the curious labyrinthine structure of their teeth. They occur in the Red Sandstone formation, and remains have been found in Britain and other parts of Europe. Their heads were several feet long, and their footprints, by which they were discovered, closely resemble the prints of the human hand.

Lac, a resinous matter deposited on the branches of a number of tropical trees by the females of the lac insect, the exudation including eggs and a viscous covering. At the gathering time the twigs are broken off and dried in the sun, when

the insects die, and the lac that remains is termed *stick-lac*. From this, by the removal of extraneous accretions and dissolving, *seed-lac* is produced. *Shell-lac* is seed-lac after it has been melted and otherwise prepared, and this is the best known of the lacs, being used in printing and the manufacture of varnishes and sealing-wax, and for other commercial purposes.

Lac, or Lakh, a Sanskrit word, meaning a mark, used in India to indicate a lac, *i e.*, 100,000 rupees.

Lace, a delicate fabric of linen, silk, or cotton threads, made by hand or machinery, and worked in various ornamental designs. The kinds of lace are many, deriving their distinctive names either from the method employed in production or from the place where any special variety was originally made. The best-known makes are pillow or bobbin-lace, woven and plaited by hand; needle-point lace, worked by the needle over a traced design; and machine lace, which practically dates from Heathcote's invention of the early part of the 19th century. Some of the most famed laces are the following: *Alencon*, a needle-point lace; *Brussels*, a very fine kind, with needle-point sprigs and flowers; *Chantilly*, a silk variety with flowers and open-work; *Cluny*, a netlace with darned stitch; *Honiton*, a delicate kind with dainty sprigs and figures; *Mechlin*, generally made in one piece and very varied in design; and *Valenciennes*, or bobbin lace, of great durability, the pattern and ground of which are made at the same time, being one of the best and most costly of laces, now manufactured mainly in Belgium.

Lace-Wings, insects with frail, transparent, and much-veined wings whose grubs eat large numbers of insect pests such as aphids. The eggs are borne at the ends of threads attached to plants.

Lachesis, a genus of venomous snakes of the rattle-snake family confined to tropical countries, and including the "deadly bushmaster," of Surinam, and several Crotalidæ pit-vipers of Guiana and Brazil.

Lacquer, a varnish made from shellac and certain colouring matters, and utilised for imparting lustre to various surfaces of metal or wood. In China and Japan the production of lacquer ware of a decorative character has long been an important industry, bringing into use gold, coral, vermilion, sprinkled, and other lacquers, with pleasing effect.

Lacrimoso, a musical term denoting a mournful method of playing; sadly, with feeling.

Lacrymatory, tube-like vessels of glass found in graves of the ancients of the urn-burial period, and supposed by some to have been the receptacles of the consecrated tears of lamenting friends, but really used for holding ointments or perfumes.

Lacs-d'Amour, a cord of running knots worn on the arm at one time by widows and unmarried women to denote their condition.

Lactic Acid, an organic acid that may be obtained by fermenting milk sugar (lactose). It is formed in muscular tissue when this is active.

Lactometer, a tube or instrument for ascertaining the proportion of cream in a quantity of milk. Called also a galactometer.

Ladder, a framework of portable steps, made of wood or metal. There are innumerable varieties, according to their uses. Thus: the standing-ladder, the step-ladder, scaling ladder, companion ladder, collapsible ladder, etc.

Ladybird, the common name of a large family of beetles—the *Coccinellidæ*. The insect is usually of a red or yellow colour with small black or coloured spots. Ladybirds are of good service to the gardener because their larvæ feed on aphids. There are about 2,000 species.

Lady-Day, the day of the festival of the Annunciation of the Virgin Mary, Mar. 25. One of the four English quarter days.

Lagoon, a stretch of shallow water opening out upon the sea. Venice is built on lagoons.

Lake Dwelling, certain prehistoric habitations originally built above the waters of lakes or rivers, evidences of which have been found in Switzerland, Britain, and other parts of the old and new worlds. They were erected on platforms supported by piles, the stumps of many of which still remain. The most valuable evidences in this connection, however, are the recovered fragments of pottery, bone, flint, bronze, and iron implements, as well as some few human skeletons, affording interesting testimony to the primitive existence led by the lake dwellers.

Lakes are bodies of water collected in depressions of the earth's surface. The most notable lakes are the Great Lake series of North America, including Lakes Superior, Michigan, Huron, Erie, and Ontario, all discharging into the St. Lawrence River. Africa has an enormous area of lakes, including the Albert Nyanza and the Victoria Nyanza, forming the sources of the White Nile, Lakes Tanganyika, Nyassa, Tchad, etc. Smaller lakes are numerous in other countries—Switzerland, Germany, Italy, England, Ireland, Scotland, all having their lake regions, where the scenery is invariably beautiful and romantic.

Lake School, the name given, at first in ridicule, to a distinguished trio of poets—Wordsworth, Coleridge, and Southey—who made their homes in the English Lake District.

Lalo, the leaves of the Baobab, dried and powdered; a favourite food of certain African tribes.

Lama, a priest of the Tibetan Buddhists. At the head of the hierarchy is the Grand or Dalai Lama. The priesthood constitutes the civil as well as the religious government of Tibet. When the Dalai Lama dies, his spirit is held to pass into a new-born infant; a royal search is instituted, and the child selected as the new Dalai Lama is recognised by certain bodily marks. Second in importance is the Tashi or Panchen Lama, regarded as an incarnation of Amitabha, a Buddha.

Lamellibranchs (**Pelecypods**), the class of molluscs to which the oysters, cockles, mussels, clams, and scallops belong. In these animals the body, which is compressed laterally, is enclosed in two hinged shells held together by muscle action. The gills are thin plates, hence the name "lamellibranch." All are aquatic molluscs.

Lamellicornia, a group of beetles, distinguishable because the antennæ are made up of a number of plates. The Lamellicorn beetles are herbivors and number several thousand species, the best-known being the stag-beetles, cockchafers, and scarabs.

Laminarians, seaweeds with long ribbon-like fronds.

Lamination, a geological term designating a class of rocks with thin cleavages, such as slate or shale.

Lammas Day is one of the oldest of the Church festivals, probably derived from the loaf-mass (hlafmæsse) of the Anglo-Saxons. It occurs on August 1. In the olden times it was the day when loaves were given in place of first-fruit offerings.

Lammergeyer, the bearded vulture of alpine regions, resembling an eagle in appearance. It has a white head with black tufts at base of the bill, and its general plumage is dark brown, nearly black. It is found in the remote mountain ranges from Southern Spain to China, and is becoming scarce.

Lampblack, a carboniferous pigment obtained from flame-smoke, and now produced in specially constructed furnaces in which bodies rich in carbon, such as tar, resin, petroleum, etc., are burned. The smoke or soot resulting is collected from the sides of the furnace, and forms lampblack. It finds use in making printer's ink, black paint, etc. Being a very pure form of carbon, it is also utilised in the manufacture of dynamo brushes and arc-lamp carbons.

Lamprey. These fish differ from those with which most people are familiar in having no jaws, no paired fins, and no scales. Together with the hagfishes, the lampreys are placed in a special class—the Cyclostomes. There are three British lampreys; all are eel-like in form.

Lamps are vessels for holding an illuminating agent, and in modern times are of many kinds. In Anglo-Saxon times they were made of horn. The first public street lamps were oil lamps, London being lighted in this manner in 1681. Gas lamps were introduced in 1814. A great

advance was made in domestic lamp illumination by Argand, a Frenchman, in 1787, who invented a lamp having a circular burner or wick. The flame was oxygenised by the admission of a current of air greatly increasing the brilliance of the light. Among the more distinctive lamps of later times are the various electric lamps, the incandescent gas lamps, the paraffin oil and naphtha spirit lamps, the submarine lamp for burning under water, and the Davy safety lamp for colliery use.

Lance, a military weapon which was up to 1927 carried by cavalry regiments, and consisted of a long spear for hurling at or charging an enemy with. The war lance of the Middle Ages was about 16 ft. long.

Lancelet. (*See* **Amphioxus.**)

Lancers, light cavalry soldiers. Most European armies had regiments of Lancers—the Russian Cossacks, the German Uhlans, etc.—but there were no regiments of Lancers in England before 1816. There were four regiments in 1939.

"Lancet," the name of a noted English medical journal, established in 1823 by Dr. Wakley.

Land Crab, a family of crabs (*Gecarcinidæ*) which live mainly on land, though migrating to the sea to deposit their eggs.

Land League, an association formed in 1879, with Parnell as president, for compelling a reduction in the rents of land, and a reconstruction of the land laws in Ireland, and in case of non-compliance refusing to pay rent. For a time this League exercised great political influence and was an important aid to the Home Rule agitation.

Landrail, popularly known as the Corncrake, is a regular summer visitor to Britain, and is well known by its harsh and piercing note, so familiar in cornlands in the night time.

Landslip, a breakage of a mass of soil or rock away from a mountain, hill, or cliff, due to a variety of natural causes, such as the saturation of the earth by water or the decay or slipping of portions of rock. Many serious landslips have occurred from time to time. In 1618, an earthfall happened at Plurs on Lake Como, involving the destruction of many buildings and the loss of numerous lives. In 1806 a portion of Rossberg mountain in Switzerland slipped from its position, and falling into the valley below buried many villages and hamlets and over 800 people. A chalk cliff from 100 to 150 ft. high and three-quarters of a mile long fell at Lyme Regis, in Dorsetshire, in 1839, doing great damage. Over 200 people were killed by a landslip in Naini Tal, in India, in 1880; and at Quebec, in 1889, a rocky eminence called Cape Diamond gave way, many buildings being destroyed and lives lost. Notable landslips in recent times have occurred at Amalfi (Italy) in 1924, and at Murchiston (New Zealand) in 1929.

Langue d'oc and Langue d'oïl, the two principal mediæval French dialects, *oc* and *oïl* being their respective words for the affirmative particle (modern French *oui*). *Langue d'oc*, spoken south of the Loire, was the language of the troubadours. Provençal, one of its dialects had a literary revival in the 19th century under the influence of the poet Frédéric Mistral. *Langue d'oïl* was spoken in northern France, and it was the dialect of the Paris region which developed into modern French.

Lantern, a case for enclosing, holding, or carrying a light. In its earliest form it was made of horn, and called a lanthorn, but the name now covers a variety of forms, from the large stationary lantern of a lighthouse to a Chinese collapsible paper lantern. (*See* **Magic Lantern,** etc.)

Lantern Fly, bugs belonging to the family *Fulgoridæ* in which the head is drawn out to form a lantern-like structure. In no instance is the "lantern" luminous, though naturalists used to think it was.

"Lantern of England." Bath Abbey possesses so many windows that it is called sometimes the "Lantern of England." Among numerous interesting monuments Bath Abbey contains that of Malthus author of *Essay on Population.*

Lanthanum, a metal belonging to the rare earth group of metals, discovered by Mosander in 1839.

Lapidary, a cutter of, or dealer in, precious stones; also used in adjective form in regard to the working, engraving, or setting of stones.

Lapis Lazuli, an azure-blue mineral. The pigment ultramarine is made by grinding it, though artificial ultramarine has largely superseded it. The mineral (also called *lazurite*) has been used as a gemstone since ancient times.

Lapwing *or* **Green Plover,** familiar British bird on moors and marshlands with iridescent greenish-black plumage, white underparts, and black crest. Often called "peewit" from its cry.

Larboard is the old nautical term indicating the left-hand side of a ship, and changed by Admiralty order to "port" in 1844. Starboard is the right-hand side.

Larch, a familiar coniferous tree in the mountain regions of northern Europe, and though not native to Britain, the Common Larch is successfully cultivated in various parts of the kingdom. It is one of the best of all turpentine-yielding trees, and the bark is valued for tanning. The larch is an unusual conifer in being deciduous.

Lares were tutelary deities of the ancient Romans, and of two classes, *Lares domestici*, the household gods, and *Lares publici*, the gods of public places. Both classes were represented by images or statues.

Larid, a bird of the *Laridæ* or gull family.

Lark, a family of song birds (*Alaudidæ*) of many species, some of which—notably the skylark—are famed for their habit of soaring into the air, singing all the while. They build their nests on the ground in the open country and, except for the black lark of Russia, have streaked brown plumage. The skylark and woodlark are the best known British species, while the crested lark and shore lark are among the occasional visitors. Africa has the greatest number of larks; America has only one species, the horned lark.

Larkspur, the common name of the genus *Delphinium*, a favourite flower introduced into British gardens from Switzerland in 1573.

Larva, the undeveloped form of any animal which, before maturity, undergoes metamorphosis.

Lateen, a triangular sail affixed to a tapering yard used on light cargo vessels of the Mediterranean.

Latent Heat is the quantity of heat required to convert 1 gram of a substance from solid to liquid (latent heat of fusion) or from liquid to vapour (latent heat of vaporisation). Thus when a solid changes into a liquid or a liquid into a gas, the addition of heat to bring about the change produces no rise in temperature, the energy being absorbed in the form of latent heat. An equal amount is released when the process is reversed. The latent heat of fusion of ice is about 79·6 calories per gram and that of the vaporisation of water about 539 calories per gram.

Lateran Councils were the religious conventions held in the Lateran basilica at Rome for deciding important questions of Church doctrine. The most brilliant was that of 1215, which pronounced in favour of a Crusade. That of 1869–70 pronounced the infallibility of the Pope. (*See* **Œcumenical Councils.**)

Lateroflexion, a scientific and pathological term signifying "a bending aside."

Latin America. The Spanish-speaking, Portuguese-speaking, and French-speaking countries of N. America, S. America, Central America, and the W. Indies.

Latitude of a point on the earth's surface is its angular distance from the equator, measured on the surface of the earth in degrees, minutes, and seconds. Thus the equator is 0° Lat. and the poles 90° Lat. (N. or S.). First determined by Hipparchus of Nicæa about 160 B.C.

Latitudinarians, a body of theologians whose object was to enlarge the scope of the Anglican Church so as to bring the Nonconformists within its fold, and included such eminent 17th-century divines as Burnet, Tillotson, Hales, and Chillingworth.

Laughing Gas is nitrous oxide, and received its name from the fact that the first effect to be noticed was that of producing exhilaration. One of the earliest anæsthetics, it is still much used in dentistry and for minor surgical operations.

Launce, a family of eel-like sea fishes found in large numbers on the coasts of North America and Europe. There are two species common to British waters. These fishes are of a bright

silvery hue, and live much in the sand underneath the water. They are prized as bait.

Laurentian Shield refers to a group of Pre-Cambrian rocks in the region of the Upper Lakes of Canada, nearly 2 million sq. m. in extent. Of enormous importance to Canada on account of the mineral wealth, forests yielding valuable timber and wood-pulp, and water-power.

Lawn, very fine sun-bleached linen, in olden time called "cloth of Rheims."

Lead, a soft malleable metal, occurring in numerous ores, which are easily smelted. It is found in its native form in small quantities in Sweden. Lead is largely used in plumbing on account of its pliability, and as an alloy element it combines in the formation of type metal, stereo metal, shot metal, pewter, and many other compounds. Lead mining is carried on in several of the northern counties of England and in Wales. The world output of lead ore before 1939 averaged 1,800,000 tons per annum, of which about one-fourth ws raised within the British Empire, Australia being the chief British lead-producing region.

Leaf Insect, a group of insects related to the locusts and grasshoppers which in colour and form closely resemble leaves.

Leaf Miners, larval insects which tunnel between the upper and lower skins of leaves. Most leaf miners are caterpillars of tiny moths; some sawfly larvæ have the same habit.

Leagues, or combinations of kings, countries, communities, have been frequent since the kings of Canaan united against the Israelites. Among the most famous leagues may be mentioned the Holy or Catholic League, which prevented the accession of Henry IV. of France until he became a Roman Catholic; and the League of Augsburg against Louis XIV. of France in 1686.

League of Nations, was founded on Jan. 10, 1920, with the object of promoting international peace and security. The original members were the signatories to the Peace Treaties at Versailles, and membership grew to fifty-three as new nations and ex-enemy States were admitted. Two notable absentees were the United States and Soviet Russia, the latter not being represented until 1934. Germany was a member from 1926 to 1933. The League had an Assembly which met at Geneva every year and a Council which met five or six times a year. The Permanent Court of International Justice sits at The Hague. The final Assembly of the League was held at Geneva between April 8 and 18, 1946. Its place has been taken by the United Nations. The International Labour Organisation, set up by the League of Nations met on April 20, 1944, at Philadelphia and resumed its old quarters at Geneva under the new organisation in 1946.

Leap Year *or* **Bissextile,** was fixed by Julius Cæsar, 45 B.C., the addition of one day in every four years bringing the measure of the calendar year even with the astronomical year, with three minutes per year over. The Gregorian Calendar corrected this by dropping leap year at the centuries not divisible by 400. For instance, 1700, 1800, and 1900 were not leap years.

Leather was made in ancient Egypt, Greece, and Rome, and has through succeeding centuries played an important part in the service of man. It consists of the dressed hides or skins of animals after the process of tanning has been gone through. Untanned skins are known as pelts. Leather is classed either according to the skins from which it is made or the system of preparation employed. The best-known kinds are morocco, kin, Russian, chamois, Cordovan, grained, patent, russet, tan, calf, Hungarian.

Leather-Jacket, the larva of the Crane-fly (daddy-long-legs). Leather-jackets can prove serious pests of grassland.

Leaven, a mixture of flour and sour milk, formerly used in fermenting large quantities of fresh dough, a preparation now superseded by yeast.

Lebensraum, a German slogan for "living space."

Leech, an aquatic blood-sucking worm, mostly found in fresh-water ponds. Each end of the body is provided with a sucker, but that at the head end has jaws and teeth. The medicinal leech has three jaws. The leech attaches itself with avidity to animal bodies and sucks until glutted.

Leeward, a nautical term, meaning the sheltered side of a vessel—that is, the opposite side to that from which the wind is blowing.

Legal Aid. *See* **C12** (1).

Legal Tender. *See* **N9.**

Legerdemain, sleight of hand, conjuring, juggling, a kind of performance in which trick and dexterity of hand deceive the eye and give the impression of feats that are naturally impossible.

Legion, a body of Roman troops, varying in numbers at different periods. A legion was divided into 10 cohorts, and every cohort into three maniples. Three legions composed the Roman army of occupation in Britain.

Legion of Honour, the French order for distinguished services, military or civil, was instituted by Napoleon I. in 1802, and confirmed and modified under later rules. There are five grades—Grands Croix, Grands Officiers, Commandeurs, Officiers, and Chevaliers.

Legitimists, supporters of the claims of the elder branch of the Bourbon family to the throne of France. The death of the Comte de Chambord in 1883 childless transferred the right of claim to the Comte de Paris, head of the younger Bourbon branch. Now applied to any supporter of monarchy by hereditary right as against a parliamentary or other title.

Legume, the fruit typical of the pea, bean family, or *Leguminosæ*.

Leitmotif, a musical theme intended to represent a particular idea and introduced whenever the composer wishes that idea to be held in mind. Wagner made use of the leitmotif to such an extent that his enemies said that each of his characters presented a visiting-card.

Lemming, small light-brown rodents with dark spots, abounding in Scandinavian countries and in Siberia. The lemming is about 5 in. long, with a short stump of a tail. The migrations of the lemming are famous: so insistent is the urge to keep moving that these animals will march on into the sea in their thousands and be drowned.

Lemur, the most primitive member of the Primate order of mammals (to which man, apes, and monkeys also belong). They are noted for having strong pliant toes enabling them to use their feet as hands, and also well-developed thumbs on the hands. They have long squirrel-like tails, fox-shaped heads, and large staring eyes, and are distributed over the tropical parts of the Old World, being most abundant in Madagascar.

Lend-Lease, an arrangement made by the U.S.A. in March 1941 to provide goods, services, and capital facilities to nations whose fighting contributed to her own defence. The principal beneficiaries were Great Britain and Soviet Russia. There was to be payment or repayment in kind, property, or other benefits to the U.S.A., but when the time of settlement came goods already consumed were written off the account and the recipient countries were asked to make some payment for what remained in existence. By the end of the war practically all the Allies were giving each other Mutual Aid, as it was called, making available their own resources for the use of others in the task of defeating the common enemy. It is estimated that Lend-Lease aid given by the U.S.A. amounted to over £12,000 million and Mutual Aid given by Great Britain to over £2,000 million.

Lenses are, broadly speaking, either *convex*, having the thickest part in the centre and magnifying objects, or *concave*, with the thinnest part in the centre and reducing the objects. Each kind has several varieties, peculiar from their proportions, arrangements, and specific effects.

Lent, the forty days' period of fasting that precedes Easter.

Leo, one of the twelve signs of the Zodiac, bounded on the west by Cancer, and on the east by the Virgin. The constellation consists of seventy-five stars, of which Regulus (a double star) is the brightest. The Leonids, the best-known of meteor showers, radiate from a point in this constellation.

Lepidodendron, a fossil plant of gigantic height (nearly 100 ft.) bearing a cone-like fruit, frequently met with in the coal strata.

Lepidoptera, the order of insects to which the 90,000 butterflies and moths belong.

Lepidosiren, a genus of S. American lung-fishes. In times of drought these fish burrow in the mud, and breathe by means of the air bladder which functions as a lung.

Lepus, the constellation of the Hare, situated under the Orion group, and one of the constellations with which the ancients were familiar.

Lernæa, a crustacean parasitic on fish. This "fish louse," after entering upon its parasitic stage, loses its external organs.

Letters of Administration. *See* **D18** (2).

Lettres de Cachet, sealed letters which the kings of France issued to their agents to secure the imprisonment of distrusted or disliked persons without trial. Abolished in 1789.

Levée, a State reception held by the Sovereign or his representative and attended by men only.

Levellers, an English military-political party prominent about 1647 in the Parliamentary army, which advocated the rights of the people.

Lever, a rigid bar of metal or wood used for raising heavy bodies, and worked by means of a support called the fulcrum placed underneath the lever.

Lewis, a contrivance for stone-lifting, the principle of which was known to the ancient Romans; it consists of two dovetail tenons of iron or other metal, expanded by an intervening key in a dovetail-shaped mortice in the stone, and shackled by a ringed bolt to the hoisting chain.

Leyden Jar, the earliest form of electrical condenser. Its invention is usually credited to Muschenbroeck of Leyden (1745). It consisted of a jar coated inside and out with tinfoil for about two-thirds of its height and having its inner coating connected with the top by a brass knob and chain. The jar was charged by connecting it to an electrostatic machine.

Li, a Chinese distance measure, about the third of an English mile. Also a Chinese weight, the thousandth part of an ounce, or liang.

Lias, a geological term referring to the lower section of the Jurassic group, and mainly comprising shales and limestones.

Libel. *See* **D14** (2).

Liberalism has grown historically from protest, political, economic, social or ethical, against what were regarded as the authoritarian aspects of the modern state. Its aim has been to remove obstacles blocking human progress, to gain personal liberty in all fields, and fiscal liberty in the form of free trade. It is the successor of the Whig Party, which in the 17th and 18th centuries stood for the limitation of royal power. From 1830 to 1885, the Whig, later the Liberal, was the dominant Party in parliament. In 1886 it split on the Irish Home Rule question. The close of the 19th century saw the fortunes of Liberalism at a low ebb, but at the election of 1906 the party was returned to power with an overwhelming majority. Up to the beginning of the First World War, the Liberal Government carried through a bold programme of social reform which laid the foundations of the Welfare State as we know it to-day. After the Coupon election of 1918, the Liberal Party gradually lost its hold on the electorate, and its forces were further decimated by the breakaway of the National Liberals in early 1932. In the crisis of 1931 the Liberal Party had joined the National Government and had accepted tariffs under an agreement to differ, but in the following year Liberal Ministers resigned from the Government on account of their opposition to the Ottawa Agreements. Certain Liberal Ministers who remained in the Government formed the nucleus of the National Liberals, who from that period onwards have given general support to the Conservative Party. Modern Liberal policy calls for the protection of the rights of the individual; for the freeing of World Trade; for a system of profit-sharing to bring harmony into industry and create a property-owning democracy, and for full support for the United Nations. It supports social legislation and also private enterprise. On nationalisation, Liberal policy demands that no undertaking should be nationalised until it has been clearly shown by an impartial enquiry that State control and ownership is necessary in the interests of the community as a whole. Liberals supported the nationalisation of the coal-mines, the railways, gas and electricity on these grounds. They opposed the nationalisation of steel, and stated in the 1951 General Election that they were opposed to any further nationalisation. In the 1959 general election the liberals returned 6 members to Parliament and polled 1,640,761 votes (5·9% of electorate).

Libra, the Scales, one of the twelve Signs of the Zodiac, lying east of the Scorpion.

Libraries, before the invention of printing, were few, and collected together at enormous cost. At Nineveh remains of libraries, consisting of tablets of baked clay, have been discovered. There were two libraries at Alexandria containing a vast collection of rolls or volumes, founded by Ptolemy I Soter (367–283 B.C.) and established by Ptolemy II Philadelphus (309–246 B.C.). Among the great libraries of later times may be mentioned the Vatican Library at Rome, moved to its present premises in 1588; the Royal Library in Paris which later became the Bibliothèque Nationale; The Astor Library, New York; and in England, the Bodleian Library, Oxford, and the British Museum Library at Bloomsbury. Since 1850 public libraries have been established in all the chief cities and towns of the kingdom. The first lending library was opened in Edinburgh in 1726. Mudies' circulating library was founded in 1852. Rate-born expenditure on public libraries in Britain in 1956–57 was nearly £16 million. In most villages there is a "county library centre" to which collections of books are sent by the County Library. In Great Britain there are 24,000 centres of this kind in village clubs, halls, shops, schools, and even homes. In some counties there is a library van or the bibliobus, as it has been called by a French writer. This travelling library tours on a pre-arranged time-table so that everyone knows exactly when it will arrive. Four of the best special libraries in the world are open to the public in London. They are:

1. The Library of the National History Museum (for zoology, geology, and related subjects).
2. The Library of the Science Museum (all branches of science and technology, except medicine).
3. The Patent Office Library.
4. The Library of the Victoria and Albert Museum, which is the national art library containing volumes and photographs on all aspects of fine, applied, and decorative art.

Full details of the large number of specialist libraries in London (including that of the British Library of Political and Economic Science, one of the best collections in the world on this subject, at the London School of Economics) will be found in *The Student's Guide to the Libraries of London*, by R. A. Rye, published by the University of London Press and *The Libraries of Greater London*, by L. M. Harrod, published by G. Bell. *See also* **Bodleian Library, British Museum, India Office Library.**

Libration, an astronomical term referring to an apparent irregularity in the moon's course, which may be libration in longitude or latitude, or diurnal, and due to a variety of causes.

Libretto, the word-book of an opera or oratorio. Usually the composer and the librettist collaborate in the writing of an opera, but several composers (*e.g.*, Wagner) wrote their own libretti. Boito, librettist to Verdi for "Otello" and "Falstaff," himself composed two operas, "Mefistofele" and "Nerone."

Licence is a permission given to do some act, which, without such permission, it would be unlawful to do. It usually refers to permits issued on payment of excise duty. Licences are required for keeping carriages, dogs, for operating a television or wireless set, for driving a motor vehicle, for shooting game, for setting up as a bookmaker, for hawking and peddling, for selling beer, ale, wines and spirits, tobacco, patent medicines, etc.

Licensing Hours for the sale and supply of liquor are fixed by the Licensing Act, 1921, at 9 hours

for London on weekdays and 8 hours for the provinces with 5 hours on Sunday. Local authorities have the power to modify these hours for various reasons (Market day, etc.).

Lichens. In every lichen, two plants are associated (a condition called symbiosis)—one being an alga and the other a fungus. The fungus derives its food from the alga; probably the alga gains too from the association, being protected against desiccation by the fungus. Lichens are the first plants to colonise on bare rocks.

Lictor, a public functionary of ancient Rome whose duty was to carry out the orders of the magistrates, punish offenders, and attend upon his superiors on all public occasions.

Lieder, the plural form of the German word *Lied* meaning song. It is applied particularly to poems set to music by the German romantic composers, Schubert, Schumann, Brahms, and Hugo Wolff.

Lien, the right by which a person holding personal property of another can retain possession of it until some claim that he has against the original owner is satisfied.

Life-Boat was invented by three men, Lionel Lukin who converted a coble into a boat for saving life in 1785; William Wouldhave, who discovered how to make a boat right herself if she capsized, and Henry Greathead, who built a life-boat, partly from Wouldhave's model, in 1789. This boat was stationed at South Shields, which was the first permanent life-boat station to be established. It was not until 1851 that the first life-boat able to self-right was built, and a motor was first installed in a life-boat in 1904. Modern motor life-boats have engines of from twin-18 h.p. to twin-80 h.p., with a speed of nearly 10 knots. All coastal life-boats in this country are maintained by the Royal National Lifeboat Institution founded by Sir William Hillary in 1824. The service is maintained by voluntary contributions and costs over £400,000 a year.

Light. The first demonstration that light had a finite speed in empty space was made by the Danish astronomer Olaus Roemer in 1675. Einstein postulated that the speed of light *in vacuo* was a universal constant and the maximum speed anywhere in the universe. Measurements of the speed of light using radio waves made by Dr. L. Essen of the National Physical Laboratory in 1947 have led to a value of 186,282 miles per second, which agrees well with the latest measurements made in Sweden using light waves. The velocity of light is a fundamental physical constant, basically involved in atomic theory and astronomical measurements.

Light Year. A measure of astronomical distance, equal to the distance light travels in the course of a year. A light year is thus 5.88 million million miles. *See also* **F3** (2).

Lighthouses, to warn ships of dangerous places and indicate coasts, points, harbours, etc., have existed since the building of the Pharos, a tower of white marble 600 ft. high, built by Ptolemy II Philadelphus at Alexandria about 280 B.C. In early lighthouses the lights were simple fires. The most famous and one of the earliest British lighthouses is the Eddystone (which see). The introduction of parabolic mirrors was a great improvement, providing a reflecting medium which intensified the light beam in the required direction. Further improvements were made by Fresnel, Stevenson, and others. A new Dungeness lighthouse is planned which will be revolutionary in design and the first in Britain to be fully automatic in operation. It will be powered by a small but extremely powerful lamp, and electronic equipment will control all the operations from switching on the main beam at nightfall to detecting presence of fog and sounding fog signals. The lighthouses of England and Wales, the Channel Islands, and Gibraltar are under the control of Trinity House; Commissioners of Northern Lighthouses control those of Scotland; and the Commissioners of Irish Lights control the coasts of Ireland. Particulars of lights in all parts of the world are published for the guidance of navigation in the *Admiralty Lists of Lights*, compiled annually by the British Admiralty.

Lightning, the flash of a discharge of electricity between two clouds, or between a cloud and the earth, when the strength of the electric fields becomes so great as to break down the resistance of the intervening air. With "forked" lightning the actual path, often branched, is visible, while with "sheet" lightning the flash is hidden by the clouds which themselves are illuminated. "Ball" lightning is the name given to the luminous balls which have been seen floating in the air during a thunderstorm. The Boys camera has provided much information regarding the sequence of events in a lightning discharge. It is found that a flash consists of a number of separate strokes, usually four or five, and that the discharge of electricity to earth begins with a faintly luminous "leader" moving downwards and branching at intervals. As the ground is approached a much brighter luminosity travels back along the conducting channels, lighting up the several branches. The multiple strokes which follow in fractions of a second have the same "return" nature and are rarely branched. Lightning flashes to earth damage structures, cause loss of life and endanger overhead power systems, often interrupting electricity supply. Such storms generally affect radio transmissions and present hazards to aircraft. Thunder-clouds may develop energy far exceeding the capacity of our largest power generating stations.

Lightning Conductor, a metal rod, the upper part of which is of copper with a conical point, the lower portion being iron, which extends into the earth. Its effect is to gather to itself the surrounding electricity and discharge it into the earth, thus preventing its falling upon the protected building. In ships, lightning conductors are fixed to the masts and carried down through the ship's keel-sheathing. Benjamin Franklin was the first to realise the possibilities of lightning protection and, in 1752, carried out his famous experiment of drawing electricity from thunder-clouds, with the aid of a sharp-pointed conductor fixed to a kite.

Lignin, a substance found in the cell walls of plants, being particularly abundant in all woody fibres.

Lignite *or* **Brown Coal,** an intermediate substance between peat and coal; it is, in fact, undeveloped coal, and known as brown coal. The best-known deposits in Britain are the Bovey Tracey Beds in Devon.

Lillibulero, an old marching song composed by Purcell. With words by Wharton, it is said to have "sung James II. out of three kingdoms." During the second world war it was used by the B.B.C. as a station identification signal preceding news bulletins.

Lily Family (**Liliaceæ**), one of the largest families of flowering plants, with 200 genera and 2,500 species. It includes the true lilies (*Lilium*), tulips and hyacinths. Useful vegetables belonging to the family are the onion and asparagus. Most members are herbaceous plants; shrubs or small trees occur in the genera *Aloe* (Yucca) and *Dracæna* (Dragon-tree).

Lime, an alkaline earth obtained from kiln-heated limestone, and used in making mortars and cements; a valuable fertiliser, particularly on acid and clay soils.

Limes, trees of the genus *Tilia*, including some 30 species spread over north temperate regions The word is a corruption of "linden." Limes native to Britain are the small-leaved *T. cordata* and the broad-leaved *T. platyphyllos*. The hybrid *T. vulgaris* was introduced into Britain from the Continent during the 17th century and is frequently seen in streets and parks. Lime-wood was used by Grinling Gibbons for his fruit, flower, and bird decorations.

Limestone is carbonate of calcium. It is found in every geological formation, and is often highly fossiliferous. Marble is limestone that will polish after cutting.

Limpet, a marine mollusc with a single-valved shell, generally found sticking close to sea-washed rocks.

Linen, a textile fabric manufactured from flax fibre, known to the ancient Egyptians, and first manufactured in England under Henry III. by Flemish weavers. The chief seat of the manufacture is Ulster, with Belfast as the centre.

Dunfermline (famous for its damasks) and Manchester are also large linen-producing towns.

Ling, a sea-fish common on the coasts of Britain, and abounding in more northern waters. It averages from 3 to 4 ft. in length, and is a voracious feeder, living chiefly on small fish. Ling is also the name applied to *Calluna vulgaris*, the plant which most people called "heather."

Linseed, the seed of the flax plant, containing, apart from its fibrous substance, certain oily and nitrogenous matter of considerable commercial value. This yields linseed oil, and what is left is converted into cattle food.

Lion, the most impressive of the Cat tribe (Felidæ) of the order Carnivora. It is chiefly found in Africa, being comparatively rare in Asia. Its large square head, its flowing mane (in the males only), and its tufted tail distinguish it. From tip to tip it can reach a length of 10 ft.; a weight of 500 lb.

Lion and Unicorn, the supporting figures of the royal arms of Great Britain, date from the union of Scotland with England at the accession of James I. (James VI. of Scotland), the lion representing England and the unicorn Scotland.

Liqueurs are essences combined with alcoholic liquid, and are of many kinds, named according to their flavourings or place of production, and include Maraschino, Chartreuse, Curacoa, Benedictine, Noyau, Kümmel, etc.

Liquid, the name given to matter in such state that it takes its shape from the containing vessel. The volume it occupies is independent of the container, however. *See* **F16**.

Litanies were first used in church processions in the 5th century. The first English litany was commanded to be recited in the Reformed churches by Henry VIII. in 1545.

Lithium, a silver-white metallic element discovered by Arfvedson in 1817. It is softer than lead. Its main ores are lepidolite, spodumene, amblygonite.

Lithography, the art of drawing on stone and printing therefrom, was discovered by Alois Senefelder about 1796, and was introduced into England a few years later. Many improvements in the art have been made in recent years, especially in chromo-lithography and photolithography.

Litmus, a special kind of colouring matter produced from certain lichens. The resulting colour is violet; is turned red by acids and blue by alkalis.

Litre, a French measure both for liquids and dry articles. In the former measure it is equal to 1·76 imperial pints; in the latter to a cubic decimetre.

Liturgy, the name given to the Church ritual, though strictly applying only to the portion used in the celebration of the Eucharist. The present English liturgy dates from 1547–48, when it received the approval of Parliament.

Liverworts (Hepatics), plants related to the mosses and belonging to the second most primitive subdivision of the Plant Kingdom. There is no differentiation into stem and leaves. Liverworts are most common in damp situations, such as the banks of ditches.

Livre, an old French coin, the equivalent of the present franc. Not current since the end of the 18th century.

Lizard, the name given to a diversified order of reptiles, of which there are about 1,600 species. Included among the lizards are the geckos, chameleons, glass snakes, skinks, and blind worms.

Llama, mammals related to the camels, from which they differ in small size, absence of humps, and more woolly coat. The domestic llama of S. America is used as a beast of burden, also providing wool, meat, and milk.

Loach, a fresh-water fish, a common habitant of British rivers and streams. It has several barbels around its mouth, and is of a darkish-green colour on the back, with darker stripes and spots.

Loadstone *or* **Lodestone**, an oxide of iron, found chiefly in Sweden and Norway. Its scientific name is magnetite. It has the power of attracting pieces of iron and served as the first magnets used in compasses.

Loam, soil composed of clay and sand in such proportions as to keep the ground porous.

Lobby Correspondents are political correspondents of newspapers who do not report the actual proceedings of Parliament—this is done by Parliamentary Correspondents—but interpret political news and events.

Lobsters are marine crustacean animals existing in large numbers in the northern seas of Europe and America, and in fair proportion on some parts of the British coasts, especially in the neighbourhood of the Channel Islands.

Locarno, Treaty of, 1925, whereby Germany, France, and Belgium undertook to maintain their present frontiers and to abstain from the use of force against each other. Hitler broke the pact by re-occupying the Rhineland, the demilitarisation of which had been recognised by Germany.

Locust, insects of the grasshopper family, but much more powerful. They are inhabitants of hot countries, and often make their appearance in untold millions, like clouds, devastating all the vegetation that comes within their course. The locust-tree (*Ceratonia siliqua*) is supposed to have furnished food to St. John the Baptist in the wilderness, and its "beans" have accordingly been styled "St. John's Bread."

Loess, a deposit of silt or marl laid down by wind action. The biggest loess deposits are in Asia, the source of the dust of which they are composed probably being the deserts of Central Asia.

Log, a line used for reckoning the speed at which a ship is travelling. It was first used in the 16th century. The line is divided into spaces of 50 ft. marked off by knots and measured by a half-minute sand glass, bearing the same proportion to an hour as 50 ft. bear to a mile.

Logarithms, a system of calculation invented by John Napier in 1614, and developed by Henry Briggs a few years later. Thus if a number is expressed as the power of another number, *i.e.*, if $a = b^n$, then n is said to be the logarithm of a to base b, written $\log_b a$. Common logs are to base 10 and Napierian to base 2·7182818 . . ., expressed as e. Their use represents a great saving of time.

Logical Positivism, a school of philosophy founded in Vienna in the nineteen-twenties by a group known as the Vienna circle; their work was based on that of Ernst Mach, but dates in essentials as far back as Hume. Of the leaders of the group, Schlick was murdered by a student, Wittgenstein came to Britain, and Carnap to America following the entry of the Nazis. Briefly, the philosophy differs from all others in that, whilst most people have believed that a statement might be (*a*) true, or (*b*) false, Logical Positivists consider there to be a third category. A statement may be meaningless. There are only two types of statement which can be said to have meaning: (1) those which are tautological, *i.e.*, those in which the statement is merely a definition of the subject, such as "a triangle is a three-sided plane figure" ("triangle" and "three-sided plane figure" are the same thing), and (2) those which can be tested by sense experience. This definition of meaningfulness excludes a great deal of what has previously been thought to be the field of philosophy; in particular, it excludes the possibility of metaphysics. Thus the question as to whether there is a God or whether free-will exists is strictly meaningless, for it is neither a tautological statement nor can it be tested by sense-experience.

Lollards, a body of Reformers who, under the leadership of Wyclif, were subjected to cruel persecution in the reign of Richard II. Sir John Oldcastle was a prominent Lollard, and was burned at the stake.

Lombards, the name given to a community of Italian merchants who settled in England in the 13th century and first became prominent as moneylenders and later as bankers. Lombard Street derives its name from them.

London Clay, geological stratum which outcrops in various parts of London, notably at Highgate. It represents the lower stratum of the Eocene. Outside the metropolis, brickfields utilise the clay for brickmaking. Water held above this impervious stratum is tapped by a number of artesian wells in London. The tunnels of the Captial's underground railways run through the London Clay.

Londonderry, Siege of, by James II.'s army in 1689, lasted 105 days. The garrison and inhabitants were driven to famine, but held on until the siege was raised.

London University comprises nearly one-third of the academic activity of the United Kingdom, and is recognised as one of the great universities of the world. Originated in the foundation of a non-sectarian college in Gower Street in 1828. Among the chief colleges are: University, Kings, Imperial College of Science and Technology, London School of Economics, School of Oriental and African Studies, Queen Mary, Birkbeck, and the 4 women's colleges, Royal Holloway, Bedford, Westfield, and Queen Elizabeth College. London University was the first to throw open all degrees to women (1878).

Long Distance Routes. The National Parks and Access to the Countryside Act 1949 provided for the establishment in England and Wales of Long Distance Routes for walkers and where possible for horse riders. The first routes chosen were the Pennine Way (a magnificent hill walk of 250 miles from Edale in Derbyshire along the Pennines over the Cheviots to the Scottish border); the Cornwall and Pembrokeshire coasts; and Offa's Dyke which runs some 168 miles along the marches of Wales. Surveys are also being made of a way from Beachy Head to Salisbury; the Pilgrim's Way; and a walk over the Chiltern and Berkshire Ridges, the Marlborough Downs and so to Seaton. (*See also* **National Parks.**)

Longitude of a point on the earth's surface is the angle which the meridian through the poles and that point makes with some standard meridian. The meridian through Greenwich is usually accepted as the standard meridian and the longitude is measured east or west of that line. As the earth revolves through 360° in 24 hrs., 15° longitude represent 1 hour's difference in apparent time.

Long Parliament (1640–60), marked the end of Charles I's 11-year attempt to govern without parliament. It carried through what has come to be called " the English Revolution " and was the parliament of the civil war (1642–49).

Lord, a title of honour held by such as are peers of the realm, and bestowed on persons who have achieved distinction or inherited by descent. It is also borne by Bishops, on spiritual and ecclesiastical grounds, and is accorded as a courtesy to the eldest sons of dukes, marquises, and earls, to the younger sons of dukes and marquises, and to Judges of the High Court in England and Scotland.

Lord Lieutenant is the Queen's representative in the county, and his office is now largely ceremonial. On his recommendation the magistrates or Justices of the Peace are appointed by the Lord Chancellor. The office was created by Henry VIII. in 1549 to take over the military duties of the sheriff.

Lords, House of, the Upper House of the British Parliament composed of Lords Spiritual and Lords Temporal. The former consist of the Archbishops and twenty-four English Bishops and the latter of Peers. The full membership is about 800. The right of the Lords to veto Bills passed by the Commons is restricted by the Parliament Acts of 1911 and 1949. The Lord High Chancellor presides over the House of Lords. (*See* **C7** (2) for an account of the limitation on its power of veto, *also* **C10**.)

Louis d'Or, a French gold coin of the value of 24 francs, first issued by Louis XIII. in 1640, but superseded by the Napoleon, or 20-franc piece.

Louse, parasitic insect found on the skin of birds and mammals. The bird or biting lice make up one order (*Mallophaga*); the true or sucking lice belong to another order, called *Anoplura*. Two species of lice parasitise man, and one of these, the body louse, is a carrier of typhus.

Louvre, one of the old royal palaces of Paris, was built in its present form partly by Francis I., and added to by later monarchs, Louis XIV. completing the edifice. Napoleon I. turned it into a museum and enriched it with the plunder of many foreign art galleries. The great extension to the Louvre building begun by Napoleon I. was completed under Napoleon III. in 1857. Much injury was done to the building during the Commune of 1871. Amongst other famous treasures it houses the Venus de Milo and Leonardo da Vinci's masterpiece, " La Gioconda."

Lovebird, a vivid little bird native to Africa, resembling a parrakeet but with a short, wide tail and short body. Lovebirds build nests, parrakeets do not.

Luddites, a combination of workmen formed in 1811, in a period of great distress, with the object of destroying the new textile machinery then being largely adopted, which they regarded as the cause of their troubles. Their first outbreak was at Nottingham, and was stated to have been started by a young apprentice named Ned Ludd. Afterwards, serious Luddite riots occurred in various parts of the country, especially in the West Riding of Yorkshire, where many people were killed, mills were destroyed, and numbers of rioters were tried and executed. Charlotte Brontë used the period in her novel, *Shirley*.

Luniks, the name of the Soviet moon rockets. *Lunik I*, launched 2 Jan. 1959, with payload of 800 lb. and max. velocity of 25,500 m.p.h., entered a solar orbit between Earth and Mars to become the first man-made planet. *Lunik II*, launched 2 Sept., 1959, with payload of 860 lb., and max. velocity of 25,500 m.p.h., landed on the moon. *Lunik III*, launched 6 Oct. 1959, with payload of 613 lb. and max. velocity of 24,500 m.p.h., circumnavigated the moon and took a photograph of its hidden side which it televised back to Earth. *See also* **F49** (2).

Lunar Month, the period in which the moon makes its revolution around the earth—about 29½ days.

Lung Fishes *or* **Dipnoi.** In these fishes an air bladder, which can be filled with air gulped in through the mouth, functions as a lung. This method of breathing enables them to survive in the muddy bottom of dried-up streams and swamps. They occur in Australia, Africa, and S. America.

Lupercalia, yearly festivals held in ancient Rome in honour of Pan.

Lute, a stringed instrument of the guitar type of unknown antiquity. Its name is Arabian. Lute music was very popular in England in the 17th century. There has been a revival in this century.

Lutecium, element of the rare-earth metal group discovered in 1907 by Urbain.

Lynch Law is the dealing out of summary punishment to offenders by private individuals without appeal to the law. It is said to get its name from one Charles Lynch, a Virginian planter, who in the latter part of the 18th century was accustomed to take into his own hands the punishment of offenders. Instances of lynch law have been frequent in the United States, and generally result in the carrying out of a rough and ready death sentence, negroes often having been the victims.

Lynx, cats of sturdy build, with tufted ears and spotted fur, inhabiting many parts of the world, including Northern and Central Europe. They commit serious ravages among sheep and goats and are very fierce.

Lyon King of Arms, the President of the Scottish Lyon Court, and head of the heraldic organisation for Scotland.

Lyre, an upright stringed instrument rather like a miniature harp. It was the universal musical instrument of classical Greece and Rome.

Lyre-Bird, a remarkable genus of Australian birds, the males of which possess a beautiful lyre-shaped tail. The bird is not more than 15 in. long, but its tail, which it displays to advantage during its remarkable courtship dance, is 23 in. in length.

M

Macadamising, the system of road-making invented by John Macadam (1756–1836). The road bed is laid with hard broken stones, of a nearly uniform size, which by the weight of the traffic alone soon assume firmness. Nearly all the main country roads are macadamised.

Macaque. A family of monkeys which include the Barbary ape (specimens of which live on Gibraltar), the Rhesus macaque (the organ grinder's monkey and the one used for experimental work in the investigation of disease), the Bonnet monkey of southern India and

Ceylon, the Crab-eating, and the Pig-tailed monkeys of south-eastern Asia.

Macaw, a genus of large parrots with brilliant scarlet and sky-blue plumage, with interminglings of green. Native to South and Central America.

Maccabees, a patriotic Jewish family whose achievements in early history were very notable. The revolt of the Maccabeans in the 2nd century B.C., in which Judas captured Jerusalem and purified the Temple, is the most famous exploit connected with this historic name. The feast of the Maccabees is celebrated with rejoicing in December.

Mace, originally a weapon of offence, now an ensign of authority borne before officers of state and other dignitaries. At the present day, among others, there are maces for the Speaker of the House of Commons, the Lord Mayor of London, and other mayors. The mace-bearer is the functionary who on ceremonial occasions carries the symbol of authority before judges and civic or state officials.

Macedonians, a sect formed by Macedonius, Bishop of Constantinople, in the 4th century, who denied the existence of the Holy Ghost. The Papal Council expelled the bishop and his followers from the Church in 360.

Mach Number. Unit of high-speed flight. The ratio of speed of flight to speed of sound under same conditions of pressure and density. Speed of sound at sea-level is 762 m.p.h., so flight speed of 381 m.p.h. is equivalent to a Mach Number of ½. At supersonic speeds the Mach Number is greater than 1; subsonic speeds, less than 1. *See* **F69** (1).

Machinæ Organa, defined in the 10th book of Vitruvius as "contrivances for the concentration and application of force," and known by the names of instruments, engines, and machines.

Mackerel, a familiar sea-fish existing in large numbers in the northern waters of both hemispheres. In May and June immense shoals are to be found round the British coasts.

Madder, one of the most important of dye-stuffs, largely used in producing Turkey-red dye, but now superseded by artificially prepared alizarin. Natural madder is the root of the *Rubia tinctorum*.

Mad Parliament, held in 1258 at Oxford to settle the differences between Henry III, and his barons. It resulted in the Provisions of Oxford, which provided for an advisory council of fifteen for the king that was to meet twelve representatives of the barons three times a year for consultation. The plan was operative until the rising of the barons under Simon de Montfort in 1263.

Madrepore, a white coral-like substance consisting of carbonate of lime, formed by the gradual growth of polyp deposits, and abounding in tropical seas.

Madrier, a term in military engineering denoting a beam laid in a ditch to support a wall, or in a mine to hold up the sides or roof: also an armoured plank affording protection against hostile fire, or fitted to receive the mouth of a petard in attacks upon obstacles.

Madrigal, a style of unaccompanied composition for three or more voices. Developed in the Netherlands, it reached perfection in 13th-century Italy. Brought to England during the Renaissance it achieved great popularity and many English composers became famous for their madrigals.

Madwort, a common name of the botanical genus alyssum.

Maelstrom, a great whirlpool. The most famous is that off the coast of Norway, between the islands of Moskenës and Mosken, of the Lofoten group, the power of which has been much exaggerated.

Mafia, a secret Sicilian society formed for purposes of vengeance, private and public, prominent about 1860, and again after the second world war.

Magenta, an aniline dye discovered in 1859 by Sir W. H. Perkin, and named after the great battle of that year between the French and Austrians.

Magi, priests of the Persian fire-worshippers. Their sacred fires blazed in the open air, and around them they performed their mystic rites. Zoroaster, their great reformer, flourished about 615 B.C. It was not till thirteen centuries later that Parseeism in Persia was superseded by Mohammedanism, and the only representatives of the old worship now left are the Parsees of India.

Magic, a term applied to the pretended art of influencing the course of events by supernatural means. According to some a primitive stage of belief in magic precedes the establishment of religion. Magic has been practised in all countries and in all ages. The priesthood of ancient Egypt was notably proficient in these arts, and much early ritual seems to have been magical in intent, including the rite of sacrifice. The powers of the gods themselves are often attributed to magic in Egyptian, Babylonian, Vedic and other mythologies The practice of magic continued in Europe during the Middle Ages in spite of the efforts of the Church. Magic took various forms—the cure of disease, predictions, and the gratification of personal desires. Thus, there was *black magic*, which communed with evil spirits; *white magic*, dealing with good spirits; and *natural magic*, the science of the occult; while *astrology* and *alchemy* were the advanced outcome of these superstitions. In a primitive state of culture when conditions are difficult and knowledge limited, man in his despair resorts to magical practices to bring about his desires.

Magic Lantern, an apparatus for throwing pictures on a screen, invented by Kircher in the 17th century, and consisting of a lantern, behind the light of which is a reflector, while in front is a tube carrying a condensing lens, this being supplemented by a double convex lens which enlarges the object to be shown.

Magistrates *or* **Justices of the Peace** preside over courts of petty sessions, and are appointed by the Lord Chancellor on the recommendation of the Lord Lieutenant of the County. There are some 25,000 magistrates in Britain, of whom about 1,000 are women. They are unpaid. Mayors during their time of office at J.P.s *ex officio*. In certain big towns a barrister known as a stipendary magistrate is appointed to act as full-time salaried magistrate. There are 28 stipendaries in London known as Metropolitan Police Magistrates. *See* **C11** (1).

Magna Carta was sealed by King John at Runnymede on June 15, 1215, in obedience to the insistent demands of the barons, and has been confirmed many times by later monarchs. It was not a revolutionary document. It laid down what the barons took to be the recognised and fundamental principles for the government of the realm and bound king and barons alike to maintain them. Its main provisions were that no man should be punished without fair trial, that ancient liberties generally should be preserved, and that no demands should be made by an overlord to his vassal (other than those recognised) without the sanction of the great council of the realm.

Magnesium, a metallic element, first isolated in 1808 by Sir Humphry Davy, who prepared it by electrolysing the chloride. Its chief ores are magnesite and dolomite. Industrially it is obtained by electrolysis. Many important light alloys contain magnesium. The metal burns with a very bright light, and for this reason it is used in photographers' flash bulbs and also in firework manufacture.

Magnetic Poles are at a considerable distance, of the order of 1,000 miles, from the geographical poles, and are not antipodal to one another. The poles do not remain fixed, and the North pole wanders more than the South. The position of the North magnetic pole is in the region of lat. 74° N.; long. 100° W., considerably north of Amundsen's observations of 1904. The South magnetic pole is not far from lat. 70° S.; long. 150° E.

Magnetic Storms, large irregular disturbances superimposed upon the normal magnetic field of the earth. They may occur at any time, but are most frequent during equinoctial months and in years of sunspot maxima. World-wide in extent, magnetic storms are most pronounced in the polar regions, being due apparently to intense electric currents located in the upper atmosphere near to the zones of greatest auroral frequency. One theory attributes the high ionisation of these

belts to solar radiation. Magnetic storms cause radio fade-outs and interfere with telegraphic communication.

Magnetism, the quality of attraction for iron possessed by the lodestone or magnet-stone, was known to the ancient Greeks, Chinese, and Arabians. Later, perhaps about the time of the Norman Conquest, it was discovered that lodestone or magnetised iron, if freely suspended, sets itself north and south. This discovery led to the invention of the mariner's compass. Basic law of magnetism is "like poles repel, unlike poles attract," and this was formulated by Peter the Pilgrim in 1269. The earth acts like a huge magnet with its axis inclined at about 10° to the axis of rotation, the magnetic poles being on the Boothia Peninsula (North Canada) and South Victoria Land (Antarctica). The magnetic field at the surface consists of the regular field of a magnetised sphere with an irregular field superimposed upon it. Variation in the magnetic forces occurs from place to place and from time to time, and maps showing the distribution over the globe of points of the same declination (*i.e.*, the angle which the magnetic meridian makes with the geographical one) are of the utmost importance in navigation. In the south-east of the British Isles, at present, a magnetic needle points 9° and in the north-west 14° west of true north. Little is known regarding the origin of the main (regular) field of the earth, but it is believed that most of the irregularities are due to the presence of intense electric currents in the upper atmospheres. *See* **F17–18.**

Magnificat, the hymn of the Virgin Mary, given in Luke 1, 46 beginning in the Vulgate with the words "Magnificat anima mea Dominum" ("My soul doth magnify the Lord"), and used in the services of all Christian Churches.

Magnitude in astronomy is a measure of the apparent brightness of a star, which is inversely proportional to the square of its distance. A low number indicates a bright star, and a high one a faint star. The *absolute magnitude* is a measure of *real* brightness, *i.e.*, the brightness a star would have at a standard distance away of 32·6 light years. The distance can be calculated if the apparent and absolute magnitudes are known.

Magnolia, the type of the botanical family *Magnoliaceæ*, comprising many beautiful trees, and shrubs with large and fragrant flowers, and chiefly native to North America and Asia.

Magpie, a well-known bird of the crow family, of glossy black and white plumage, famed for its mischievous propensities.

Magyars, the Hungarian race who came to eastern Europe from S.W. Asia and settled in Hungary in the 10th century. Their language belongs to the Finno-Ugrian group.

Mahdi, an Arab leader of great influence, invested with powers akin to those of a Messiah in the Mohammedan mind. The title was taken by Mohammed Ahmed, who overran the Egyptian Sudan, and in 1885 captured Khartoum.

Mahogany, a fine hard wood susceptible of a very high polish, and distinguished for the beauty of its colour and markings. The tree which produces this wood (*Swietenia mahogani*) is a native of the West Indies and tropical America. Mahogany is said to have been first brought to England by Raleigh in 1595.

Mahrattas, a warlike people strongly opposed to the East India Company in the 18th and early part of the 19th centuries, but subdued in 1818.

Maidenhair Tree *or* **Ginkgo.** This tree takes its name from the shape of its leaves, which resemble those of the maidenhair fern. Widely cultivated in China and Japan. It is the only survivor of an order of gymnosperms which flourished in Mesozoic times. Botanically remarkable in that the pollen tube contains two sperms which are motile.

Mail-Coaches, which are usually regarded as things of a very distant past, did not come into existence till 1784, when Mr. John Palmer, of Bath, put the first mail-coach on the road between Bath and Bristol. They were soon afterwards adopted in other parts of the kingdom, and were employed in carrying the mails until superseded, in great part, by railways. The present mail vans carry no passengers.

Maize, an important cereal largely grown in U.S.A., Argentine, Rumania, China, India, and Union of S. Africa, commonly known as Indian corn in the U.S.A.

Majolica, a kind of pottery carrying a highly coloured glaze or enamel, supposed to have been introduced into Europe by the Moors from Majorca, in the 15th century, and brought to a high degree of artistic beauty in those days. Raphael and other great artists made designs for the ware. After the 16th century majolica production practically ceased, though in recent times some clever imitations of the old ware have been manufactured.

Major Scale. (*See* **Diatonic Scale.**)

Malacostraca, the sub-class of the Crustacea to which the lobsters, crayfish, shrimps, belong.

Malays, a race of people with oblique eyes, high cheek bones, and brown skin, whose native countries are Malaya, Polynesia, the Philippines, and Madagascar.

Malmaison, château at Rueil-Malmaison, a western suburb of Paris. It derives it name from having been inhabited in the 11th century by the Norman brigand Odon, and afterwards, according to the tradition, by evil spirits, exorcised by the monks of St. Denis. It was the residence of Napoleon and of the Empress Josephine after her divorce. She died there in 1814 as the result of a chill caught while showing the Russian Emperor round the grounds. In 1900 it was given to the nation.

Malmsey, a strong, sweet wine originally made in Greece, but now also in Spain, Madeira, and the Azores; known also as Malvoisie.

Malt is barley grain which has gone through a steeping and preparing process to render it suitable for brewing purposes. It was for a couple of centuries subjected to a fluctuating duty, producing in 1863 a sum of £6,273,727. The tax was abolished in 1880.

Maltose, a sugar formed in cereal grains during germination. It is produced by hydrolysis of starch, and further hydrolysis converts the maltose into glucose.

Mamluks, commonly known as Mameluks, were originally—in the 13th century—a bodyguard of Turkish and Circassian slaves in the service of the Sultan of Egypt, and attained such influence that in 1250 they were strong enough to appoint one of their own body to the throne of Egypt. After that a succession of Mamluk Sultans reigned down to 1517. Then the Turks annexed Egypt, and the Mamluks were taken into the service of the Beys. They again came to the front after Napoleon's conquest of Egypt, and for a time resumed governmental sway; but in 1811 they were decoyed into the citadel of Cairo and massacred by order of Mehemet Ali.

Mammalia, a zoological term covering all that portion of the animal kingdom, the females of which are provided with mammary glands for suckling their young. A further characteristic is the double articulation of the skull with the vertebral column. *See* **F25** (1).

Mammoth, extinct elephants of gigantic size. In 1799 the first perfectly preserved specimen was found in Siberia in a block of ice. It was in prehistoric times an inhabitant of Britain and other parts of Europe, as well as of Asia and America.

Mammoth Cave of Kentucky, about 10 miles long, is one of a series of spacious caverns formed in the limestone rock formation, and is from 40 to 300 ft. wide and at one point 300 ft. high. Stalactites and stalagmites abound.

Manatee, an aquatic mammal of the sea cow (Sirenia) order of mammals, averaging when full grown from 10 to 12 ft. in length, with shovel-shaped tail, and four limbs and nails which almost give the appearance of arms and hands. In spite of their ungainly aspect, these creatures are believed to have given rise to the legend of mermaids.

Manchus, the original nomadic race inhabiting northern Manchuria who invaded China early in the 17th century. A Manchu dynasty occupied the imperial throne of China from 1644 to 1911.

Mandamus, a writ of command issued from the Queen's Bench Division of the High Court addressed to any person, corporation, or inferior

court requiring them to do something which appertains to their office.

Mandarin, the name given to a powerful Chinese official, civil or military under the old régime, whose rank was shown by the wearing of a button on the cap. In Chinese the name is Kwan.

Mandible, the lower jaw in human anatomy. The two parts of a bird's beak are known as the upper and lower mandible. The term is also used for biting jaws in arthropods.

Mandoline, an Italian fretted guitar, so called from its almond conformation.

Mandrel, a cylindrical bar or spindle used for a variety of purposes in engineering.

Manganese, a metallic element discovered by Scheele in 1774. It is silver-white, not very hard (it forms a hard alloy with carbon), brittle, and tarnishes when exposed to air. Its chief ore is pyrolusite (manganese dioxide). Steels containing manganese are very tough, and used for making machine parts.

Manikin, a dwarf or pigmy; an artificial figure employed in anatomical demonstrations, made sometimes of papier-mâché.

Maniple, eucharistic vestment worn over left arm.

Manna, a tree of the ash genus growing in the South of Europe and in the East, and exuding a sweet substance which is gathered, boiled, and eaten.

Manometer, instrument used to measure gas pressure. Usually a U-tube containing water or mercury, one end open to the atmosphere, the other to the gas whose pressure is to be measured. More sensitive for small pressures than the Bourdon gauge.

Manors were estates originally granted in Anglo-Saxon times as rewards for knightly service, and included the privilege of a special court with jurisdiction, criminal and civil, within the manorial territory. (*See* **Court-Leet.**)

Mansion House, the official residence of the Lord Mayor of London, stands opposite to the Bank of England, and was erected in 1739–53 from the designs of George Dance.

Mantis. Large insects belonging to the same order as the locusts and grasshoppers. The manner in which the forelegs are held, as though in suppliance, has gained for these insects the common name of "praying mantis." They are distributed throughout the warmer countries of the world.

Manuals, the keyboards of an organ which are operated by the hands as apart from the pedals which are worked by the feet. In a large organ there may be four manuals, each controlling a group of stops. These groups are called great organ, swell organ, choir organ, solo organ.

Manx, the original Celtic inhabitants of the Isle of Man, where a Celtic dialect still lingers.

Maoris, the race found in New Zealand at the time of its discovery by Europeans. The Maoris are believed to have migrated from Polynesia about 1350. They number 155,546 (1959), and being very intelligent people have adapted themselves with considerable success to the conditions of civilised life. Until 1870 they were frequently in arms against the Government, but since then have settled down with the Whites as equal citizens.

Maple, trees native to the northern hemisphere. There are over 100 species. The sycamore is the best-known species growing in Britain. The sugar maple abounds in Canada and the eastern parts of the United States. The sugar is tapped by boring holes in the tree in Feb. and Mar., and the juice that escapes is collected and evaporated. The maple-leaf is the Canadian national emblem.

Maquis, name of the dense scrub in Mediterranean France and Corsica, providing good cover for bandits and outlaws. The French resistance movement adopted the name Maquis during the German Occupation, 1940–45.

Marabouts, Mohammedan hermits or monks, especially amongst the Moors and Berbers of N.W. Africa. They live in monasteries or attached to mosques and are held in great veneration by the Berbers.

Marble is limestone in its hardest and most crystalline form. There are many varieties—33 were used in the building of the Paris Opera House—but white is the purest and rarest. From about 568 B.C. white marble was used by the Grecian sculptors for their statues. Rome was rich in marble buildings and monuments, and Palmyra was mainly built of white marble. Devonshire and Derbyshire yield the best English marbles, and several localities in Ireland furnish particular kinds. Vermont, Massachusetts, and Tennessee are the chief marble-producing States of America. The American marbles are mostly light grey. The Marble Arch, at the northern entrance to Hyde Park, was originally built for the front of Buckingham Palace.

March, the third month of the year, and the first of the old Roman Calendar. It was named after the god Mars, and was the *Hlyd* (storm) *monath* of the Anglo-Saxons.

Mardi Gras, the last day of the Carnival in France, Shrove Tuesday.

Mares' Tails, term popularly applied to high (cirrus) cloud when it appears in tufts or feather-like plumes.

Mariner's Compass. (*See* **Magnetism.**)

Mariolatry, a term applied by non-Catholics to the worship (hyperdulia) of the Virgin Mary, began in the 4th century, and still a prominent part of Roman Catholic religious observances.

Marionettes are puppets moved by strings. They originated in the *Fantoccini* of the 15th century which had such vogue in Italy and are still popular, being adopted in Germany and England later. Our *Punch and Judy* is a version of Punchinello.

Marl, a rock composed partly of clay and partly of carbonate of lime or magnesia. Usually grey in colour.

Marlinspike, a pointed iron tool used by sailors to splice wire. The instrument used when rope splicing is called a fid.

Marmoset, small monkeys confined to the New World. Very squirrel-like in appearance, with long bushy tails, and thick woolly fur, they are pretty little animals and the smallest of all monkeys. There are claws, not nails, on their digits, the big toe excepted.

Marprelate Tracts, seditious pamphlets written with great maliciousness by a group of Elizabethan puritans about 1586, and intended to discredit the episcopacy, caused a great sensation in their time, and led to the execution of their supposed author, John Penry.

Marquess *or* **Marquis,** the title next in precedence to that of duke. The first English marquess was Rovery de Vere, Earl of Oxford, who had the honour conferred upon him by Richard II. in 1385.

Marquetry, a kind of inlaying in which thin layers of coloured woods are wrought into a design, and mainly used in ornamental floors.

Mars, the fourth nearest planet to the sun, being 141,500,000 miles distant. Its diameter is 4,215 miles as against the earth's 7,920. There has been much speculation about certain dark lines which some observers have seen on the surface of Mars; photographs give no support to the theory of an artificially constructed network of canals, but it is possible they represent areas covered by some simple form of vegetation of the lichenous type. The temperature of the planet's surface would allow living organisms as we know them to exist, but the quantity of oxygen in the atmosphere would be almost certainly too little to support animal life.

Marseillaise, the French national hymn, written and composed by Rouget de L'Isle, a French engineer officer, who was inspired to write it in 1792 to encourage the Strasburg conscripts. It immediately became popular, and received its name from the fact that it was sung by the Marseillaise troops while marching into Paris.

Marshalsea Prison, a once well-known house of detention in Southwark. It stood near St. George's Church, and was originally a prison for royal servants convicted of offences, but from 1842 to 1849 was a debtors' prison. It was abolished in 1849. Dickens described it in *Little Dorrit.*

Marsh Gas. (*See* **Methane.**)

Marsh Tortoise, an amphibious animal of the order *Chelonia,* spread over many countries and inhabiting ponds and small rivers. There are 42 species, and they are all carnivorous.

Marston Moor, near York, was the scene of the famous battle between Prince Rupert and his

forces against Cromwell and his troops on July 2, 1644. Cromwell was victorious, and this formed the turning-point in the Civil War.

Marsupials, mammals having a marsupium or pouch; the young are born of comparatively small size and imperfectly developed, but are transferred to the maternal pouch. Except for the oppossums of America, all marsupials occur in Australasia. Well-known marsupials are the kangaroos, wallabies, and wombats.

Martello Towers, circular forts erected on the coasts of England early in the 19th century as defences against the threatened Napoleonic invasion. So called from the circular fort at Mortella (Corsica), which resisted an English fleet in 1794.

Marten, carnivorous animals of the weasel family, one species of which was once common in Britain, but now seldom met with. Many valuable furs come from martens, *e.g.*, the sable of N. Asia and the marten of N. America.

Martial Law is a term loosely employed to indicate the suspension of the administration of normal civil law and its replacement by military authority when this is rendered desirable by such circumstances as war or rebellion.

Martin, a well-known bird-visitor to Britain. It belongs to the swallow family, and the two species that spend their summers here are the house-martin, which makes its nest of mud under the eaves of houses, and the sand martin, which builds in sandy banks.

Martingale, a long strap or thong of leather, one end of which is fastened to the girth of a horse, between the fore legs, and the other to the bit, or to a thin mouthpiece of its own.

Martinmas *or* **St. Martin's Day**, falls on Nov. 11, and is one of the Scottish quarter days. St. Martin was a popular Saint with our ancestors, and Martinmas was a busy time for the mediæval housewife. It was the date when "Martlemas Beef" was dried in the chimney, and enough bacon and mutton cured to last until the spring, because, owing the the scarcity of winter fodder, fresh meat could seldom be obtained. This diet of dried meat without vegetables caused scurvy, King's evil, leprosy, and other maladies. Originally the goose belonged to Martinmas, not to Michaelmas, the legend being that when Martin was elected Bishop of Tours he hid himself, but was betrayed by the cackling of geese. He died in the 4th century. The spell of fine weather sometimes occurring at Martinmas is called St. Martin's Summer.

Martyrs. People who suffer death in testimony to their faith. Stephen was the first Christian martyr in 39. The first English martyr was St. Alban, 286, and in Tudor times many eminent churchmen went to the stake at West Smithfield, in London, and at Oxford, where now exists the "Martyrs' Memorial." There is a Martyrs' Memorial Church in St. John St., Clerkenwell, not far away from the scene of the Smithfield fires.

Marxism. The doctrine formulated by Karl Marx and Friedrich Engels about the middle of the 19th century and the basis of modern Communist theory (with the new addition of the works of Lenin and Stalin). Marxist thought was strongly influenced by that of Hegel, but the Idealism of Hegel was transformed into the Materialism of Marx and Engels. The most important aspect of Marxism is its interpretation of history, which is seen as the history of class struggles according to the law of the dialectic described by Hegel. (*See* **Idealism.**) Thus the Feudal System with its land-owning aristocracy was thesis to the antithesis of the rising merchant class, and the result (synthesis) was the modern capitalist system, which in its turn will be thesis to the working-class's antithesis leading to the classless society. Differing ideologies and, in fact, differing cultures, all are produced by the economic relations within a society; thus all ideologies are a form of propaganda for the ruling class. (*E.g.*, Darwin's theory of the struggle for existence was a justification of the capitalist's attitude to the working-class.) Marxism also implies an economic theory based on the concept of surplus value, and is applied to physics, biology, and all other sciences in the form of dialectical materialism. Although the work of Marx has led to a greater understanding of society and contains much truth, few other than Communists accept the theory wholeheartedly. Anthropologists accept that the material and technological structure of a society influences the ideologies and the way of life of the individuals within it, but they would not agree that it completely determines them. Furthermore, they point out, most societies have not been arranged on a class basis.

Mason and Dixon's Line is the boundary line separating the old Slave States of America from the Free State of Pennsylvania. It was drawn by two English surveyors, Charles Mason and Jeremiah Dixon, between 1763 and 1767.

Masquerades are balls or dances at which those who take part appear masked or in character. Edward III. was fond of this type of entertainment. Pepys and Evelyn mention a masquerade held at Whitehall on Feb. 2, 1665. This form of revel became a craze in London at the beginning of the 18th century. In modern times it survives in the fancy dress ball.

Masques were light dramatic compositions set to music and performed on special occasions. One of the best-known examples is Milton's "Comus," which was given at Ludlow Castle in 1634.

Mass, the service in the Roman Catholic Church in which are enacted and enshrined Christ's words and actions at the Last Supper. It is high or low, *i.e.*, performed with full choral service, or merely by the rehearsal of prayers without singing. Mass was first celebrated in Latin in the 4th century, and was introduced into England in the 7th century.

Mass Spectrograph, an instrument for separating isotopes. It works by sorting electrified particles according to their masses; the particles stream through a magnetic field, and the lightest particles undergo the greatest deflection.

Massorah, a collection of criticisms on the Hebrew text of the Scriptures, and rules for its correct interpretation.

Mast, a long round piece of timber or tubular steel or iron, standing upright in a vessel, and supporting the yards, sails, and rigging in general. The earliest ships had only one mast, carrying a simple sail. The number increased until there were 4 or 5, or even more. Above the lower mast of a sailing-ship comes the topmast, and above that, the topgallantmast and royalmast. The position of each mast is indicated by a prefix, as foremast, foretopmast, foretopgallantmast, foreroyalmast, mainmast, maintopmast, etc. The foremast is in the fore of the ship, the mainmast in the centre, and the mizzen nearest the stern. In large vessels nowadays the mast does not extend to the keel, as it formerly did, but is usually stopped at the second deck.

Master of the Revels was an important Court official upon whom devolved the arrangement of Court festivities. The office is at least as old as the time of Edward III. By 1737 it seems to have died.

Master of the Rolls, one of the English judges, formerly a judge of Chancery, but since 1881 a judge of the Court of Appeal only. In addition he has charge of the rolls or records of Chancery and ranks next to the Lord Chancellor and Lord Chief Justice.

Mastodon, an extinct order of quadruped closely resembling the elephant in structure, but much larger.

Materialism is the philosophical belief that the basic stuff of which the universe is made is matter, and that everything in the universe is either matter or derived from matter. The earliest materialists were the Greek philosophers of the Ionian School in Asia Minor—Thales of Miletus, Anaximander, and Anaximenes (*c.* 600–550 B.C.). After Plato, the philosophy of materialism seemed to be discredited and was little heard of until the 19th century, when advances in physical science seemed to make the theory more plausible. It is now generally thought that, with further discoveries, the position is once more untenable. But it must be remembered that there are two forms of materialism—the atomistic–mechanistic type and the organismic type. The former somewhat crude belief is, it may safely be said, untenable. It

held, for example, that man and other living things are mere machines, and that concepts such as mind, beauty, truth are meaningless. Organismic theory holds that all things, living or otherwise, are systems of energy—that one must consider not merely structure but also relations and process. Mind in this theory is not a thing but a process occurring at a particular level of development, beauty is a particular relationship between object and observer, truth similarly is a relationship. Since the body, for example, consists of relationships between organs as well as the organs themselves, it cannot be explained as the mere sum of its parts. "The whole is more than the sum of its parts." In this form the theory of materialism is much more tenable and cannot be said to be outdated.

Mathematics is the language of physics, and uses symbols for expressing measurements, theories, and laws. Mathematical formulæ summarise and condense in exquisite simplicity the results of vast numbers of observations and experiments.

Matins, the first of the canonical hours or services of the day in the Roman Catholic Church and Morning Prayer in the Anglican Church. The daily service in the Roman breviary (*q.v.*) consists of eight offices or "hours," fixed by canon, for prayer and devotion. Formerly, Matins was recited or sung at midnight, Lauds at sunrise, Prime at 6 a.m., Terce at 9 a.m., Sext at midday, Nones at 3 p.m., Vespers at sunset, and Compline before retiring for the night. Lauds are now commonly joined to Matins.

Matriarchate, an ancient theory that the mother was the source of authority and not the father, and that in the "golden age" women exercised supreme control.

Mau-Mau, a secret, anti-European, terrorist movement which agitated the Kikuyu tribe of Kenya during the years 1953–57. Mau-mau was a symptom of native insecurity and discontent; emergency powers were lifted in Nov. 1959, and large-scale reforms are in progress.

Maundy Thursday, the day before Good Friday, commemorates the Last Supper. "Maundy" derives from Christ's command (mandatum) to his disciples on that day to love one another. It was the custom in the monasteries for the monks to wash the feet of the poor on this day, and for many centuries the sovereigns of England, through their almoners, have distributed money, food, and clothing to "as many old men and as many old women as the Sovereign is years of age." The Royal Maundy ceremony is still observed, special silver money granted by the Royal Almonry is coined for the occasion and the distribution takes place in Westminster Abbey. (*See* **U.K. Coinage, N9**.)

Mausoleum, a special place of sepulture, generally for the reception of the remains of members of a royal or other family of distinction. The name is derived from the tomb of King Mausolus at Halicarnassus, erected about 350 B.C., and forming one of the seven wonders of the world. The royal mausoleum at Frogmore was founded by Queen Victoria, where she was buried, together with the Prince Consort and other members of the Royal Family since deceased.

Mauve, a colouring matter produced from lichens by Dr. Stenhouse in 1848, but in 1856 obtained from aniline by William Perkin (1838–1907), who gave it the name Mauveen. This was the first synthetic organic dyestuff ever to be produced, which led to the building up of the great synthetic dyestuffs industry.

May, the fifth month of the year, but the third of the ancient Roman calendar. Supposed to be named after Maia, the mother of Mercury, to whom sacrifices were offered on the first day of this month. In England in former days May Day was made the occasion of many festivities, including the crowning of the May Queen, dancing round the Maypole, etc.

"Mayflower," the name of the ship which in 1620 conveyed the Pilgrim Fathers, 101 in number, from England to America. (*See* **Pilgrim Fathers**.)

May Fly, sluggish insects abundant over streams and rivers. The larvæ, which are aquatic, live several years, but the adults die a day or so after emerging and laying their eggs.

Mayor. In Great Britain various authorities share the work of local government. The village has three authorities, the parish council, rural district council, and county council; the small town has two, the urban district council and county council; the medium-sized town has two, the borough council and county council; the large-sized town has only one, the county borough council. Only the boroughs and county boroughs have a mayor and corporation. A mayor is *ex officio* a justice of the peace during his term of office. He represents the borough on all formal occasions, and has precedence (subject to Royal prerogative) over everyone else in the borough. Some cities, notably London and Birmingham, have a Lord Mayor. The chief Scottish cities have their Lords Provost. (*See* **Local Government, C3–4**.)

Mazarin Bible, an edition of the Latin Vulgate discovered in the library of Cardinal Mazarin, from which Gutenberg in 1452–55 printed the first book for which the metal types were used.

Mazurka, a Polish dance in 3-beat time. Chopin wrote many Mazurkas as concert-pieces for the pianoforte.

Meal-Tub Plot was a pretended conspiracy in 1679 against the Duke of York, afterwards James II., concocted by an informer named Dangerfield, who sought to incriminate the Earls of Halifax, Essex, and Shaftesbury. Evidence of the fictitious nature of the plot was subsequently discovered in a meal-tub belonging to a woman with whom he had lived, and he was publicly whipped and put in the pillory. A man named Francis struck him a blow which caused his death, for which the assailant was hanged.

Meal-Worm is the larva of a beetle—*Tenebrio molitor*—and is found in corn mills, granaries, and bakeries, where it does considerable damage. It is largely used for feeding birds.

Mean. In mathematics generally understood to be the arithmetic mean, *i.e.*, the average. The geometric mean between two quantities is the square root of their product.

Medals, as decorations for military service, were first issued in this country by Charles I., who ordered medals for gallantry to be distributed to certain soldiers in 1643. Medals were also issued to officers and men who were victorious against the Dutch fleet in 1653. After Lord Howe's victory in 1794 a naval medal was instituted. Medals were also struck for the victory of Waterloo, and since that time special medals have been issued in connection with all our wars. The Victoria Cross, a special reward for personal gallantry in the Navy, Army, and Air Force, was instituted in 1856. The George Cross for gallantry instituted in 1940 ranks next to the Victoria Cross. The Military Cross was instituted in 1914.

Medlar, a tree of which the fruit is about 1 in. in diameter and hard fleshed when gathered, but after being stored for a few weeks it softens. It has a peculiar flavour. Its large white flowers give it a decorative appearance.

Meerschaum, a white or yellow-white earthy mineral, found in beds in Asia Minor, Greece, and other places, is a silicate of magnesium allied with water. Its chief use is in making pipe-bowls, though in Spain it is used for building purposes.

Megalith, a prehistoric monument, consisting of a large single stone or a group of such stones, in a circle as at Stonehenge or in burial chambers as at New Grange, Ireland. Megalithic monuments have been constructed by different peoples in different parts of the world since the third millennium B.C.

Megalosaurus, an extinct reptile of enormous proportions, having a length of from 30 to 40 ft. Fossil remains of this monster have been found in Oolithic Slate and Weald Clay.

Meiosis, a process of plant or animal cell division, in which the number of chromosomes is halved, only one member of each pair of chromosomes appearing in each gamete or sex-cell. *See* **F31** (1).

Melody, a succession of single notes forming a pattern around which the rest of the composition (harmony, counterpoint) is woven. The theme (of a fugue, for instance) is a short melody.

Mendelian Law. The first statistical rules of inheritance, determining the ratio of variation

of characteristics in the offspring of differing individuals, and the classification of characters discontinuously inherited, were first formulated by the Austrian monk Gregor Mendel. The results of his most important experiments in the crossing of peas were published in 1866, and showed that when two races are crossed, the resultant hybrids will exhibit the dominant features of one parent, but the offspring of the second generation will show those of both grandparents. *See* **F30–31.**

Mendicant Friars, certain religious orders which spread over Europe in the 13th century, and comprised the Franciscans, Dominicans, Augustines, and Carmelites. Originally they depended entirely on alms.

Meniscus, the curved surface of a liquid in a tube.

Mennonites, a protestant sect, an offshoot of the Anabaptists, which broke away in 1525 and adopted the doctrines of Menno Simons, a Dutch reformer. At first known as the "Swiss Brethren." There are several communities still existing. (*See* **Anabaptists.**)

Mercator's Projection, a method of indicating meridians and parallels of latitudes on maps, introduced by Mercator in the 16th century, and still universally used in navigator's charts.

Mercers' Company, the wealthiest and one of the oldest of the London Livery Companies. It governs St. Paul's School and the Mercers' School and administers many important charities.

Merchant Adventurers' Company, a famous chartered regulated trading company which operated from the 14th century to near the end of the 16th century. It had a monopoly of the export trade in cloth.

Merciless Parliament, the name given to the parliament of 1388 summoned by Richard II., which decreed the execution of several of the king's ministers and the outlawry of the Duke of Suffolk.

Mercury, one of the smaller planets and the nearest to the sun, being 36 million miles distant. It has no satellite.

Mercury *or* **Quicksilver,** is one of the oldest-known metals, whose chief ore is the sulphide, cinnabar found in certain parts of Spain, China, Japan, Mexico, and South America. It is liquid at ordinary temperature. It is largely used in the construction of barometers and thermometers. Alloys of mercury are called amalgams. It is also of great value in medicine.

Meridian, an imaginary circle extending through the North and South Poles and any given place. When the sun is at its midday height at any place it is " on the meridian "; hence the terms ante-meridian (a.m.) and post-meridian (p.m.).

Merino Sheep were imported into England from Spain in 1788, and had great influence in improving native breeds, especially in regard to the quality of the wool.

Merit, Order of, founded by King Edward VII. in 1902 as a special distinction for eminent men and women without conferring a knighthood upon them. The Order has twenty-four British companions in addition to foreign honorary members limited in number, as the choice of members is, by the Sovereign's pleasure. Lord Kelvin was the founder companion. The only honorary members still alive are General Eisenhower (1945) and Dr. Schweitzer (1955). Florence Nightingale is the only woman to have received this coveted decoration.

Merovingians, the name given to the family that ruled over France from about 500 to about 750. Clovis was first of the line and Chilperic the last.

Mesons (from Greek *meso* = middle), a family of unstable particles of mass between that of an electron and that of a proton believed to be important in the interaction of protons and neutrons in the atomic nucleus. Some are positive, some negative, some neutral. No stable meson is known, the longest-lived particle having a lifetime of only two-millionths of a second. The first of these particles was discovered in cosmic radiation in 1937 and called the mu-meson or *muon*. In 1947 a heavier type was discovered called the pi-meson or *pion*, which behaved like the meson predicted on theoretical grounds by Yukawa in 1935. (It is the pion that keeps the proton and neutron together in the nucleus.) Charged pions decay into muons and *neutrinos*; neutral pions disappear into energy in the form of gamma rays. Later work has led to the discovery of mesons of still higher masses. Particles of masses greater than that of the proton, also found in cosmic radiation and produced artificially, are called *hyperons*. *See also* **F12, 13.**

Mesozoic. The geological era which includes the Triassic, Jurassic, and Cretaceous rocks. It began about 225 million years ago and lasted about 150 million.

Metamorphic Rocks are such geological deposits as have undergone alterations of structure and composition. The most active agents in producing these metamorphic changes are heat, water, and pressure. *See* **F8** (2).

Métayage, a system of land tenure prevalent in Italy and France, whereby the landlord provides the land and materials and the tenant the labour, the produce being evenly divided between them.

Meteorites. The word meteor originally signified any natural phenomenon, but in modern usage meteors are small bodies coming from interplanetary space which become luminous by friction on entering the earth's atmosphere. Popularly called "Shooting Stars." Larger meteors are known as fireballs. Some of these reach the ground. The object which has been a meteor in flight then becomes a meteorite. In some meteorites iron is the predominating element, others are like rock. The iron meteorites are more common amongst those which have been preserved, but falls of rock-like meteorites occur more frequently. At l'Aigle in France in 1803 from 2000 to 3000 meteorite stones fell; this fall is famous because it convinced scientists that meteorites really came from outside our atmosphere. (The largest meteorite stone actually known to have fallen to earth is one which descended in Emmott County, Iowa, in 1870, weighing 437 pounds.) A meteorite weighing no less than 36½ tons found in Greenland is now in New York. On June 30, 1908, an enormous meteor fell in Siberia in a sparsely-inhabited region. A hot blast destroyed all trees within a radius of about 5–10 miles, the explosion waves being recorded by barographs as far distant as London, Washington, and Batavia. For the next few nights there was in Europe in the northern sky brilliant illumination due to sunlight falling on clouds of dust at a great height in the atmosphere. Whether this dust had accompanied the meteor in its journey through space like the tail of a comet or whether the dust had come from Siberia is unknown. When the place where the meteor fell was visited in 1927 some 200 craters were found, but no considerable meteorite has been recovered.

Meteorology, the science of the atmosphere considered as a heat engine. Deals with weather, climate, optical phenomena, atmospheric electricity, physical processes such as radiation and precipitation, the dynamics and structure of cyclones, anticyclones, etc. Wide application to problems of aviation, agriculture, commerce and shipping. Meteorological observing stations are in operation all over the world, and on the simultaneous or synoptic reports of their instrument readings and estimates of pressure, temperature, humidity, speed and direction of wind, rain, character and amount of cloud, visibility, etc., forecasts, gale, snow and frost warnings are based. The Meteorological Office is part of the Air Ministry, whose Director is appointed by the Air Council. *See also* **Weather** and **F46** (2).

Methane. This gas occurs over marshes and swamps, where it is liberated in the decay of vegetable matter. It is the main constituent of natural gas, and also occurs in coal-mines, where it is called " fire-damp " because of the explosive character of its mixture with air.

Methodists, a term designating the religious organisation founded by John Wesley in 1739, after a long course of successful preaching by him in all parts of the kingdom as well as in America. It professed to have but one aim, " to spread scriptural holiness over the land." The itinerant system of the ministry is a prominent feature of the organisation. Since Wesley's day, some

off-shoots of Methodism have arisen and flourished. A scheme of union was consummated in Sept. 1932 at a United Conference in the Albert Hall, London, whereby the Wesleyan Methodist, the Primitive Methodist, and the United Methodist Churches became one Church, now known as The Methodist Church.

Methylated Spirit, a mixture of 90 parts by volume ethyl alcohol, 9½ parts wood naphtha (methyl alcohol), ½ part crude pyridine, together with small amounts of petroleum oil and methyl violet dye. Industrial methylated spirit consists of a mixture of 95 parts by volume ethyl alcohol and 5 parts wood naphtha.

Metre, unit of length in centimetre-gram-sec. system = 39·37 in.

Metre is the form of poetic rhythm, or the way words are arranged in a rhythmic pattern to make verse. *See* **M2–4.**

Metric System, the system of weights and measures based on the gram and the metre, smaller and larger units being decimals and multiples of the primary units respectively. It became the legal metrology of France in 1795, but was not in general use until about 1840. Since then the metric system has been adopted in most of the continental countries and is used universally in scientific work. There have been many attempts to get the system adopted in Britain, and there is now reason to hope that others will follow the enterprising example of the pharmaceutical industry, which adopted metric weights and measures in wholesale trading in July 1953. *See* **N11.**

Metronome, an instrument for beating time during the performance of a musical composition. It has a double pendulum, and is wound up like a clock.

Mezzotint, an engraving from copper or steel produced by instruments which burnish and scrape away portions of the surface, and yield an impression effectually graded in light and shade.

Mica. The mica of commerce is a nearly transparent mineral, which has great heat-resisting power, and can be split into thin plates. The most important micas are muscovite (potassium mica), the commoner variety, and phlogopite (magnesium mica).

Michael, St., and George, St., an order of knighthood originally founded for the Ionian Isles and Malta in 1818, and reorganised in 1869, so as to admit Crown servants connected with the Colonies. The Earl of Derby, Earl Russell, and Earl Grey were the first of the new knights.

Michaelmas Day, the festival day of St. Michael and All Angels, Sept. 29th, one of the English quarter days.

Microbe, a term proposed by Sédillot in 1878 to denote any minute organism, vegetable or animal, or found on the borderland between the two great natural kingdoms. The term is commonly used, but not by scientists.

Micrometer, an instrument for measuring minute distances; usually attached to the eye-pieces of a microscope or telescope, and consisting of two very fine hairs or wires stretched across the field of view, one fixed, the other movable. It was invented by William Gascoigne in the 17th century and improved by later inventors. Sir Joseph Whitworth made one in 1858 to measure the millionth part of an inch.

Microphone, an instrument for converting sound waves into electrical variations. The first microphone was invented by Prof. David Edward Hughes, in 1878. It is used for telephone communications, in broadcasting, in gramophone recording, etc.

Microscope, invented about 1590 by Janssen, and improved by Galileo, Fontana, and others, is an instrument which by a lens system magnifies minute objects. Microscopes are simple, compound, and binocular. The more powerful instruments have a magnifying capacity of as much as 10,000 diameters. (*See also* **Electron Microscope.**)

Middle Ages, usually considered to comprise the 1000 years from the fall of the Western Roman Empire in the 5th century to the Renaissance in the 15th. The period was essentially the age of faith and we owe it many churches of incredible beauty. It was dominated by the Roman Church, while the monasteries were the storehouse of learning until the rise of universities in the 13th century. Feudal ideas and practices became very widespread, their later decline being hastened by the Black Death. (*See* **Section G.**)

Midge, the common name of small two-winged flies of the genus *Culicoides*. The term "gnat" is sometimes applied to midges, though in Britain it is more commonly a synonym for the mosquito, clouds of which appear on summer nights in country places.

Midrash, name given to the homiletical interpretation of some of the Hebrew Scriptures in which allegory and legendary illustration were freely used. Compiled by Jewish rabbis from *c.* A.D. 200.

Millenary Petition was presented to James I. in 1603, on behalf of nearly 1,000 Puritan Ministers against certain of the rites and ceremonies of the Church of England. The Hampton Court Conference was the outcome of this petition.

Millennium, a period of a thousand years. The term is specifically used of the period of a thousand years during which, according to Rev. xx. 1–5, Christ will reign in person on earth. The Millenarians are a sect that interprets the "Millennium" as beginning with the commencement of the 6001st year from the Creation, which according to Archbishop Ussher (1581–1650) was in 4004 B.C.

Millipede. Arthropods allied to the centipedes, from which they differ in having two pairs of legs to each body segment instead of one pair. Worm-like in shape but with a pair of antennæ on the head, they are vegetarians and can do much harm to garden plants.

Millstone-Grit, a bed or rock of the Carboniferous group underlying the Coal Measures, and attaining in England a thickness in parts of 5,000 ft. It is from this rock that millstones have been made from time immemorial.

Mimicry, the resemblance of an animal to another animal or to inanimate objects. Examples of the former are the hover flies, which mimic wasps and bees; of the latter, leaf insects, stick insects, and caterpillars that look like dead twigs.

Mind. The nature of mind has for the most part been thought of as a philosophical problem, and historically has been described in terms of three main theories: those of materialism, idealism, and dualism. Materialism implies that mind does not, in fact, exist—it is merely an illusion, since the whole universe is composed of matter and matter alone. This belief, held by the Ionian school of Ancient Greece, has been held by few other philosophers. Idealism, on the other hand, takes the opposite point of view: it considers that matter is an illusion and that the whole universe is composed of the same stuff as mind. Sometimes, as in the philosophy of Berkeley, this belief takes the form of a theory that the universe is a thought in the mind of God. Dualism, the third viewpoint, insists that both matter and mind are fundamental—that neither can be reduced to the other. Most philosophers have held some form of this theory. The difficulty about dualism is that, if both mind and matter exist, it is very difficult to see how they interact—how thought is translated into action and how physical states of the body can (as they obviously do) influence the mind. Three further theories have been devised to explain how, if we accept dualism, interaction takes place. These are: (1) interactionism, which simply insists that interaction does take place; (2) psychophysical parallelism, which states that mind and body are parallel processes which coincide by the will of God but never really act one on the other; and (3) epiphenomenalism, the theory that mind is simply an appearance given off by matter as a flame is produced by a candle. In recent times, however, psychology has had something to say about the problem. Most psychologists consider that mind is a process, not a "thing." We do not, for example, ask to see what a "digestion" is or what it looks like—we accept the obvious fact that digestion is a reality but that it is a process going on in the stomach. In much the same way, the psychologist says, mind is a process going on in the brain. *See also* **Section F (Part III).**

Minim, a musical term denoting a note equal to two crochets, or half the value of the semi-

breve; also pharmaceutical term for $\frac{1}{480}$th part of a fluid ounce.

Mink. Semi-aquatic mammals closely related to polecats. There is one American species and one European. The fur, which varies light to dark brown, is soft and thick, and is among the most valuable of commercial furs.

Minnesingers were minstrel poets of Germany who, during the 12th and 13th centuries, composed and sang verses of heroism and love. They were of knightly rank, the counterpart of the French troubadours. *See* **G39** (1).

Minnow, a small fresh-water fish of the carp family, abounding in all the waters of Europe; it has a mottled back and silvery belly, and forms a popular bait for trout.

Minor Scale. (*See* **Diatonic Scale.**)

Minstrels were originally specially appointed instrumentalists and singers—pipers, harpers, and gleemen—engaged by barons and manorial lords to amuse their tenants. Later, minstrels assumed nomadic habits, made their way into the houses of the great, and were generally welcome. By Elizabeth's time, however, they were too numerous, and they were classed as "rogues and vagabonds," along with actors.

Minuet, a composition in 3-beat time and in the rhythm of the minuet dance. A movement of a sonata or symphony may be in minuet form.

Miracle Plays, which were very popular in England in the 15th century, were usually religious in character, representing some of the dramatic incidents of the Bible. Staging of plays was one of the many activities of the Gilds of those days. *See* **G39** (2).

Mirage, an optical illusion often observed in desert regions when the objects on the surface of the earth often some distance away appear as if reflected in a surface of water. Mirage is due to the unequal heating of the different parts of the atmosphere, which bends the light rays, and so produces distorted images.

Mishna, the first part of the Talmud, setting forth the "Oral Law" of the Jews.

Missal, the name of the mass-book of the Roman Church compiled 492–96 by Pope Gelasius I., and revised by Gregory I., 590–604. The present Roman Missal was sanctioned by the Council of Trent 1545–63. In the Anglican Communion the Book of Common Prayer superseded the Missal in 1549.

Missel-thrush receives its name from its partiality to the mistletoe-berry. Larger than the song-thrush, with spotted breast rather than speckled.

Mistletoe, a parasitic evergreen with white berries used as a decoration at Christmas-time. The familiar mistletoe of Europe is the *Viscum album*, which grows on the boughs of lime, willow, apple, poplar, maple, ash, hawthorn, but seldom on oak-trees. It was sacred to the Druids, and in Norse mythology it was a mistletoe dart that killed the god Baldur.

Mistral, a cold dry northerly wind peculiar to the French coast of the Mediterranean.

Mites, minute animals related to spiders, but without the well-marked division of the body exhibited by the latter. Some are parasites, *e.g.*, the scab mite and mange mite. The garden pest called the "red spider" is really a mite.

Mitrailleuse, a breech-loading machine gun adopted by the French army previous to the Franco-German War of 1870.

Mitre, the twofold pointed head-dress of bishops and certain abbots of the Western Church, and occasionally of other ecclesiastics.

Moa, the name for several species of ostrich-like extinct birds related to the New Zealand kiwi. The largest species, *Diornis maximus*, stood 8 ft. 7 in. high. They died out about 500–700 years ago.

Moabites, a race of Judæa, descendants of Lot. They were often in conflict with the Israelites, but were finally subdued by Jehoshaphat, 895 B.C.

Moabite Stone, a stone of the 9th century B.C. containing the earliest known inscription in Phœnician characters, and discovered in the highlands of Moab in 1868. It is now in the Louvre, Paris. It records the campaign between Moab and Israel, a different account of which is given in the Old Testament.

Mocking Bird, an American bird of the thrush family, widely distributed over the north and south of the western hemisphere. It is renowned as a beautiful songster, and has remarkable mimicking powers.

Moderator, a material used to slow down neutrons in an atomic pile. Examples of moderators are pure graphite and heavy water. *See* **F51** (1).

Mohair is the wool of the Angora goat and used very largely in the worsted trade for the manufacture of dress fabrics.

Mohammedanism. *See* **Islam.**

Molasses, sugar-cane juice in its uncrystallised form after boiling. The crystallised part is the raw sugar.

Mole, a small burrowing animal with long, sensitive nose, about the size of a small rat, with short legs and forefeet armed with strong claws for digging in the earth. Their subterranean dwellings are of curiously ingenious construction, and they do not often leave them except to make raids on mice, frogs, snails, etc. The earth-worm, however, is the mole's chief item of food. Not to be confused with the vole which has a blunt nose.

Molecule, the smallest mass of any substance, whether an element or a compound, capable of independent existence, and still retaining the properties of the substance. *See* **F11** (2).

Mollusca designates the soft-bodied invertebrate animals, most of which are protected by a shell. These shells are univalve—that is, of one piece, as in the case of snails; bivalve, as in the oyster; or multivalve, in the mail shells (*Chiton*). The squids, octopus, and nautilus are also molluscs, belonging to the class called Cephalopoda, the distinctive feature of its members being possession of tentacles. *See* **F24** (2).

Molybdenum, a fairly hard white metal with properties resembling those of chromium. Its commonest ore is the sulphide, molybdenite. The chief use of the metal is in the manufacture of alloy steels; high-speeding cutting steels can contain about 10 per cent. of molybdenum.

Monazite, a cerium mineral containing some thorium. Occurs as grains, often as sand ("monazite sands"). Deposits occur in India (Travancore), Russia, Norway, Madagascar, S. Africa, Brazil, U.S.A.

Monday, the second day of the week, called by the Anglo-Saxons *Monandaeg*, because the first hour of this day was supposed to be ruled by the moon.

Mongols, a yellow race of Central Asia, largely nomadic. In the 13th century, they conquered large portions of Asia, including China, Persia, and India. They founded the Mogul dynasty in India in 1525, and ruled up to the end of the 18th century, when their empire came under British control.

Mongoose, species of mammals related to the civets, feeding on vermin and reptiles. These animals, which have long tails and short legs, occur in Africa and Asia (especially India). The biggest mongoose is the Egyptian ichneumon, and this has been introduced into the W. Indies because of its ability to kill large poisonous snakes.

Monitor, a family of lizards noted for their great size. There are about 30 species widely distributed over the tropical parts of Asia, Australia, and Africa. The monitor, which lives on Komodo and other E. Indian islands, is 7 ft. long and known as the "Komodo Dragon."

Monmouth's Rebellion was headed by James, Duke of Monmouth, a natural son of Charles II. (1649–1685). He was sent to Scotland to quell the Covenanters in 1675, and succeeded in winning the Battle of Bothwell Bridge 1679; but was banished for aspiring to the throne to the exclusion of the Duke of York, afterwards James II. In 1685 he landed at Lyme Regis, and assumed the title of king, but was defeated at Sedgmoor, and executed on Tower Hill. Judge Jeffreys stamped out the remnant of the rebellion in the "Bloody Assize."

Monocotyledons. One of the two sub-classes into which the Flowering Plants (or Angiosperms) are divided. Distinguishing features are: the veins of the leaves run parallel to each other, and the parts of the flower are arranged in multiples of three. Most monocotyledons are herbs; many are cultivated for their beautiful flowers, *e.g.*, lilies, tulip, daffodil, iris, orchids,

and cannas. A few are tree-like, *e.g.*, bananas, pineapples, bamboo, and palms. *See* **F28**.

Monolith, a column or shaft comprising a single stone. "Cleopatra's Needle," now on the Thames Embankment in London, is an example.

Monotremata, the name of the order of mammalia comprising the most primitive mammals, which lay eggs. There are only two genera in this order; the Duck-billed Platypus (*Ornithorhynchus*), the Spiny Ant-Eaters or Echidnas.

Monroe Doctrine, a principle of American policy declining any European intervention in political affairs of the American continent, outlined by President Monroe in 1823. At the same time interference was disclaimed with existing European colonies in the Western Hemisphere. The American Civil War hampered the application of the doctrine for some time, but afterwards the United States firmly insisted on it. The Doctrine is not international law, but a national policy of the U.S.A.

Monsoons, regular persistent winds which blow at certain seasons in middle latitudes, mainly in South and East Asia. Their occurrence is related to the great changes of pressure which take place between summer and winter over the land mass. In India the south-west monsoon (June–Oct.) is moisture-laden from its long passage over the sea and in the higher regions, especially, there is heavy rainfall. Sudden reversal of the wind results in the cold north-east monsoon (Oct.–March) which is dry on account of the shelter afforded by the mountain ranges to the north. Frequently the term "monsoon" is applied to denote the associated rainfall without reference to the actual winds.

Monstrance, an ornamental transparent receptacle in which the Sacred Host is carried in procession or exposed for adoration.

Montessori System of education was worked out by Dr. Maria Montessori (1869–1952) in the early 20th century. She first experimented on defective children (aged 3–6) in the slum districts of Rome. Her results were so amazing that she began work on normal children. The *Casedei Bambini* (rooms set apart for children in the courtyards of a tenement block) became world famous. Her system is based on free discipline and free movement and not on the annihilation of a child's individuality and its immobility on a bench in a classroom. Dr. Montessori invented apparatus for her pupils which stimulates interest and creates attention. Children in her schools can learn to read, write, count, and do simple arithmetic before the age of 6. Her method has revolutionised infant education, and it is being used in many countries.

Month, the 12th part of the calendar year. A lunar month is the interval of new moon to new moon or full moon to full moon; mean length, 29 days, 12 hours, 44 minutes, 2·87 seconds. A sidereal month represents the time of the moon's revolution from a given star back to the same again, 27 days, 7 hours, 43 minutes, 11·5 seconds. In English law, since 1926, a month, unless otherwise expressed, means a calendar month.

Monts-de-Piété, Government institutions for advancing money for goods left in pledge, were first established in Italy in 1462. Similar institutions in France in 1777 were suppressed by the Revolution, but restored by Napoleon, and have since been expressly regulated by law.

Monument of London, erected in 1671–77 by Wren in commemoration of the Great Fire, is 200 ft. high and cost £14,500. The original inscription upon it ascribed the fire to "the treachery and malice of the popish faction," which stood down to 1831, when the words were erased as objectionable. The black marble staircase consists of 345 steps.

Moon, the earth's satellite, 2,160 miles in diameter and 238,857 miles distant from the earth. Its surface is believed to be covered by a layer of dust, the depth of which is as yet unknown. For the first time in history a space flight from the earth to the moon was made on 13 Sept. 1959 by the Soviet space rocket *Lunik II*, which hit the moon after 36 hours' journey; *Lunik II*'s instruments confirmed that the moon has no external magnetism and no radiation belt around it. *Lunik III* photographed the back of the moon. *See also* **Luniks, F46** (2), **49** (2).

Moorhen, a bird of the crake family, familiar on the borders of British ponds, rivers, and lakes. Dark-grey plumage, with olive-brown wings edged with white; yellow-tipped red bill.

Moors, the name given to the Moslems who live in N.W. Africa and to those who once lived in Spain. In 711 Moorish Arabs invaded Spain and spread beyond the Pyrenees into France, where they were driven back by the end of the century. Spain, however, remained virtually under Moorish domination until the 11th century, and during that period was the most civilised and prosperous part of Western Europe. In the arts and sciences the impact of Moorish culture was profound and lasting. Examples of the brilliant splendour of Moorish architecture are still to be seen in Toledo, Córdoba, Seville, and Granada. During the long struggle for the Christian reconquest thousands were killed and expelled, and in 1492 Granada, their last remaining kingdom, was forced to surrender. They were virtually exterminated by the Inquisition, and the last were expelled in 1609. *See also* **G31** (2).

Moose, the largest members of the deer family. The N. American Moose stands 5½–6¾ ft. high, and has huge palmate antlers. There is another New World species, occurring in Alaska. The European species is known as the elk.

Morganatic Marriage, a form of marriage, formerly peculiar to Germany but also found in the royal families of other countries, where the contracting parties are of unequal rank. In such marriages the left hand is given instead of the right, and it is stipulated that the children of the marriage are not to enjoy the rank or inherit the possessions of the parent, though such children are legitimate. Morganatic marriage is unknown in English law.

Morgue, a repository for dead bodies awaiting identification, the best-known morgue being that of Paris, which was formerly open to the general public.

Mormons, *or* **Latter-Day Saints,** a religious sect founded by Joseph Smith in 1830 under the title of the Church of Jesus Christ of Latter-Day Saints. The Church encountered opposition and persecution, and finally established itself in Salt Lake City in Utah, where it has grown and prospered. Polygamy, introduced by Brigham Young, who succeeded Smith in 1847, was repudiated by the Mormon community in 1890. Utah was recognised as a State of the Union in 1896.

Morpunkee, an Indian pleasure-boat, long and narrow, of considerable capacity, with a high peacock-shape decoration at the stern.

Morris Dance, an old English country dance of the reel order.

Morse Alphabet, a system of dots and dashes, intended to be used in combination with the indicator in telegraphy; but usually read by sound, the receiving operator writing down the words in the system as transmitted. This system of signals was invented by the American inventor and artist Samuel Finley Breese Morse (1791–1872) of Charlestown, Massachusetts.

Mosaic, a joining together of small pieces of coloured glass, marble, or other materials in designs to imitate painting. *See also* **G30** (1).

Moscow, the Retreat from, was one of the most disastrous events in the career of Napoleon I. He entered Moscow on Sept. 14, 1812, and the next day the Russians set fire to the city, practically burning it down. The French were forced to evacuate, and in the retreat to France Napoleon lost the greater part of his army.

Mosque, a Mohammedan church, the greatest being that of Santa Sophia at Istanbul, now converted into a museum of Byzantine art. *See* **G28** (2).

Mosquito, small two-winged flies with long legs and and slender body. Their larvæ are aquatic. The females of some species are blood-suckers, and thus come to transmit the blood parasites which cause malaria and yellow fever, for example.

Mosses. Most mosses live in moist habitats, but there are some species that can withstand desiccation and are adapted to live on rocks and tree-trunks.

Moss-troopers were bands of Scottish marauders who used the mossy regions of the Scotch and English borders as hiding-places, and thence

made frequent plundering expeditions, keeping that part of the country in constant unrest. They were put down in the 18th century.

Motet, an unaccompanied anthem of the Catholic and Lutheran Churches. Many fine motets which were settings of sacred writings or paraphrases and which were written mostly in the 15th century still survive.

Moth. Together with the butterflies, the moths make up the insect order *Lepidoptera*, in which the wings are scaly. In most moths the antennæ taper to a point, and are not clubbed as in butterflies. The majority are nocturnal, and pupate in a cocoon, whereas the pupa of butterflies is naked and usually bright-coloured.

Motion, Laws of. According to Newton: (1) A body continues in its state of rest or uniform motion in a straight line except in so far as it is compelled by external forces to change that state. (2) Rate of change of momentum is proportional to the applied force, and takes place in the direction in which the force acts. (3) To every action there is an equal and opposite reaction.

Movement, one of the contrasting pieces which together make up a Sonata, Symphony, or Concerto. A typical sonata has three movements, while a typical symphony has four.

Mule, a hybrid between horse and ass. Also the name of the spinning machine invented by Crompton in 1779 which combined the principle of Hargreaves' spinning jenny with the machine invented by Arkwright.

Mullions are projecting windows with vertical divisions—forming a highly decorative feature in Gothic architecture. The horizontal stones forming the crossing divisions between the lights of this class of window of the Elizabethan or Tudor period of Gothic are styled transoms.

Mummies are embalmed bodies, found mostly in Egypt, supposed to be those of distinguished people who lived thousands of years ago. Mummies have also been found in Peru, Mexico, and Persia. The embalming process which has enabled the bodies to be preserved can only be conjectured, though it is known that various aromatic substances were used after the viscera and other vital organs had been removed, the cavities being filled with absorbent dust, chippings, and cedar wood. A splendidly preserved and magnificently decorated mummy of the Pharaoh Tutankhamen (1350 B.C.) was found and minutely described in 1925.

Munich Agreement. In Sept. 1938 Mr. Neville Chamberlain and M. Daladier, British and French Premiers, reached agreement with Hitler at Munich for the dismemberment of Czechoslovakia, primarily for the benefit of Germany. Czechoslovakia itself was not consulted, nor Russia which with Britain and France had jointly pledged themselves to uphold the independence of Czechoslovakia. Hitler had been threatening that country for some time, but every concession had been met by further demands. After three visits to Germany, during which Hitler raised his demands, the British and French statesmen gave way. Mr. Chamberlain declared on return that he had secured "Peace in our Time." The Agreement was the subject of much controversy. Hitler seized Czechoslovakia in Mar., 1939.

Musk Deer, a small deer of the Himalayas, standing about 20 in. high. It is grey in colour, slightly brindled, and carries a small pouch in the abdominal region, containing what is commercially known as musk, an article which is of great value in the manufacture of various perfumes.

Musk Ox, an animal with characteristics of both sheep and ox, and having a musk odour. It is a native of Northern Canada.

Mussel, a well-known bivalve mollusc found in great abundance on the rocks of the sea-shores. The freshwater mussels of streams and ponds do not belong to the same genus.

Mutton Bird, an Australasian name of controversial origin for a shearwater or petrel, *e.g.*, the Short-tailed and Sooty Shearwaters and the Great-winged, Kermadec, and White-headed Petrels. The young are taken by hand from their burrows for human food.

Myriapoda, the class of invertebrate animals including centipedes, millipedes, and many others. They are widely distributed, but the largest species are found in the tropics.

Myrrh, a resinous substance obtained from a tree of the natural order *Amyridaceæ*, growing plentifully in Abyssinia and Arabia. Its use for embalming, medical, and aromatic purposes may be traced back to the most remote times.

Mysteries, Greek, secret mystic ceremonies of the ancient Greeks, religious drama accompanied by dancing, the most well known being the Eleusinian and Orphic ceremonies.

Mystery Plays were the mediæval religious dramas performed by the priests at great ecclesiastic festivals, particularly in France and Bavaria, staging the Nativity, Passion, and Resurrection. *See* **G39** (2).

Myxomatosis is a virus disease that affects only the rabbit family. It was first reported in 1898 from Montevideo, Uruguay, where a stock of laboratory rabbits—a domestic form of the wild European rabbit (*Oryctolagus cuniculus*)—was almost wiped out by it. It is now known that myxomatosis exists as a mild or sub-clinical infection in the native wild rabbits or tapetis (*Sylvilagus braziliensis*) of Brazil and possibly other parts of South America. In the European rabbit myxomatosis causes almost 100% mortality, the symptoms including intense swelling and inflammation of the eyelids, which spreads towards the forehead and ears, and may also affect the genital region. Although the appearance is distressing, it is by no means certain that suffering is severe. Many attempts have been made to introduce myxomatosis as a means of controlling rabbit numbers, but these were unsuccessful until January, 1951, when it was reported that the infection was spreading rapidly in parts of Australia. In 1952 it was introduced into France, and caused a marked reduction in the rabbit population. In the autumn of 1953 the disease reached Great Britain with the result that the total wild-rabbit population has been severely reduced. Domestic rabbits can be given a fair degree of protection through the use of a vaccine which is available at a low cost through veterinary surgeons and pharmacists.

N

Nadir, one of the two poles of the horizon, the other being the zenith. The nadir is the pole vertically below the observer's feet.

Nahum, one of the books of the Minor Prophets of the Old Testament. It is a prophecy of doom on the approaching sack of Nineveh which fell in 612 B.C. to the Medes and Babylonians.

Naiad, a water-nymph of classic mythology, beautiful and mystic; celebrated by Virgil, Ovid, Homer, and other ancient writers.

Nantes, Edict of, was a decree promulgated by Henry IV. of France in 1598, giving full freedom of worship to the Protestants of the country. It was the revocation of this edict in 1685 by Louis XIV. that drove hundreds of thousands of French Huguenots to this country.

Naphtha, a liquid combustible believed to have been one of the ingredients of "Greek fire." Naphtha is a light, highly inflammable oil obtained by distilling petroleum, shale oil, or coal tar. The petroleum naphtha consists of a mixture of paraffins; that from shale contains olefines as well as paraffins. Coal-tar naphtha contains xylol.

Naphthalene is procured from coal tar, and its derivatives are much used in the manufacture of colours for dyers and printers. "Moth balls" are made of naphthalene.

Narcotic, a medical dictionary definition is that a narcotic is a drug that produces stupor, complete insensibility, or sleep. In terms of drug addiction, a narcotic has been defined as altering and distorting the user's perception of himself and of the external world, being taken primarily for that purpose. *See* **P22–23**.

Nardus, a genus of coarse grasses, growing on bleak upland heaths and hill slopes. *Nardus stricta*, known as "mat-weed," is a British species.

Narghile, an oriental tobacco pipe so constructed that the smoke passes through water and up a long flexible tube before reaching the lips of the smoker.

Naseby, Battle of, was fought on June 14, 1645, between the Royalists under the command of

Prince Rupert and the King, and the Parliamentarians under Fairfax and Cromwell. It resulted in a complete defeat for Charles.

National Anthem, a musical composition with words, officially adopted for ceremonial use as an expression of patriotism and loyalty to a national cause. The national anthem of the United Kingdom is "God Save the Queen" which has been in use since about the middle of the 18th century. There is some doubt about its origin. It has been variously attributed to Dr. John Bull, Henry Carey, and James Oswald.

National Assembly, the name taken by the body responsible for the opening stages of the French Revolution and subsequently by other Sovereign bodies in France and elsewhere.

National Covenant, an oath and declaration subscribed to by the Scottish Presbyterians in 1638 to maintain their religion against Charles I.'s Episcopalianising designs.

National Debt constitutes the financial obligation of a state, and amounted in Great Britain at March 31, 1960, to an approximate total (net) of £27,735 million, an increase of £359 million over 1958–59. The National Debt is divided into *funded* and *unfunded* debt, the former representing debt in respect of which there is no fixed date for repayment, and taking the form of Consols and debts due to the Bank of England, while unfunded debt consists of Government loans, repayable at a fixed date.

National Gallery, established in 1824 at Pall Mall, London, with the Angerstein Collection of 38 pictures, purchased for £60,000 as a nucleus. The existing building which was opened in 1838 has been enlarged several times. The National Gallery at Millbank, known as the Tate Gallery, was given to the nation by Sir Henry Tate in 1897.

National Guard of France, a body of citizen soldiers first instituted on the day before the destruction of the Bastille in 1789, and ceased under the Consulate and Empire. It was revived in 1830, but was disbanded after fighting in the Franco-Prussian War.

Nationality, British. A British subject or Commonwealth Citizen is a person who is a natural-born British subject; a person to whom a certificate of naturalisation has been granted; a person who has become a subject of Her Majesty by reason of any annexation of territory or who, subject to certain exceptions, is the wife of a British subject. A natural-born British subject is one born within Her Majesty's Dominions and allegiance or if born out of Her Majesty's Dominions whose father was at the time of such person's birth a British subject. A married woman does not necessarily lose her British nationality either by virtue of her marriage to an alien or of her husband's subsequent change of nationality. The British Nationality Act, 1948, replaced the British Nationality and Status of Aliens Act of 1914 as the basis of the law of British citizenship. *See.* **D7** (1).

National Parks. Under the National Parks Act 1949 a National Parks Commission was set up to create National Parks in England and Wales. Twelve areas had been recommended in the Hobhouse Report, and of these several have already been designated. The areas named in the Report were the Lake District, Snowdonia, the Peak District, Dartmoor, the N. Yorkshire Moors, the Pembrokeshire Coast, Exmoor, the Yorkshire Dales, the South Downs, the Roman Wall, the Broads, and the Brecon Beacons and Black Mountains. It is not intended to change the character of these territories but to control their development so as to harmonise with the two dominant principles: (*a*) that the characteristic beauty of the landscape within the Park area shall be preserved and (*b*) that the visiting public shall have ample access and facilities for recreation and enjoyment. (*See also* **Long Distance Routes.**)

National Physical Laboratory, situated at Teddington, is one of the world's largest and best-equipped laboratories. It was first established in 1900, and functions as a central bureau of physical standards and as a research laboratory of industrial physics. In 1918 it became part of the Department of Scientific and Industrial Research and has the following Divisions: Aerodynamics, Applied Physics, Basic Physics, Control Mechanisms and Electronics, Electricity, Light, Mathematics, Metallurgy, Ship and Standards.

National Portrait Gallery, established in 1856, and now located in a building in St. Martin's Lane adjoining the National Gallery. Contains portraits of eminent people in history, literature, art, etc., and a valuable collection of medals and autographs.

National Trust, founded in 1895. "A non-profit-making organisation incorporated by Act of Parliament for the purposes of promoting the permanent preservation of lands and buildings of historic interest or natural beauty for the benefit and access of the people." As a consequence of gifts of public-spirited individuals the Trust now owns many acres of magnificent scenery and property, including mediæval castles, bird sanctuaries, ancient monuments, birthplaces and homes of famous men, and classic examples of domestic architecture, preserved for the enjoyment of present and future generations. Since 1946 lands and houses of interest to the nation may be given to the National Trust in lieu of death duties.

Nativity. There are three Nativity-Festivals in the Christian Churches, the Nativity of Christ on Dec. 25, the Virgin Mary on Sept. 8, and John the Baptist on June 24.

Natterjack, a curious warty, prominent-eyed, brown toad (*Bufo calamita*), having a bright yellow line down the middle of its back. It utters a muttering sort of croak, hence its name.

Naturalisation, the grant of British nationality to an alien. Before an application can be made to the Secretary of State for the grant of a certificate an alien must have qualified by 5 years' residence in the U.K. or service under the Crown, during the 8 years immediately passed.

"Nautical Almanac," published under the authority of the Admiralty, is always issued four years in advance, and contains information specially prepared for the use of navigators and astronomers. It first appeared in 1767.

Nautilus, a term now applied only to the pearly-shelled nautilus, the sole surviving example of the four-gilled section of the *Cephalopoda*. Its fossil relatives are called Ammonites. The spiral shell is divided into a number of compartments, the animal living in the last and largest chamber. There are three or four species, all living in tropical seas. The Paper Nautilus is not related to the Pearly Nautilus, belonging to the same order as the octopus.

"Nautilus," the name of the American nuclear-powered submarine which made the first voyage under the North Pole in Aug. 1958, having navigated a new north-west passage without stars, compass, radio, or radar but using a piece of equipment known as an "inertial navigator." (*See* **Inertial Navigation.**)

Nave is the body or main open portion of a cathedral or church, and extends from the chief entrance to the choir, or chancel, and is usually flanked by aisles. A nave, in mechanics, indicates the "hub" or central part of a wheel.

Neandertal, the name of the valley lying between Düsseldorf and Wuppertal, where in a limestone cave a now famous skull of a very early species of prehistoric man was discovered in 1856. Fossils of Neandertal man have been found over a wide area, and from archæological evidence he disappeared from Europe during the last North Polar Ice Age, about 25,000 years ago. *See also* **F33** (1).

Necromancy, "the black art," was in olden times much believed in, and supposed to be an occult power by which its practitioners could converse with the spirits of the dead and learn the future.

Negroes are the dark-skinned, woolly-headed races, natives of tropical Africa, or descendants of such natives. There are many different racial types, but the most typical Negroes are found in W. Africa—the Ashanti of Ghana, and the Yoruba of Nigeria. There are the Pygmies living in the forests north and south of the equator, the Bushmen of the Kalahari Desert, the Hottentots of South Africa, who however have largely lost their identity, the Bantu peoples, and many others. Their culture is rich in folk-lore, and they have a great gift for music and dancing. About 25 million people of Negro descent are in N. and S.

America, the European slave trade having taken them there from their homes in W. Africa.

Negus, the name given to any mixture of wine and water, and said to have been named after Colonel Francis Negus about 1714. The sovereign of Abyssinia is styled the Negus.

Nekton, term used to differentiate actively swimming aquatic organisms (*e.g.*, fishes) from the "drifters" or plankton.

Nelson Column, in Trafalgar Square, London, designed by Mr. William Railton, was chosen from among a number of designs—temples, obelisks and various sculptural groups—sent in as a result of a competition held in 1839. The erection of the column was begun in 1840. Twenty-six years later the lions designed by Landseer were set up at the foot of the completed column. The statue of Nelson himself was made by E. H. Bailey and the bronze reliefs at the base executed by Carew, Woodington, Ternouth, and Watson, representing the Battles of the Nile, St. Vincent, Copenhagen, and Trafalgar. Height 170 ft., executed in Portland stone instead of granite, as originally planned, at a cost of £46,000.

Nematodes, the roundworms or threadworms. Some parasitise man and domestic animals.

Nemean Games were instituted at Nemea in honour of Archemorus, and revived in 1226 B.C. They were celebrated every third year, and were finally given up in A.D. 396. The conqueror in contests of strength and agility was rewarded first with a crown of olives, and later with wreathed chaplets of parsley leaves.

Néné or Hawaiian Goose. At the Severn Wildfowl Trust at Slimbridge Mr. Peter Scott is trying to save this bird from extinction.

Neodymium, an element belonging to the rare earth metal group. Discovered by Welsbach in 1885.

Neon, inert gas present in air to the extent of about 1 part in 65,000. The crimson glow produced when an electric discharge passes through the gas is familiar in advertising signs.

Neoprene, generic name for a class of synthetic rubbers made from acetylene.

Nepotism, the bestowal of patronage by reason of relationship rather than of merit. It had its origin in the custom of certain Popes to enrich their families out of the offices of the Church.

Neptune. Apart from Pluto this is the most distant of the planets, estimated to be about 2,793 million miles from the sun, and taking about 165 years to revolve around it. Discovered by the German astronomer Galle on Sept. 23, 1846, after its existence had been predicted by Leverrier and Adams.

Neptunium, element 93, one of the four new elements discovered during the progress of the atomic bomb project in the second world war. Neptunium is formed when a neutron enters a nucleus of Uranium 238, and it decays radioactively to yield plutonium.

Neuroptera, an order of insects which includes lacewings, alder-flies, ant-lion flies, etc.

Neutrino, a neutral particle which carries energy and spin and although possessing little or no mass plays an important part in the interaction of neutrons and protons in the atomic nucleus. *See* **F12, 13**.

Neutron, a neutral particle present in all atomic nuclei except the hydrogen nucleus which is a single proton. Mass of neutron and proton in terms of electron-mass is 1838·6 and 1836·2 respectively. Neutrons and/or protons are termed nucleons. *See* **F10, 13**.

New Deal. The measures taken by President Roosevelt in U.S.A. in 1933 to overcome the great economic crisis which broke out at the end of 1929 and to restore the social security threatened by it. The measures were drawn up by a group of experts called a Brains Trust and they provided for recovery by a programme of public works, including large-scale construction of houses and large-scale assistance to farmers. Loans were granted and authorities formed to stimulate activities which reduced the workless from 17 millions to between 7 and 10 millions. Unemployment relief was regulated and enlarged; and social insurance (which for decades had been a subject of dispute, being held to be contrary to American principles of self-help) was introduced. The President claimed at the beginning of 1939 that the New Deal programme had been successful. The outbreak of the war prevented this being tested. But many of its changes have become a permanent part of American legislation. Certain parts were repealed by the U.S. Supreme Court as being unconstitutional.

Newgate Prison, now pulled down and replaced by the Central Criminal Court, opened in 1907, was situated near the point where once stood one of the old London city gates. There is a record of a prison upon this spot in the 13th century. Later a new one was built by the executors of Richard Whittington, but this was destroyed by the Great Fire in 1666. Still another new prison on this site was erected between 1778 and 1780. In the Gordon Riots of the latter year it was destroyed by fire and re-erected. It was not used as a prison after 1880.

News Letters were an early form of newspaper, popular in the time of Charles II. They consisted of items of news and gossip collected at the various coffee-houses and other places of public resort. They often included blank pages on which readers wrote their private letters.

Newspapers. The first news-books to be published at regular intervals in Britain appeared in 1662 with news of what was going on abroad translated from German and Italian news-sheets. Licence to print was obtained from the Star Chamber, which until its abolition in 1641 allowed only the printing of foreign news. With the lifting of the ban on domestic news the Press became free. In the reign of Queen Anne English newspapers employed writers of great intellectual power and versatility. Despite the newspaper tax introduced in 1712, the number of newspapers published in London in 1776 had increased to 53, though the standard of writing was below that of earlier times. The development of the Press was greatly assisted in the 19th century by the abolition of the "taxes on knowledge," by the introduction of the cheap postal system, and by improvements in printing, distribution, collection of news, and advertising. The *London Gazette*, founded in 1665 (and still appearing twice weekly as the official organ of the Government), is the oldest newspaper living. *The Times*, known throughout the world, began as the *London Universal Register* in 1785, and adopted its present title in 1788. The *Manchester Guardian*, once a provincial but now a national newspaper with a world-wide reputation, began as a weekly in 1821, and became a daily in 1855. The *Scotsman*, founded as a weekly in 1817 and established as a daily in 1855, and the *Glasgow Herald*, which began as the *Glasgow Advertiser* in 1783, are the leading Scottish newspapers. The London Press, which is national, publishes 10 morning, 3 evening, and 9 Sunday newspapers.

Newt, amphibians of lizard shape and mottled markings. There are three British species, the largest being the Great-Crested Newt (*Triturus cristatus*), which attains a length of 6 in.

Newton's Rings. Concentric circular rings, due to the phenomenon of interference, which are seen around the point of contact of a slightly convex lens on a flat plate of glass.

New Year's Day, Jan. 1. The first New Year's festival of which we have record is that constituted by Numa 713 B.C., and dedicated to Janus.

Nibelungenlied, the German epic of the 12th century comprising numerous mythical poems or sagas of which several English translations exist. These poems have been utilised with great effect as foundations for Wagner's famous series of operas comprised under the general title *Ring des Nibelungen*. *See* **G38 (2)**.

Nicene Creed, a summary of the principles of Christian faith, first issued in 325 by the Council of Nicæa (summoned by the emperor Constantine the Great) for the purpose of thwarting the Arian heresy and asserting the godhead of Christ. Date of Easter fixed at Council of Nicæa.

Niche, a recess or nook constructed for a statue or other special ornament. Such niches are numerous in the older ecclesiastical buildings, and usually contain the figures of saints or historic personages.

Nickel, silver-coloured metal, fairly soft though harder than iron. Chief source of the metal is the nickel sulphide in iron–copper pyrites

deposits in Ontario. Chief uses are: in electroplating, in coins, as an element in alloy steels.

Nicol Prism, a device for producing plane-polarised light. It consists of two pieces of Iceland spar cut and cemented together in a special way.

Nicolo, a large brass reed instrument, common in the 17th century, but now superseded by the bassoon.

Nicotine, an alkaloid substance contained in the tobacco plant. It is a clear, colourless oil and highly poisonous, paralysing the nerves. In the act of smoking tobacco, however, only an infinitesimal quantity is absorbed in the smoke.

Niello Work was in considerable vogue in the Middle Ages, and is said to have suggested the idea of engraving upon copper. It was produced by rubbing a mixture of silver, lead, copper, sulphur, and borax into engravings on silver, and some highly decorative results were obtained.

Night-heron, a stocky, short-legged heron of black and white plumage, red eyes, and yellowish legs, crepuscular except in breeding season, and an occasional visitor to Britain.

Nightingale, a familiar singing bird which visits the southern counties of England every summer, and is sometimes found as far north as Yorkshire. It is a shy bird, not often seen, but the song of the male, usually heard in the late evening or at early morn, is of remarkable sweetness and variety. After its wooing period is over its song ceases.

Night-jar, nocturnal insectivorous bird, owl-like in appearance, with mottled brown plumage of "dead leaf" pattern. It is a common breeding visitor to the British Isles, Apr. to Sept., and lays its eggs on bare ground.

Nihilism, the name commonly given to the earliest Russian form of revolutionary anarchism. It originated in the early years of the reign of Alexander II. The term was first used by Turgenev in his novel *Fathers and Children* published in 1862.

Nile, Battle of the, fought in 1798 between the English and French fleets in Aboukir Bay. Nelson annihilated Napoleon's fleet and the latter and his army were stranded in Egypt.

Nimbus, a circlet of light depicted round the heads of saints or divine personages in ancient art; also name of dense dark "rainy" cloud.

Nirvana, in Buddhism, is the condition of supreme attainment, and involves the extinction of every form of desire, ambition, or unrest. It is the holy state. (*See* **Buddhism.**)

Nitre *or* **Saltpetre,** is now mostly manufactured by the double decomposition of sodium nitrate and potassium chloride. Its chief use is the manufacture of gunpowder and fireworks. It has been manufactured in England since 1625.

Nitrogen, a non-combustible gas devoid of taste or smell, and constituting nearly four-fifths of the atmospheric air.

Nitro-Glycerine, an explosive yellow fluid produced by mixing small quantities of glycerine with a combination of one part of nitric acid and two parts of sulphuric acid. By itself it is a dangerously explosive substance to handle. In 1867, Nobel produced dynamite, a safe explosive made by absorbing nitro-glycerine in kieselguhr.

Nitrous Oxide, a compound of nitrogen and oxygen possessing mild anæsthetic power. It was the first of the inhalation anæsthetics to be used.

Nobel Prizes. A list of Nobel Laureates is given at the end of this Section.

Noble, an old English gold coin current in the 14th century, and of the value of 6*s*. 8*d*.

Nocturne, a short piece of music, romantic in character, generally for the pianoforte. The nocturne was invented by John Field, from whom Chopin borrowed the idea. After this the nocturne became popular all over Europe, being known in Italy as "notturno" and in Germany as "nacht-musik."

Nonconformists *or* **Dissenters,** are all such religionists as do not conform to the doctrine of the Church of England. Up to the passing of the Act of Uniformity in 1662 they were called "Puritans." At various times the Nonconformists have been rigorously persecuted, but in later times the utmost toleration has been granted to them. The oldest bodies of Nonconformists are the Presbyterians, Baptists, and Independents. The Methodists date from 1739. (*See also* **Baptists** *and* **Methodists.**)

Nones were dates of the Roman calendar which fell on the 5th of each month, excepting Mar., May, July, and Oct., when they fell on the 7th.

Nonet, a musical composition for nine voices or instruments.

Nonjurors were High Church bishops who refused to swear allegiance to William III. in 1689, contending that James II. had been unjustly deposed.

Non Nobis Domine! ("Not unto us, O Lord!"), a musical canon, sung as a grace at public feasts (traditionally attributed to Byrd).

Northmen were the early inhabitants of Scandinavia, famous as sea adventurers and pirates. Their attacks on Britain and other parts of northern Europe prior to the 11th century were often successful, and they established settlements in the islands off the Scottish coasts, and in the north of France, where they founded the duchy of Normandy, from whence came the Normans who conquered England in the 11th century.

North-East Passage, from the North Atlantic to Bering Strait has been rapidly developed by the U.S.S.R. in recent years as a northern sea route to render accessible vast areas of northern Siberia. Attempts to find a north-east passage were made by Englishmen and Dutchmen in the 16th century but they were always defeated by the ice, for the sea is completely frozen for some 3,000 miles for 9 months of the year. A Swede succeeded in sailing from Europe to Japan via the Arctic in the late 19th century and several Russian expeditions have been made. (*See also* **Arctic Exploration.**)

North-West Passage, from the Atlantic to the Pacific through the Arctic Seas, has been the dream of navigators for centuries. Attempts to find it were made in the 16th and early 17th centuries by John and Sebastian Cabot, Frobisher, Gilbert, Davis, Hudson, and Baffin. Two centuries later Ross, Parry, Franklin, and others made the attempt; but it was not until 1903–5 that Amundsen, discoverer of the South Pole, made the complete voyage. The American nuclear-powered submarine *Nautilus* opened up a new short sea route between the Atlantic and the Pacific when she made her epic voyage under the North Pole in Aug. 1958.

"**Not Proven,**" a verdict peculiar to Scottish law under which, in criminal cases where, the evidence not being sufficient to fully demonstrate the charge made, a prisoner is given the benefit of the doubt and set free, and cannot be retried even if later evidence of his guilt be discovered.

Notre Dame, the famous Paris cathedral, was founded in 1163, and is one of the finest specimens of Gothic architecture in Europe. The best descriptions of the buildings are to be found in Victor Hugo's "Hunchback of Notre Dame."

November, the 9th month of the year originally, but from 713 B.C., when Numa added Jan., and Feb., it became the 11th month.

Noyade, a mode of execution by drowning practised during the Reign of Terror in France at Nantes. The victims were set afloat in a boat with a movable bottom.

Nuclear Energy. *See* **F50.**

Nucleus, Atomic. *See* **F10.**

Numismatics, the science of coins and medals, has proved a fascinating study to many, and has resulted in the discovery of valuable historic evidence at various times. The difference between a coin and a medal is that the former is a piece of money, while the latter commemorates some person or event. The Royal Numismatic Society, founded in 1838, published the *Numismatic Chronicle,* and the British Numismatic Society, founded in 1904 to deal specially with the history of British coins, publishes a *Journal.*

Nunc Dimittis, a familiar hymn ("Now lettest thou thy servant depart in peace") forming part of the Evening Service in the various Christian Churches. (Luke ii, 29.)

Nuncio, a representative of the Pope sent on diplomatic missions. Nuncios were permanently established during the 16th century.

Nunneries, convents for the exclusive residence of women living under vows a life of religious observance. They are common in Roman Catholic countries, and there are still a few in

Britain. The first English nunnery was founded at Folkestone in 630, and up to the dissolution of the monasteries such institutions were numerous.

Nuremberg Trial. On Nov. 21, 1945, an International Military Tribunal, consisting of one American, one British, one Russian, and one French member, began the trial of twenty-four Nazi leaders. There were four counts: the conspiracy of Nazism; wars of aggresssion; war crimes; and crimes against humanity. Twelve were condemned to hanging of whom ten were hanged on Oct. 16, 1946. Goering committed suicide; Bormann has never been found; Papen, Schacht, and Fritsche were acquitted. The rest received varying terms of imprisonment.

Nuthatch, name of a number of tree-creeping birds, plump, with short tail, bluish-grey plumage, and black stripe under eye. Nest in holes and wedge nuts in bark of trees, hammering them to get a kernel. There are three European species, one, *Sitta europaea*, resident in England.

Nutmeg, the kernel of the stone of a tropical fruit, used as a spice and highly aromatic.

Nyctea, a kind of snow-owl of large size and white plumage found in the Arctic and Sub-Arctic latitudes of Europe, America, and Asia.

Nylon, a generic term for any long-chain synthetic polymeric amide which has recurring amide groups as an integral part of the main polymer chain, and which is capable of being formed into a filament in which the structural elements are orientated in the direction of the axis. The first nylon of commerical interest was made in 1935, and the world's first nylon factory—in the United States—began production in 1940.

Nymphæa, the white water-lily, dedicated by the Greeks to the water nymphs.

O

Oak, a tree of the genus *Quercus*, including some 300 species distributed over the northern hemisphere and into the tropics. Two species are native to Britain, where the oak is the commonest tree (1 in 3)—*Q. petræa*, which has long-stalked leaves and acorn-cups sitting directly on the stem, and *Q. robur*, which, in contrast, has long-stalked acorn-cups and stalkless leaves. Oak timber is much prized for its strength and durability, and from the time of the Spanish Armada to Nelson's day was in great demand for naval construction. It has always been used for building, flooring, furniture, and cabinet work. The oak is attacked by many insects, the round nut-like oak galls, or oak-apples, being produced by the sting of certain minute gall wasps.

Oak Boy, a member of a body of Irish insurgents (who wore oak sprigs in their hats) who rose in 1746 against forced labour on the roads and a stricter exaction of tithes.

"**Oaks,**" the name of a famous race for three-year-old fillies run at Epsom two days after the "Derby."

Oakum, loose hemp and untwisted ropes, in the preparation of which prison labour used to be largely used in England.

Oasis, the name given to any fertile spot in a desert region. Such spots are fairly numerous on the Sahara and Libyan deserts, and some of them are extensively peopled and successfully cultivated.

Oats, a well-known cereal product, probably native to Asia, but cultivated with considerable success for many centuries in Scotland and England. The United States also produces large quantities. Cakes and porridge of oatmeal are common articles of food in many countries, especially in Scotland.

Obbligato, originally, as the name suggests, a part which must be played (= obligatory). Now, by a curious misuse of the word, a part which need not be played, *e.g.*, a "violin obbligato"—additional to the pianoforte accompaniment and may be omitted if desired.

Obelisk, a tapering monolithic column, square at the base and pyramidal at the top, regarded by the ancient Egyptians as a sacred stone and usually found at the entrance to the sun temples. Twelve were transported from Egypt to Rome and set up at various times: there is one in the Place de la Concorde in Paris, and one on the Thames Embankment in London—Cleopatra's Needle—originally erected at Heliopolis, centre of the sun-cult, by Tuthmosis III about 1500 B.C.

Obi, the Japanese name for a coloured sash commonly worn by Japanese women, and tied with a large bow at the back of the waist.

Obit, the date or the anniversary of a person's demise; the term is used also in reference to a service of religious character celebrated on such an occasion.

Oblation, a gift offered in worship, referring especially to the bread and wine given by the laity for the Eucharist.

Oblivion, Act of, was the act of "free pardon and oblivion" in respect of "all treasons and state offences" committed between 1637 and 1660 (the Civil War and Commonwealth period), excepting from it the "regicides" and certain priests.

Oboe, (old spelling: hautbois). A reed woodwind instrument rather similar to the clarinet in appearance, but having a double reed. The tone of the oboe is more thin and penetrating than that of the clarinet. The tenor oboe is called the Cor Anglais, while the bass oboe is the Bassoon. There is also a "double-bass" oboe called the contra-bassoon.

Observatories existed in ancient Babylon and Egypt. They were erected on tombs and temples. The most famous observatory of Egypt was that of Alexandria, erected by Ptolemy Soter, 300 B.C. It was not until the 16th century, however, that an observatory adequately equipped for astronomical investigations was built. This was at Cassel. Tycho Brahe's observatory at Uranienburg was erected in 1576. The Royal Observatory at Greenwich was completed in 1675. Mount Wilson Observatory in California has had a 100-in. reflector telescope working since 1917 but Mount Palomar Observatory, also in California, has a 200-in. reflector—the largest in the world, completed in 1949—which can reveal remote galaxies out to a limiting distance of 2,000 million light years. It is known as the *Hale* telescope in memory of Dr. George Ellery Hale, the founder of the Mount Wilson Observatory. A 98-in. telescope, the *Isaac Newton*, is being installed at the new Royal Greenwich Observatory at Herstmonceux Castle. A number of observatories are devoted to meteorological and geophysical work, the most important in the British Isles being those at Eskdalemuir (Dumfries), Kew, Lerwick, and Valencia (Eire). (*See also* **Astronomy** *and* **Telescopes.**)

Obsidian, a form of volcanic rock of vitreous structure, and usually a silicate of aluminium, lime, magnesium, etc. Produced when acid lavas are rapidly congealed, it is usually black and fractures like pitch.

Ocarina, a simple kind of musical instrument usually made of terra-cotta. The whistle mouthpiece is at right angles to the bulbous body, in which are a number of finger-holes. The tone resembles that of a mellow flageolet.

Occultation, in astronomy, refers to the concealment of a celestial body by the passing before it of some other heavenly body. The most frequent occultation is that of a fixed star by the moon.

Occultism, originally the practice or study of the occult or secret sciences, including alchemy, astrology, magic, necromancy, etc.; but in recent times referring also to theosophy, spiritualism, palmistry, and so forth.

Ocean comprises the great body of water which covers five-eighths of the surface of the earth, and has an average depth of 2 miles. The principal oceans are the Pacific, Atlantic, Indian, and Arctic. *See* **F9.**

Ocean Currents are well-defined streams running over certain portions of the ocean and caused mainly by wind-friction, slope of the sea surface and differences in density of the water, all movements being influenced by the deflective forces due to the earth's rotation. The climatic importance of the great ocean currents is that they constitute one of the means whereby heat is transferred from lower to higher latitudes.

Ocelot, usually called the leopard cat, is found in S. America. It is about 4 ft. in length, including tail, and of a grey or tawny colour and spotted.

Ochres, the name of a number of natural earths impregnated with mineral colourings, chiefly silica and alumina. They include iron ochre, yellow ochre, and plumbic ochre, being respectively oxides of iron and lead. Ochres are largely used in the making of paints.

Octane Number, the index of the knock-rating of petrol.

Octarch, the kings of the English heptarchy, Hengist (455) being the first, and Egbert (800) the last.

Octastyle, in architecture, is a term applied to an eight-columned portico such as that of the Parthenon of Rome.

Octateuch, meaning a collection of eight books, is a term generally applied to the first eight books of the Old Testament.

Octave, an interval of an eighth (*see Interval*). The interval between one note and the same note pitched higher. A pure note is an air vibration of fixed frequency. Middle C is thus 256 vibrations per second. The note an octave above middle C is exactly twice this frequency, *i.e.*, 512 vibrations per second.

Octet, a musical composition for eight voices or instruments.

October, the 10th month, but the 8th in the old Roman calendar. It was held sacred to Mars.

Octopus, a genus of marine molluscs with eight tentacles that bear suckers.

Octrois are special taxes levied on articles of food before entering a city. They have been established in France from early times, and still exist, though at various periods they have been suspended.

Odes were originally extempore compositions sung in honour of the gods by the ancient Greeks and Romans. They were divided into three sections: strophe, antistrophe, and epode. All the most famous ancient odes—of Anacreon, Pindar, Horace—were composed before the Christian era. Among the best-known English odes are those of Milton, Dryden, Collins, Gray, Wordsworth, and Keats.

Odeum, a small theatre for the recitation of musical compositions, generally contiguous to a larger public theatre; thus the odeum of Athens in classic days adjoined the theatre of Bacchus.

Odyssey, Homer's famous epic poem setting forth the incidents of the wanderings of Odysseus on his way back to Ithaca after the Siege of Troy. *See* Greek Myths and Legends.

Œcumenical Council, a general council of the Christian Church summoned when important questions of Church doctrine and policy are to be decided. The early councils were predominantly Greek and convoked by the emperor. Those summoned by the Pope are called Lateran Councils and their decisions are not binding on the rest of Christendom. Only 20 Œcumenical Councils have been held in the history of Christendom; the first being the Council of Nicaea, 325, and the most important being the Council of Trent, 1545–63. Pope John XXIII convened an Œcumenical Council in Jan. 1959.

Œil-de-Bœuf, a term in architecture denoting openings, usually round or oval, in friezes, roofs, or domes of buildings, designed for the admission of light.

Ohm's Law, was propounded by Dr. G. S. Ohm in 1827 and now usually expressed in the equation: voltage = current (in amps.) × resistance (in ohms). The *ohm* is the practical unit of electrical resistance. *See also* **N12** (2).

Olbers' Comet was discovered in 1815 by Olbers the German astronomer. Olbers also discovered the asteroids Pallas and Vesta (1802–07).

Old Red Sandstone, a synonym for the Devonian system. *See* **F20.**

Olefines, a series of hydrocarbons, in which the hydrogen atoms are double the number of those of carbon. The first member of the series is ethylene.

Oleic Acid, an important fatty acid present in lard and olive- and cotton-seed oils. Used in soap-making. Olein is the ester formed by the reaction of oleic acid and glycerine.

Oleographs, the name given to reproductions of paintings in oils, the colours of the original being more or less faithfully copied. The process is one that closely resembles chromolithography.

Oleometer, an instrument for ascertaining the specific gravity of oil. (*See* **Hydrometer.**)

Oléron Laws or Judgments, were a code of maritime laws, introduced into England in the reign of Richard I. in the 12th century. Oléron is an island off the west coast of France, opposite the mouth of the Charente.

Olive. This small tree, whose fruit yields olive oil, is a native of the eastern Mediterranean countries, but has been introduced into cultivation elsewhere. Its oil is used for cooking, in packing sardines, and in soap making; the green unripe fruit is pickled for table olives.

Olympiads were periods of four years which elapsed between each celebration of the Olympic games, instituted in honour of Zeus by the Greeks, and held at Olympus in the Peloponnesus. These festivals included competitions in literature, art, drama, rhetoric, music, and gymastics, and they were continued, with intervals, from 776 B.C. to A.D. 394. Athletic revivals have taken place at Athens 1896, Paris 1900, St. Louis 1904, London 1908, Stockholm 1912, Antwerp 1920, Paris 1924, Amsterdam 1928, Los Angeles 1932, Berlin 1936, London 1948, Helsinki 1952, Melbourne 1956, and it is planned to hold the 1960 Olympiad in Rome. (*See* **U36** for 1956 Results.)

Omega, the last letter of the Greek alphabet, and widely adopted in literature in its figurative sense as indicating the end of anything.

Onyx, a kind of silica built up of different-coloured layers, which are parallel and straight (not curved as in agate).

Oolite, a geological term for the Jurassic oolitic limestones existing through a long stretch of country extending from Yorkshire to Dorsetshire. It abounds in fossils of molluscs and reptiles. The term "oolite" derives from the fact that these rocks are made of egg-shaped particles of calcium carbonate.

Opal, a mineral consisting of hydrous silica, occurring in numerous varieties and colours. Precious opal displays a beautiful internal opalescence, the result of the interference of light waves on the surfaces of layers differing in their water-content. Opal miners are called gougers. Chief source, the Andamooka and Coober Pedy fields of South Australia.

Opera derives, like Drama, from the religious plays of mediæval times. These plays were always accompanied by music, but, whereas Drama has relegated music to the entr'acte, Opera has developed it to the point of being the most important feature of the performance. The first true opera was produced at Florence in 1597. It was written by Rinuccini and composed mainly by Peri and called *La Dafne*. Rinuccini and Peri followed this in 1600 with *Euridice*—the earliest opera of which we have a complete record. The first opera house was opened in Venice by Caralli in 1637. Cardinal Mazarin tried to introduce Italian opera into France, bringing in Caralli in 1660, but the experiment was a failure. Native French opera began in 1672 under the patronage of Louis XIV. with Lulli's *Les Fêtes de l'Amour et de Bacchus*. In England musical plays were being performed at this time, but the first real opera was Purcell's *Dido and Æneas* written in 1689. At this time Scarlatti was writing operas in Naples and shaping the Italian opera into the form in which we know it to-day. Handel produced nearly forty operas in thirty years, his first being *Rinaldo* at the Haymarket, London, in 1711. The comic opera seems to have originated in Naples. The first English comic opera, the *Beggar's Opera* by Gay, was given in London in 1727. Mozart, after producing his magnificent *Idomeneo* at the age of 25, wrote a succession of comic operas: *Seraglio* (1782), *Figaro* (1786), *Don Giovanni* (1788), *Cosi fan tutte* (1790). These laid the foundations for all future comic opera. *The Magic Flute* (1791) was the first of what might be called "opera for the people." Beethoven made a single excursion into opera: *Fidelio* (1805). Rossini is best known for *The Barber of Seville* (1816), a comic opera, although his reputation was made with a serious opera *Tancredi* (1813). The operas of Bellini are rarely performed outside Italy, but these had considerable influence on the work of Chopin and Liszt. Bellini's successor Donizetti is best known for his comic operas *Don Pasquale* and

L'Elisir d'Amore. This period in French opera is best represented by Auber's *Fra Diavolo*. German opera, slow to take root, developed at this time through Weber and Meyerbeer to Wagner, whose first important opera, *Rienzi*, was performed in 1842. The complete *Ring* was first given at Bayreuth in 1876 and Wagner's last opera, *Parsifal*, in 1882. The most successful exponent of comic opera at this time was Offenbach, although Strauss in Vienna and Sullivan in England enjoyed considerable local success. Italian opera underwent a revival with the advent of Verdi. Of his earlier operas, *Rigoletto* (1851), *Il Trovatore* (1853) and *La Traviata* (1853) alone have retained their popularity. *Aïda* (1871) is a more mature work, while *Otello* (1887), and *Falstaff* (1839), for which Boito wrote the libretti, are works of high merit. Several French operas of this period retain their popularity: Gounod's *Faust* (1859), Bizet's *Carmen* (1875), Massenet's *Manon* (1884), Saint-Saëns *Samson et Dalila* (1877). In 1890 Mascagni achieved startling success with *Cavalleria Rusticana*. This was followed almost immediately by Leoncavallo's *I Pagliacci* and the two are now inseparable. Of the operas produced in the 20th century, the most popular have been Puccini's *La Bohème* (1896), *Tosca* (1900), *Madame Butterfly* (1904), Richard Strauss's *Der Rosenkavalier* (1911) and Debussy's *Pelléas et Mélisande* (1902).

Ophicleide, a brass instrument invented in the 19th century. Mendelssohn and Berlioz wrote scores for the ophicleide, but the instrument has fallen out of general use.

Opium was known to the ancients, and used by them as a medicine. It is obtained from the white poppy, the unripe "head" or seed capsule of that flower yielding a juice which when dried becomes the opium of commerce. The poppy is largely cultivated in India, Persia, Turkey, Macedonia, and China for the sake of this juice, which yields various alkaloids, such as morphine, narcotine, thebane, etc. Laudanum is a tincture of opium.

Opium War, a war (1839–42) between Great Britain and China, due to the dissatisfaction of the former with the treatment of British subjects in China. The immediate cause was the attempt of China to stop the importation of opium. It was concluded by the treaty of Nanking, which established the "treaty ports" of China. Hong Kong was ceded to Great Britain.

Opossum, marsupial mammals found in the more southerly of the United States, South America, and Australasia. They are arboreal except for the water-oppossum, which eats fish.

Optics, the branch of physics which investigates the nature and properties of light and the phenomena of colour. Burning lenses were known to the ancient Greeks and Ptolomy wrote a treatise on optics A.D. 150. Lenses as visual aids were known in ancient China but eyeglasses were not in use until the 13th century. Spectacles were in more general use after the invention of printing in the 15th century. The camera obscura was invented in the 16th century and the telescope and microscope at the beginning of the 17th century.

Opus, a single work of serious music. Most serious composers list their works in this way; *e.g.*, Opus 1, Opus 2, etc. If several pieces are included in a single opus they are listed as follows: Opus 1, No. 1.

Oracles were in ancient times supposed to be words spoken by the gods, and it was the custom on important occasions to consult them about the future. The Greeks had the Oracles of Zeus at Dodona, and Apollo at Delphi, while the Romans consulted the Oracles of Mars, Fortune, and others.

Orange, a fruit growing in most sub-tropical climates and in universal demand. It is grown on an evergreen tree that attains a height of about 20 ft. at maturity.

Orangemen, members of an Irish society formed in Ulster in 1795 to uphold Protestantism. Their name is taken from King William III. (Prince of Orange) who defeated James II. at the Boyne in 1690. The society has branches in most English-speaking countries but flourishes chiefly in Ulster.

Orang-utan, one of the largest of the anthropoid apes, found only in Borneo and Sumatra. When full-grown it stands over 4 ft. in height and weighs about 150 lb.

Oratorio, a sacred work for solo voices, chorus, and orchestra. The word applies to a special composition and not to a musical setting for a normal part of the church service.

Orbit indicates the course of a planet round the sun. All the planetary orbits are elliptical.

Orchestra, a group of instruments and instrumentalists whose playing is under the direction of a conductor. The composition of a typical symphony orchestra is as follows: STRINGS: 1st Violin (16), 2nd Violin (16) Viola (12), Violoncello (12), Double Bass (8). WOOD-WIND: Flute (3–4), Piccolo (1), Oboe (3), Cor Anglais (1), Bass Oboe (1), Clarinet (3), Bass Clarinet (1), Bassoon (3), Contra-bassoon (1). BRASS: Horn (6), Trumpet (5), Trombone (3–4), Tuba (2). PERCUSSION: Timpani (3–6), Side Drum (1), Bass Drum (1), Cymbals (1), Harp (2).

Ordeals, or **Trials by Ordeal**, were known in England in the time of the Saxons, and existed down to 1218, when they were abolished. The ordeals were usually of fire, water, or poison. The accused would be set to handle red-hot iron, be cast into water, or made to partake of poison, and unless he could withstand these tests he was condemned as guilty.

Orders, Holy, in the Roman Catholic Church are of seven kinds, extending from door-keepers, exorcists, readers, and acolytes, in the minor class, to deacons, priests, and bishops of major rank; while in the Anglican Churches there are only three—deacons, priests, and bishops.

Orders in Council are issued by the sovereign on the advice of a few selected members of the Privy Council. They must not seriously alter the law of the land. Another class of Orders in Council are issued by authority of an Act of Parliament for the carrying out of its provisions.

Ordination, the ceremony of installing ministers or clergymen in clerical offices, has existed from the earliest times. In the Anglican and Roman Catholic Churches the rites of Ordination are performed by bishops; among Nonconformists the power of ordination rests with the governing bodies of the different Churches.

Ordnance Office was an old Government department entrusted with the supply of weapons and materials of war from the time of the archers to the days of guns and explosives. After the Crimean campaign, when the administration of the Ordnance Board was shown to be very defective, the office was abolished, and its duties vested in the War Minister.

Ordnance Survey, an authorised survey of Great Britain entrusted to a special body of Royal Engineers and civilian experts, by whom maps and charts are from time to time produced, showing the full details of the geographical, geological, and industrial condition of the country. The scale adopted for counties is 6 in. to 1 mile, and 1 in. to 1 mile for the general map of the kingdom. The Ordnance Survey Department now comes under the Ministry of Agriculture, Fisheries and Food.

Organ is a musical wind instrument of ancient origin whose tones are produced by the vibrations of air in pipes of varying length. Basically, an organ consists of a number of pipes grouped in rows or ranks according to their special tone-character. The air is fed by bellows or, in modern organs, by a rotary fan, electrically driven. Each rank is controlled by a slider, and the knob that controls the slider is called a stop. The organist pulls out the stops to give the tones he wants, the other pipes being kept out of action by the slider. When a particular note on the keyboard is depressed the player may hear, by pulling out the appropriate stop, not only the normal pitch but the note in several octaves. A stop of which the notes are of normal pitch is called an 8-foot stop, a 16-foot stop would give an octave lower, a 4-foot stop an octave higher, and a 2-foot stop two octaves higher. The hand keyboard is called a manual, and the foot keyboard the pedal board. The basic tone of an organ is its diapason tone, and is normally of 8-foot length and pitch. Most large organs have

four manual keyboards and one pedal board. The most important manual is the great organ which comprises the majority of basic stops. The next in importance is the swell organ, so called because the pipes are enclosed in a box fitted with movable shutters operated by a swell-pedal. The effect provides a controlled crescendo or diminuendo. The tone of a typical English swell has a reedy character. The third manual controls the choir organ—a collection of stops suitable for vocal accompaniment. The fourth manual controls the solo organ—a group of stops which, singly or in combination, may provide a solo melody which the remainder of the organ accompanies. The pedal keyboard controls most of the bass stops. In some very large organs there is a fifth manual controlling the echo organ. This is a small group of stops usually set high in the roof of the building to give the effect of distant music. Most church organs have two or three manuals. Modern cinema organs may have some normal stops but rely chiefly on a number of effects unknown to the straight organ.

Orgies were originally secret celebrations in honour of Bacchus, and noted for the wild licence displayed by the celebrants.

Orguinette, a musical instrument composed of reeds which are played upon by a bellows. A strip of paper passes over the holes of the reeds, moved by a crank, and the paper is cut into holes to represent the required sounds. As the rollers turn the bellows the melody is "ground out."

Oriel College, Oxford, derives its name from a building called "l'Oriole" which stood on its site; was founded by Archdeacon Adam de Brome in 1326.

Oriel Window is a window projected from the front of a building, rectangular, triangular, or pentagonal. The ordinary bay window and bow window are varieties of Oriel. When an Oriel window does not reach to the ground it usually rests upon moulded sills supported by corbels.

Oriflamme, the name of the original banner of the abbey of St. Denis, and adopted by Louis VI. as his standard. It remained the national emblem of France for three centuries. The flag was of red silk, the outer edge being cut in the form of flames.

Origenists, a sect of religionists who were followers of Origen, who lived in the 3rd century. They believed that men's souls were created before their bodies, that the celestial bodies had souls, and that Christ was the Son of God only by adoption and grace. The Council of Constantinople in 553 condemned Origen's doctrines.

Original Sin, according to Christian doctrine the corruption that is born with us, as a result of Adam's fall.

"Origin of Species" (1859), the title of Darwin's famous work—by many considered to be the most important book of the 19th century.

Orioles, brilliantly coloured birds, members of the passerine family *Oriolidæ*, found in the tropical regions of Asia, Africa, and Australia. The golden oriole, perhaps the most beautiful of them all, with brilliant yellow plumage, black wings and tail, winters in Africa, visits England, and is known to have nested here.

Orion, a famous constellation of the heavens, comprising nearly a hundred stars, all visible to the naked eye. It contains three stars of the second magnitude in a line, and these are called "Orion's Belt."

"Orlando Furioso," the title of Ariosto's 16th-century epic poem, describing the doughty deeds of Orlando and other knights of the Charlemagne period.

Orleanists, members and supporters of the House of Orleans (1773–1850), of which King Louis Philippe was a member.

Ormer, a shellfish (*Haliotis tuberculata*) which occurs in the Channel Islands and on parts of the French coast. It is considered a great delicacy.

Ormulum, a version of the Gospels and Acts made by Orm, an ecclesiastic of the 12th century. It is metrical and exists in manuscript in the Bodleian Library.

Ormuzd, the spirit of good according to the Zoroastrian religion, represented as eternally warring against evil and personating purity of life.

Ornithology, the branch of Zoology which treats of the structure and habits of birds.

Ornithorhynchus. (*See* **Duck-bill.**)

Orphrey, the name of an ornamental border of gold and silver embroidered on ecclesiastical vestments.

Orrery, an instrument used in the 18th and early 19th centuries which showed the motions of the planets round the sun and the satellites round their primaries. The first orrery made was named after Charles Boyle, Earl of Orrery.

Orthoptera. The large order of insects including grasshoppers, crickets, locusts, mantises, stick insects, cockroaches, etc. These insects have biting mouth parts, and wings, if present, are in two pairs, the front pair being thickened to protect the membranous hind wings which are folded under the front ones when at rest.

Osborne House, near Cowes, in the Isle of Wight. Queen Victoria's favourite winter-residence, and where she died. It was given to the nation by Edward VII., and is now a convalescent home for Service officers. The grounds and State apartments are open to the public on certain days.

Oscar, the name of the gold-plated statuette awarded by the Academy of Motion Picture Arts and Sciences, of Hollywood, U.S.A., for the highest achievement of the year in film production.

Osier, a species of willow growing in damp soils and yielding branches utilised in basket-making.

Osmium, a very hard, bluish-white metal of the platinum group and one of the heaviest of known metals. It is obtained from certain sands of South America, California, Australia, and Russia. The alloy of osmium and iridium (osmiridium) provides long-wearing tips for gold fountain-pen nibs.

Osmosis, The process by which absorption of liquids through semi-permeable membranes takes place. A solution exerts osmotic pressure (O.P.) or suction in proportion to concentration but also depending on kind of dissolved substance. The roots of the higher plants are covered with fine root-hairs, within the cell-walls of which the sap is normally of a higher concentration than the dissolved matter in the surrounding soil. The root-hairs, therefore, draw into themselves these weaker salt-solutions. (The explanation of water and salt exchanges is complicated by the selective ability of some cells (*e.g.*, roots) to accept or reject particular dissolved substances along with the water. The absorption of salts by a plant is selective, each plant selecting through the semi-permeable membranes of its root-hairs those substances which are most suited to itself.)

Osprey, a large bird of prey, wing span 5 ft., widely distributed over all northern latitudes. It used to breed in Scotland, and did so again in 1959. It is invariably found near water and builds its nest on rocky cliffs, treetops or ruins. Feeds on fish.

Ostrich, the largest living bird, related to the rhea, emu, and extinct moa, now found only on the sandy plains of Africa and parts of S.W. Asia. The male has beautiful white plumes on wings and tail. The wings are useless in flight, but the birds have a fleetness of foot exceeding that of the swiftest horse. An ostrich's egg weighs 3 lb.

Otary, any seal which has external ears (as opposed to the *true seals* which lack them.) The eared seals make up the family *Otariidæ*, which includes the Sea-Lion and the Fur-seal of the N. Pacific.

Otter, an aquatic carnivorous mammal widely distributed over Europe, and at one time very common in England and Wales. Otter hunting, indeed, is still a country sport in some districts, and a breed of dogs called otter-hounds is kept for the purpose. The otter averages about 2 ft. in length, exclusive of tail, has web-feet, and is a very expert swimmer.

Ounce, a carnivorous member of the cat family, spotted like a leopard and having a long bushy tail. It is only found at high altitudes on the Himalayas, and is often called the "snow leopard."

Outcrop. Where a seam of rock appears at the surface of the ground, there is an outcrop of the particular rock. Outcrop coal is surface coal; the mining of such coal is called open-cast mining.

Overlord, a member of the House of Lords appointed to supervise and co-ordinate two or more ministries in the Churchill Government of 1951–53.

Overture, introductory piece to an opera or oratorio, often including the main themes to be elaborated later. Many so-called overtures have been composed as separate concert pieces.

Oviparous, a zoological term referring to such mammals, birds, reptiles, and fishes as bring forth eggs to be hatched outside the body of the parent.

Ovipositor, the organ by means of which the females of certain arthropods deposit their eggs.

Ovoviviparous, a zoological term applied to such animals as produce eggs which are hatched in the body of the parent; an example is the viper.

Owens College, Manchester, was founded by means of a bequest of £100,000 by John Owens, a Manchester merchant, who died in 1846. The college began in 1851, and formed the nucleus for the Victoria University of Manchester, established in 1880.

Owls, nocturnal birds of prey, distributed over the greater part of the world. Their forward-looking eyes, embedded in rings of feathers, give them a characteristic "owl-like" appearance, and their plumage, usually a mottled blend of browns and greys, is so soft that their flight is almost noiseless. Owls live on small mammals, reptiles, birds, insects, and fish, and are very valuable birds to the farmer. British owls include the barn owl (screech owl), short-eared owl, long-eared owl, tawny owl, little owl.

Ox, the popular name of the mammals included in the genus *Bos*. They are hollow-horned ruminants and hoofed quadrupeds, and include the various classes of domestic cattle as well as the different wild species. The adult male is called a bull, the female a cow, and the young a calf. The best-known breeds of domesticated cattle are the Durham or Shorthorn, the Angus, the Jersey, Ayrshire, Suffolk, and Hereford.

Oxalic Acid, an organic acid obtained from numerous plants, such as sorrel and rhubarb, and produced artificially for commercial purposes from sawdust, treated with caustic potash or caustic soda. It combines with metals to form oxalates.

Oxford Clay, a geological formation consisting of a bed of blue clay hundreds of feet thick, and forming the lower portion of the Middle Oolite series of the Jurassic. It makes good bricks.

Oxford University. The first indication of organised teaching at Oxford was in 1133 when Robert Pullen, the theologian from Paris, lectured there. Allusions to Oxford as a fully equipped university only occur after 1163. The earliest colleges to be founded were University College (1249), Balliol (about 1263), Merton (1264). In 1571 the university was reorganised and granted a Charter of Incorporation by an Act of Elizabeth. Other colleges, halls, and societies with their dates of foundation are: All Souls (1438), Brasenose (1509), Christ Church (1546), Corpus Christi (1517), Exeter (1314), Hertford (1874), Jesus (1571), Keble (1868), Lincoln (1427), Magdalen (1458), New College (1379), Oriel (1326), Pembroke (1624), Queen's (1340), St. Edmund Hall (1270), St. John's (1555), Trinity (1554), Wadham (1612), Worcester (1714), St. Peter's Hall (1929), St. Antony's College (1950), St. Catherine's Society (1868), Campion Hall, St. Benet's Hall, Mansfield College (1886), Regents' Park College, Greyfriars, and Nuffield College (1937). The women's colleges are:—Lady Margaret Hall (1878), Somerville (1879), St. Hugh's (1886), St. Hilda's (1893), St. Anne's (1952).

Oxygen is the most abundant of all elements. In combination, this gaseous element forms about 46% of the earth's crust; one-fifth of the atmosphere, eight-ninths by weight of all water. Joseph Priestley in 1774 was the first to separate it from red oxide of mercury. It is colourless, tasteless, and odourless, and forms the chief life-supporting element of animal and vegetable life.

"**Oyer and Terminer,**" a legal term designating a commission directed to the judges of the Supreme Courts, empowering them to hear and determine charges of treasons, felonies, and misdemeanours in the counties to which they are proceeding. Courts of Assize are known as Courts of Oyer and Terminer.

Oyez! a phrase used by the ushers of Courts of Justice to proclaim silence. It is the Norman-French word "Oyez" ("Hear ye.").

Oyster, a bivalve mollusc, of the genus Ostrea, having very numerous species and abounding in nearly all seas. The shell is rough and irregular. Oysters are exceedingly prolific, spawning in May and June. In England and Scotland deep-sea oysters are not allowed to be sold between June 15 and Aug. 4, and other kinds between May 14 and Aug. 4. In Ireland, no oysters may be taken between May 1 and Sept. 1, except in certain waters. The Whitstable oyster beds have existed since pre-Roman times; "clocks" are dead oysters.

Oystercatcher, a wading bird with black-and-white plumage and long, orange bill, inhabiting estuaries and sea-shores. Feeds on mussels, shell fish, etc., but not oysters.

Ozone, a modified form of oxygen, containing three atoms of oxygen per molecule instead of two. It is prepared by passing oxygen through a silent electric discharge. When present in air to the extent of 1 part in 4 million parts of air it kills bacteria, and has been used for this purpose in ventilating systems, *e.g.*, that of underground railways. It is present in extremely small quantities in the lower atmosphere but is comparatively plentiful at heights of about 20 miles. The belief widely held that seaside air is particularly rich in ozone is untrue. As ozone absorbs ultra-violet light of certain wavelengths spectroscopic methods, involving the analysis of sunlight, are chiefly used in ozone determinations. *See also* **F46** (1).

P

Paca, a genus of large rodents found in Central and South America, and resembling the guinea-pig. It is of nocturnal habits, has a streaked and spotted fur, and lives on fruits and plants.

Pacific Ocean. The first European to recognise the Pacific as distinct from the Atlantic was the Spanish explorer, Vasco Nuñez de Balboa, who discovered its eastern shore from a peak in Panama in 1513. The first European to sail upon it was Magellan, who entered it by the strait that bears his name in 1520. Sir Francis Drake was the first Englishman to sail upon it in 1577. The world's greatest ocean depth is in the Pacific in the Marianas Trench.

Pæan, the song of praise or triumph sung by the Greeks on the occasion of great celebrations.

Pæon, a foot, in ancient prosody, consisting of one long syllable and three short, the positions of the long syllable being variable.

Pagan, a person who does not worship God; a heathen. The word is derived from the Latin *paganus* (a countryman or uncultivated person). In the Middle Ages the term was used largely to describe Mohammedans (Moors, Saracens, etc.).

Pagoda, the name given in China, India, and other Asiatic countries to a high pyramidal tower, usually, but not necessarily, connected with a temple.

Palæontology, the science which is devoted to the investigation of fossils: animal (palæozoology) and plants (palæobotany). By studying the markings and fossils of living things in the stratified rocks, palæontologists have been able to establish with astonishing accuracy a record of the evolution of life through geological time. The geologist at the same time with the evidence of the fossils has been able to work out the order and the age of the rocks. *See also* **F18–20**.

Palæotherium, a genus of extinct tapir-like animals of large size, discovered in the Paris basin and elsewhere, of the Upper Eocene Age.

Palatinate, a term formerly applied to two German electorates or provinces, the Upper and Lower Palatinates. They are now provinces of Bavaria.

Pale, the name given to the part of Ireland colonised by the English and comprising portions of the counties of Louth, Dublin, Meath, and Kildare. The Anglo-Saxon rulers were styled "Lords of the Pale."

Palimpsests are ancient MSS. or parchments which

have been partly effaced and used for fresh writings. Many valuable MSS. were thus lost, but sometimes the second writing has been washed out, enabling the original writings to be deciphered. Among such restorations are a dialogue of Cicero's, a portion of a book of Livy, etc.

Pallium, a vestmental ornamentation of white wool presented by the Pope to archbishops on their appointment, and the sign of Papal confirmation.

Palm, a large straight-trunked plant or tree common to tropical countries, and usually fruit-yielding, such as dates, coconuts, etc. Many commodities useful to man are obtained from plants of the Palm family (*Palmaceæ*).

Palm Sunday, the Sunday before Easter, upon which occasion it is customary to carry palms to the churches in some countries, in commemoration of Christ's entry into Jerusalem for the Feast of the Passover, when the people went forth to greet Him with palm branches.

Palolo Worm, a marine worm which swarms in huge numbers at certain fixed times of the year off Samoa and neighbouring islands, where the natives collect it in nets and use it as food.

Panama Canal. In 1904 the United States signed a treaty with Panama (which had previously seceded from Colombia) by which rights of sovereignty over a strip of land ten miles in width, extending across the isthmus, were ceded to the U.S. The canal connects the Atlantic and Pacific Oceans, is just over fifty miles long (with sea approaches), and the width of channel varies from 300 to 1,000 ft. at bottom. Transit from sea to sea occupies about eight hours. The depth varies from 41 to 85 ft. It is constructed above sea-level, with locks. It has been available for commercial shipping since Aug. 3, 1914.

Panda, *or* **Cat-Bear,** is related to the Raccoon and to the Bear. There are two kinds, the Red or True Panda, resembling a large domestic cat, which lives in the eastern Himalayas and S.W. China, and the Giant Panda, which is more like a bear in appearance and inhabits the mountains of western China. Both frequent the dense bamboo forests of these regions.

Pandean Pipes, supposed to have been invented or played upon by the god Pan, consist of seven reeds tuned to scale and blown into by breath from the lips of the performer.

Pandex *or* **Pandects,** a summary of the Roman civil law, prepared by order of the Emperor Justinian in the 6th century A.D. (530–33).

Pangolin, the scientific name of the "scaly anteater," a member of the armadillo family, found in Africa and Southern Asia. It has an extensive tongue, covered with glutinous matter, which it uses in catching ants, its chief food. When once caught on the tongue, the insects cannot escape. When attacked the pangolin rolls itself into a ball, and its scales assume the form of sharp spikes.

Pantagruel, the leading character in one of the satires of Rabelais. *See* **G44** (1).

Pantheon, the famous temple in Rome, originally consecrated to the gods, built by Agrippa in 27 B.C. and rebuilt in the 2nd century by Hadrian. Its splendid dome and portico make it one of the most interesting architectural monuments of ancient days. Since the 7th century it has been used as a Christian church. The Panthéon at Paris, built in 1764, is modelled upon it. *See* **G25** (2).

Panther, a large carnivorous quadruped, akin to the leopard, native to India and other parts of Asia, and found also in Africa.

Pantomimes were originally stage representations in which speech was not permitted, all the action being carried on by gesture and movement. The ancient Greeks and Romans favoured them. Later on pantomime became popular throughout Europe, and in the 18th century, with the harlequinade, was adopted as a form of theatrical Christmas entertainment in England. The most famous English pantomime clown of the early 19th century was Joseph Grimaldi.

Papal Infallibility, a dogma which was finally promulgated by the Twentieth General Council in 1870. It states that the Pope, speaking *ex cathedra*, possesses infallibility for decisions on doctrines affecting faith or morals, in virtue of his supreme apostolic power. The strongest opposition to the doctrine existed among the followers of Döllinger in Germany.

Paper has been known in one form or another from very early times. The papyrus reeds of the Nile swamps served the ancient Egyptians for sheets upon which to inscribe their records. The Chinese and Japanese, centuries later, were using something more akin to modern paper in substance, an Asiatic paper-mulberry, yielding a smooth fibrous material, being utilised. With the spread of learning in Western Europe the necessity of a readier medium made itself felt and paper began to be manufactured from pulped rags and other substances. The first known English paper-mill was Sele mill near Stevenage, built about 1490, which produced the paper for an edition of Chaucer in 1498. Other mills were set up under Elizabeth, using linen and cotton as raw material. Other papermaking staples were later introduced, such as surat, esparto grass, and wood-pulp. The chief raw material in the world paper industry is wood-pulp, the main exporters being the timber-growing countries of Canada, Sweden, and Finland. Canada is the world's chief producer of newsprint and supplies a large proportion of U.S. requirements.

Papier mâché means pulped-paper and is a composition of paper pulp and other substances, to which, when moulded into form, coatings of japan, with gilt and coloured inlayings, are added. Elegant and decorative objects are made of papier-mâché. A ceramic papier-mâché is very durable.

Papyrus, the earliest known paper made in Egypt at a very remote period from a large species of reed, *Cyperus papyrus*. This plant is to be found all over tropical Africa, especially in the "sudd" region of the White Nile.

Parachute, the umbrella-shaped safety device used in emergency by the crew and passengers of aircraft. The first parachute descent was made in 1797 by André Garnerin from a balloon. In 1947 three Russian parachutists beat the international record by jumping from the stratosphere at a height of over 8 miles.

Paraclete (the Holy Ghost, or Comforter), the name used in the English translations of St. John's Gospel, and adopted by Abelard to designate the convent in Champagne founded by him, and of which Héloïse became the abbess.

Paradise, a Persian word used by the translators of the Old Testament to designate the Garden of Eden, and since meaning any place of happiness.

Paraffin was first obtained by distillation of coal, the process being discovered about 1830. About 1848, Mr. James Young procured it from mineral oil, and Irish peat also yielded it. The main source of paraffin supply to-day is crude petroleum. It is largely used in the manufacture of candles, for waterproofing, and numerous other purposes.

Parakeets, various small parrots of vivid plumage native to Australia, Polynesia, Asia, and Africa. One of the loveliest of the parakeets is the budgerigar of Australia. *See* **Z21, 23.**

Parcel Post was established in England in 1883 for inland parcels up to 7 lb. in weight, the maximum being raised to 15 lb. in 1935. The system has since been extended to practically all countries of the world. The British Postal authorities carry about 250 million parcels annually.

Parchment, made chiefly from the skins of animals, usually of goats and sheep, was employed in olden times before printing was invented and superseded papyrus as writing material. Vegetable parchment, invented by W. E. Gaine in 1853, though not equal in strength and durability to skin parchment, is about five times stronger than ordinary paper. Vellum is parchment made from the skins of young calves or lambs.

Parhelia is the term applied to the very peculiar phenomena known as "mock-suns" seen sometimes in the higher Arctic regions. The sun is then attended by a number of halos crossing each other in various geometrical forms, and said to be due to the refraction of light caused by ice crystals in the upper air.

Pariah, a word meaning "social outcast" from the word *Paraiyan*, a very low caste of Hindu,

outside the pale of regular castes, and avoided as something unclean.

Paris University, also known as the Sorbonne, was founded in 1256 and is one of the greatest educational institutions of Europe.

Parliament, is the name given to the supreme legislature of the United Kingdom. It consists of the Queen, the Lords spiritual and temporal, and the Commons. It meets in two houses: the House of Lords (the Upper or Second Chamber) and the House of Commons. It derives from the Anglo-Saxon *Witans* (*see* **Witan**). The Statute of Westminster (1275) first uses "parlement" of the Great Council in England, which comes from the French word meaning discourse. *See* **C7–11, D5.**

Parliamentary Correspondents sit in the Press Gallery of the House of Commons and describe its proceedings for newspapers either by impressions or a summary of the debate.

Parquetry, the name of a style of flooring consisting of small rectangular wooden blocks laid down according to geometrical pattern.

Parrot, the popular name of a widely distributed family of tropical birds, including the African grey parrot, the green parrot of South America—both familiar cage pets in this country—and the various parakeets, cockatoos, macaws, lories, etc. Many of these birds possess a remarkable gift of imitating sound, especially that of the human voice.

Parsec, unit of distance used by astronomers for expressing distances between stars. It is equivalent to about three and a quarter light-years.

Parsees, descendants of the Zoroastrians, or Fire-worshippers of Persia, are now more numerous in India than in the land of the Shah. They are born traders, and many of them not only possess great wealth but are renowned for their charities.

Parthenogenesis. The development of animals from unfertilised eggs. The drones of the honey bee are parthenogenetic, and the phenomenon is also common among aphids.

Parthenon, the famous Temple of Athena on the Acropolis at Athens, was built under the rule of Pericles between 447 B.C. and 432 B.C. (*See* **Greek Art, Section G.**) The famous sculptured friezes, known as the Elgin Marbles, are now in the British Museum.

Partridge, a well-known British game bird the shooting of which forms a considerable attraction to sportsmen in the season, which opens on Sept. 1. Two species are common in Britain.

Passover, the Jewish festival commemorating the departure from Egypt and the passing of the Angel of Death over the houses of the Israelites.

Passport is an official document issued to a person by his own government, certifying to his citizenship and permitting him to travel abroad. Passports to British subjects are granted by the Foreign Office, authorise bearer to leave the country and guarantee him the state's protection. Valid for 5 years.

Paten, the dish used for holding the consecrated bread in the Eucharistic service.

Patricians, the aristocracy of ancient Rome.

Paul's Cathedral, St., is the third cathedral church to be built on the site. It was preceded by a Norman building which was practically destroyed by the Great Fire in 1666. This followed a Saxon church which was burnt in 1086. The present building was designed by Sir Christopher Wren. The foundation stone was laid in 1675 and the structure was completed in 1710. It cost a little under £748,000. Its central feature is the dome, crowned by its cupola and lantern with the golden ball and cross. It escaped serious damage during the air raids of the second world war, but many of the surrounding buildings were laid waste.

***pC* Value**, introduced by Dr. C. L. Whittles in 1935 as a measure of salinity of aqueous solutions (soil extract, irrigation water, etc.); defined as the negative logarithm of specific electrical conductivity in reciprocal ohms. Alone or joined with *pH* (below) is useful as an index of osmotic pressure (*see* **Osmosis**) and related hindrance to plant growth resulting from excess of fertiliser or soil salts. If manuring is balanced, growth is best about *pC* 3.3.

Peacock, a bird of large size and beautiful plumage, its characteristic feature being a tail of brilliant "eyed" feathers, which it has the power of erecting and spreading out, the males possessing resplendent feathering to a much greater extent than the females. It is related to the pheasant; one species is found wild in the forests of India, and another inhabits Burma and the Malayan regions.

Pean, a term in heraldry indicating one of the furs borne in coat armour, the ground of which is black, with ermine spots of gold.

Peanut, Ground Nut *or* **Monkey Nut.** A member of the pea family native to S. America, but now cultivated in many parts of the world. After pollination, the flower stalk bends down and buries the pod containing the peas ("nuts") in the ground. The oil from these "nuts" can be used for margarine manufacture.

Pearl is produced by certain shelled molluscs, chiefly the oyster. The inner surface of the shells of the pearl oyster yield "mother-of-pearl," and distinct pearls are believed to be morbid secretions, caused by some external irritation. Many fine pearls are found in the actual body of the oyster. The Persian Gulf, Ceylon, the north-west coast of Western Australia, many Pacific islands, and the Gulf of Mexico are among the most productive pearl-fishing grounds. In ancient times Britain was renowned for its pearl fisheries, the pearls being obtained from a species of fresh-water mussel. Western Australia has produced a 40-grain pearl, the finest the world has seen. The largest pearl ever found was the "Beresford-Hope Pearl," which weighed 1,800 grains, over six times as much as the oyster that produced it.

Peat, decayed vegetable matter found mostly in marshy positions, and common in Ireland and Scotland. Peat is coal in its first stage of development. It is burnt for fuel in many cottage homes.

Peccary, a pig-like animal native to the Americas. There are two species: the collared peccary and the white-lipped peccary, the latter being a vicious and dangerous animal.

Peel Tower, the name applied to the numerous fortified towers or strongholds which are to be found along the Scottish Border.

Peep o' Day Boys, the Irish Protestant insurgents of 1784–95, so-called because they visited the houses of their antagonists at daybreak in search of arms.

Pelagians were a heretical Christian sect of the 5th century, founded by Pelagius, a Briton, who settled in Rome *c.* 400. A bitter controversy was aroused over the Pelagian doctrine, which denied the idea of original sin and laid emphasis on human responsibility for doing good or evil. Pelagianism was condemned by the councils of Jerusalem and Carthage as heresy.

Pelasgians, legendary peoples of ancient Greece who were the first to invade the mainland; settled in northern Greece and moved southward. Most prosperous in the 13th and 12th centuries B.C.

Pelican, a genus of bird with long depressed bills pouched underneath so that the bird can hold a number of fish in reserve for future consumption. They have immense wings and webbed feet.

Pemmican, vension or other meat, sliced, dried, pounded and made into cakes, used by explorers and others when out of reach of fresh meat.

Penguin, a genus of flightless, fish-eating sea-birds of the southern hemisphere. They are stout-bodied, short-necked, and of small, moderate, or large size. The Emperor and King Penguins make no nest but protect and incubate the single egg by carrying it in the down feathers between the feet and the body. Other species brood in the usual way and may lay as many as three eggs. Penguins use their flippers for swimming under water. All 17 species are bluish-grey or blackish above and white below. They are very sociable and breed in colonies.

Penicillin. An antibiotic drug produced by the mould *Penicillium notatum*, and discovered by Sir Alexander Fleming in 1928. It has been described as the most effective chemotherapeutic agent known. *See* **P4** (2), **9** (1).

Peninsular War lasted from 1808 to 1814. Fought in Spain and Portugal (the Iberian peninsula) by the British, Spanish, and Portuguese forces,

chiefly under Wellington, against the French. The latter were defeated.

Pentagon, government office in Washington (the largest in the world), housing many thousands of military and civilian workers in the War Department of the United States (Army, Navy, and Air Force).

Pentateuch, the first five books of the Old Testament—Genesis, Exodus, Leviticus, Numbers, and Deuteronomy.

Pentatonic Scale, the scale of five notes prevalent in Chinese, Japanese, Javanese, and some Negro music. Music based on the pentatonic scale is almost imcomprehensible to an ear accustomed to the diatonic scale.

Pentecost, in the Christian Church, the Whitsuntide festival in commemoration of the descent of the Holy Ghost upon the apostles during the feast of the Pentecost; to the Jews it is a time of solemn celebration—"the feast of weeks," celebrated on the 50th day, or seven weeks, after the Passover.

"Pepys Diary," by Samuel Pepys, was first published in 1825. The original MS. is deposited at Magdalene College, Cambridge. The "Diary" gives a picture of the social life of the period between Jan. 1, 1660, and May 31, 1669.

Perch, a well-known family of sea and fresh-water fish, with dark striped sides. The common perch of British rivers and lakes falls an easy prey to the angler because of its voracity.

Percussion Instruments, a collective term covering the instruments of an orchestra that give forth sound when struck, *e.g.*, timpani, drums, cymbals, tambourine, triangle, glockenspiel. In some modern orchestral works the pianoforte is used as a percussion instrument instead of in its usual role as a solo instrument.

Perfumes are essences or odours obtained from floral and other substances. The chief flower perfumes are those obtained from rose, jasmine, orange flower, violet, and acacia. Heliotrope perfume is largely obtained from vanilla and almonds. Among the aromatic herbs which yield attractive perfumes are the rosemary, thyme, geranium, lavender, etc., while orange peel, citron peel, musk, sandalwood, patchouli, and other vegetable products are largely drawn upon. In recent times chemistry has been called into play in aid of the perfumer, and many of the popular perfumes of to-day are chemically prepared in simulation of the scents of the flowers or other natural substances the names of which they bear.

Periclase, a mineral form of magnesium oxide.

Perigee. The moon or the sun is said to be in perigee when it is at its least distance from the earth. The opposite of apogee (which see).

Perihelion. That point in a planet's orbit when it is nearest to the sun. The opposite of aphelion.

Peripatetics were followers of Aristotle, the name arising from the philosopher's habit of walking up and down while he expounded his theories.

Peripatus, an animal which stands as a link between the annelid worms and the arthropods. In appearance it resembles a caterpillar, and it respires by a system of air tubes like those in insects. Certain other points of internal structure point to a relationship with annelid worms. There are some fifty species, the best known being the S. African *Peripalus capensis*.

Periscope, an optical instrument which enables the user to observe objects on the other side of an obstacle without exposing himself.

Periwig. (*See* **Peruke.**)

Perjury, the offence of giving false evidence. The ancient Romans threw the perjurer from the Tarpeian Rock, and after the Empire was Christianised, those who swore falsely upon the Gospel had their tongues cut out. The usual punishment in England from the 16th to the 19th centuries was the pillory, fine, and imprisonment.

Permian Formation, a group of rocks lying between the Trias and the Carboniferous strata. It has three subdivisions, Upper, Middle and Lower Permian, all of which are rich in fossil deposits.

Per Procurationem signature means that the subject of the correspondence has been put into the writer's care by his principal for him to use his personal judgment in the matter, and that he is authorised to sign on behalf of his principal. Normally contracted to *per pro* or *p.p.*

Perseids, meteor showers which are to be seen every August. The first recorded observation of the Perseids dates back to A.D. 830.

Peruke, the name given to the wigs worn by men in the latter half of the 18th century. The custom of wearing wigs was gradually superseded by powdering the natural hair. Wigs are still worn by the Speaker of the House of Commons, judges, and barristers.

Peterloo Massacre, a result of a conflict between the military and a large concourse of people assembled at a Parliamentary Reform meeting held on Aug. 16, 1819, on St. Peter's Field, Manchester, involving the loss of many lives.

Peter's Pence, the tax levied in England by the Pope from the 8th or 9th century, and subsequently extended to other countries. It amounted to a silver penny per hearth. It was withheld by England in 1366 in order to bring pressure to bear on the Pope to agree to the statute of præmunire, and was abolished by Henry VIII. in 1534, though it has since been revived as a voluntary contribution by Roman Catholics.

Peter's, St., at Rome, as it at present exists, was built in the 16th and 17th centuries, the first stone being laid by Pope Julius II. in 1506. It was not completed until 1660. The dome was designed by Michelangelo, and Raphael was employed for a time in decorating the building. It is the chief church of Roman Catholic Christendom and in it the Popes are crowned.

Petition of Right, passed in 1628, defined unparliamentary taxation, billeting, arbitrary imprisonment, and martial law over civilians as illegal. It was conceded by Charles I. to his Parliament in return for a vote of five subsidies.

Petrel, the name given to a member of a large, widely-distributed family of sea-birds of great diversity of size and colouring and distinguished by tube-like external nostrils. They usually skim low over the waves, and some, for this reason, are known as shearwaters. The storm petrel or Mother Carey's chicken occasionally patters along the surface, and is often called Little Peter—a reference to St. Peter walking on the water. Except when breeding, petrels are always at sea. They mostly nest in holes and crevices on islands and lay one egg, which is invariably white. The storm petrel, Leach's petrel, Manx shearwater, and the fulmar petrel are resident in the British Isles. (*See also* **Mutton Bird.**)

Petroleum, a mineral oil composed of a very complex mixture of hydrocarbons, occurring naturally in the earth and recovered by pumping or drilling under great pressure. The composition of the crude oil varies according to source and may be divided roughly into two types: paraffinous and naphthenic. The crude oil is subjected to fractional distillation which separates out the various grades of petroleum with their different boiling points. "Cracking" converts, by heating under pressure, oils of high boiling point into more volatile oils suitable for petrol engines. A great industry has grown up around petroleum, and the by-products, which used to be regarded as waste, form the basis of the modern synthetic-chemical industry (rubber, plastics, etc.). Chief sources are: U.S.A., Middle East, Caribbean, U.S.S.R., and Eastern Europe. The oil is carried in pipelines sometimes for hundreds of miles from oilfield to port.

Pewter, alloy of tin and lead formerly much used for making household utensils and ornaments.

***pH* Value.** Introduced in 1909 by the Danish chemist Sørensen to indicate hydrogen-ion concentration on the basis of electrical conductivity and a view of ionisation since discarded; is now taken as a logarithmic scale of acidity or alkalinity of aqueous solutions: acidity 0–7, neutrality at 7·0, alkalinity 7–14. The *pH* of blood is about 7·6 (faintly alkaline).

Phalanger, pouched marsupial mammals. They are arboreal and superficially resemble squirrels. There are two genera of flying phalangers or flying squirrels, which have a remarkable membrane along each side of the body enabling the animals to glide through the air. The members of the phalanger family are confined to the Australasian and oriental regions.

Phalangid, a member of the arachnid order Phalangida: popularly known as "harvesters."

Phalanx, a name applied by the ancient Greeks to a body of troops drawn up in close array, with overlapping shields, and eight, ten, or more rows deep. The Macedonians stood sixteen deep. A Greek phalanx consisted of 8,000 men.

Pharmacopœia, an official publication containing information on the recognised drugs used in medicine. Each country has its own pharmacopœia. The British Pharmacopœia (B.P.) is published under the direction of the General Medical Council. The Pharmaceutical Society issues the British Pharmaceutical Codex (B.P.C.); there is also an International Pharmacopœia (2 vols.) which is issued by the World Health Organisation.

Pharos, the name of the first lighthouse, built by Ptolemy II. about 260 B.C., on the Isle of Pharos, at the entrance to the harbour of Alexandria. It was about 460 ft. high, and one of the "seven wonders."

Pheasant, game birds allied to the partridges, quails, peacocks and turkeys, distinguished by their brilliant plumage and long tapering tail. First found by the Greeks in Georgia where the River Phasis flows through to the Black Sea.

Philippics, the orations delivered by Demosthenes, 352–341 B.C., against Philip of Macedon—remarkable for their acrimonious invective. The word was also used for Cicero's speeches against Antony. In modern use, any impassioned invective.

Philosopher's Stone. (*See* **Alchemy.**)

Philosophy is concerned primarily with the nature of reality (metaphysics) and seeks to determine also the nature of human knowledge with its limitations. It has been described as a sort of "clearing house" of mankind's experience, assessing and evaluating its meaning and significance while examining the beliefs derived therefrom. Enquiry into the nature of "good" and "right"—for the individual (ethics) and for the community (political philosophy)—as well as the nature of beauty (æsthetics) are other branches of the subject. Philosophy has been likened by the great contemporary philosopher, Bertrand Russell, to a No-Man's Land—"something intermediate between theology and science"—since it is concerned with speculations on questions which neither science nor dogma can convincingly answer.

Phœnix, a fabled bird of Egyptian mythology.

Phœnix Park, the great public park of Dublin, 1,800 acres in extent and containing the Vice-Regal Lodge. It was in this park that Lord Frederick Cavendish, Secretary for Ireland, and Under-Secretary Thomas Burke were assassinated in 1882.

Phosphorus was discovered by Brandt in urine in 1669. It is found in most animal and vegetable tissues. It is an essential element of all plants and of the bones of animals. In combination with various metals it forms different phosphates, which are largely utilised as manures. The chief commercial use of phosphorus is in the preparation of matches.

Photogrammetry, the science of measurement from photographs taken from an aircraft. Aerial photography has many uses and is of great value to military intelligence and for map-making.

Photometer, an instrument, of which there are various forms, for measuring the intensity of light.

Photomicrography, the taking of photographs through a microscope.

Photosynthesis is the process by which plants build up food by means of light. The carbon dioxide and water absorbed by plants are converted by photosynthesis into complex food substances, such as sugar and starch, by the green colouring matter *chlorophyll*, helped by the radiant energy of the sun. *See* **F30.**

Phylloxera, a kind of plant lice related to aphids, which attack the grape vine, and in some years cause great devastation in the vineyards. *See* **S39** (2).

Physicians, Royal College of, was constituted in London in 1518, Dr. Linacre, physician to Henry VIII., and the projector of the College, being its first president. The present College in Trafalgar Square was erected about 1825 from designs by Sir R. Smirke.

Piano-Accordion, a small, portable reed-organ whose melody is played by the right hand on a short piano-type keyboard. The left hand operates up to 120 stud-like bass keys, each of which produces a standard chord. The instrument is slung from a strap across the shoulders and wind for the reeds is provided by a central bellows operated by the movement of the left arm. The piano-accordion is an Italian development of the older accordion or concertina.

Pianoforte. Fundamentally a mechanical dulcimer whose hammers are operated from a keyboard, just as the harpsichord is a mechanical harp whose strings are plucked by quills operated from a keyboard. Historically, however, the pianoforte followed the harpsichord, on which it was regarded as an improvement. The name itself (piano-forte = soft-loud) was chosen to point out that the new instrument gave a much wider control of volume than did the harpsichord. The pianoforte first appeared in the 18th century and its invention is generally attributed to an Italian, Cristofori, who produced an instrument called the "piano e forte" in 1711. England first saw the pianoforte in the 1760's. The pianoforte soon came to be recognised as the ideal instrument for the amateur musician—a fact which nearly led to its undoing. First there arose the atrocious "cabinet-piano" in which an inferior pianoforte movement was incorporated in a piece of furniture designed to fulfil some other purpose. Later, in Victorian times, when no middle-class home was complete without a "piano," the market became flooded with cheap and nasty instruments in whose design size and price were the only considerations. Fortunately, however, the great composers of the 18th and 19th centuries realised the possibilities of the pianoforte and wrote pieces for it that taxed the powers of both performer and instrument. This put a constant pressure upon pianoforte manufacturers to improve their instruments so that these difficult pieces could be played by less expert musicians. The modern pianoforte appears in two main forms: the "grand" in which the frame bearing the strings is horizontal, and the "upright" in which the frame is vertical. The frame is a very heavy iron casting capable of withstanding a string tension of many tons. In older wooden-framed pianos the string tension is lower and the tone consequently less brilliant. The "check action" in which the hammers pivot freely has superseded the "sticker action" in which the hammer is pushed forward by a system of levers. Most pianos are provided with two pedals. The "soft" pedal should move the hammers a little to one side so that they strike only one string instead of two or three, but it may work by shortening the travel of the hammers or, in cheap actions, by the application of a light damper to the strings. The "loud" or sustaining pedal removes the main dampers so that a note continues to sound after the key has been released. Probably the most famous makers of pianofortes are Pleyel (France) and Blüthner and Bechstein (Germany). Good English pianos have been made by Broadwood, Collard, etc. *See also* **G51** (2).

Pibroch, a type of Scottish bagpipe music consisting of variations on an air.

Piccolo, a small flute with a high, piercing note. When required, the piccolo is usually played by one of the flautists in an orchestra.

Picts, inhabitants of Scotland in pre-Roman times, are held by some historians to be a branch of the old Celtic race, by others to have been of Scythian origin. They occupied the Lowland portion of Scotland, and were subdued by the Scots in the 9th century, Kenneth II. becoming king of the whole of Scotland.

Pike, a familiar fresh-water fish abundant in the temperate regions of both hemispheres. It forms good sport for the angler in rivers and lakes, and sometimes attains a weight of from 20 to 30 lb. It is extremely voracious, is covered with small scales, and has a ferocious-looking head

Pilchard, a fish of the herring family, but with

smaller scales and more rounded body. It appears off the Cornish coasts in vast shoals every summer.

Pilgrimage, the undertaking of a journey to a distant place or shrine to satisfy a religious vow or secure spiritual benefit, was resorted to in early Christian times The first recorded pilgrimage is that of the Empress Helena to Jerusalem in 326. In the Middle Ages pilgrimages became common, and were undertaken by monarchs and people of rank in all Christian countries. The Mohammedans have been making pilgrimages to Mecca since the death of the Prophet, such duty being enjoined by the Koran. Among the great centres of Christian pilgrimages are Jerusalem, Rome, the tomb of Becket at Canterbury, and the holy places of Lourdes and La Salette in France.

Pilgrim Fathers, the 101 English Puritans, who, after living some years in exile in Holland, to escape persecution in their own country, set sail for America in the *Mayflower* Sept. 6 1620, landing at Plymouth, Mass., Dec. 4. They founded the settlement of Plymouth, and are regarded as the pioneers of American colonisation although 13 years earlier a small Virginian colony had been established.

"Pilgrim's Progress," Bunyan's famous allegory, written in Bedford gaol. The first part was issued in 1678. It is the greatest work of its kind. *See also* **G49** (1).

Pilgrim Trust, The, was established in 1930 through the generosity of an American, the late E. S. Harkness, who "had many ties of affection with the land (England) from which he draws his descent." A sum, approximately £2 million, was placed in the hands of trustees for distribution in Great Britain. The terms of the deed are sufficiently wide to cover charitable, educational, and national institutions, and the disbursements are made at the discretion of the trustees. This generous benefaction is due to the donor's admiration of the part Great Britain played in the first world war, and the financial burden she has since sustained.

Pillory, a wooden instrument of punishment in use in England until 1837. It consisted of a pair of movable boards with holes through which the culprit's head and hands were put, and was usually erected on a scaffold. While a person was undergoing this punishment the mob generally pelted him with stones and rubbish, sometimes to his serious injury. People convicted of forgery, perjury, or libel were often condemned to the pillory, but from 1816 to 1837 the only offence for which it could be inflicted was perjury.

Pine, a conifer of the genus *Pinus*, which flourishes all over the northern hemisphere and includes 80–90 species, which afford valuable timber and yield turpentine and tar. The Scots Pine, *Pinus silvestris*, with its blue-green, short needles, set in pairs, and its rosy-orange branches, is native to Britain, as it is to the whole of Europe. It provides the red and yellow deal in everyday use.

Pipa, a species of toad inhabiting Guiana, and not found elsewhere. It is of considerable size, and is remarkable for the fact that the female carries its eggs on its back until they are hatched, herself depositing them in that position. Generally known as the "Surinam toad."

Pitcairn Islanders were originally the mutineers of the *Bounty*. They took possession of the island in 1790, and it was not until 1814 that their whereabouts was ascertained, accidentally, by a passing ship. The mutineers, under their leader, Adams, had settled down to a communal existence, married Tahitian women, and increased so in numbers that in the course of years they were too many for the island to support, and in 1856 they were removed by the British Government to Norfolk Island. A small number returned to Pitcairn.

Pitchblende *or* **Uraninite**, a relatively scarce mineral. It is nearly all uranium oxide, but lead, thorium, etc., are also present. Pitchblende from Joachimstal in Czechoslovakia was the material in which radium was discovered by the Curies. Pitchblende also occurs in Saxony, Rumania, Norway, Cornwall, the Belgian Congo, and at Great Bear Lake in Canada.

Plague, a fatal epidemic which spread over Europe and devastated England at different periods between the 10th and the 19th centuries. In the 14th century the devastating outbreak known as the Black Death swept over Europe. The Great Plague of London occurred from 1664–65.

Plaice, a familiar British sea-fish, of the flounder family, characterised by the red spots on the upper surface.

Plaid, a comprehensive garment of tartan or woollen material checked and coloured in distinctive markings for different Scottish clans and worn by women as well as men.

Plainsong, a style of musical composition sung in unison (all voices singing the same tune without harmony), familiar in the Western Church from very early times and still performed, principally in the Roman Catholic Church. Though restrained and contemplative in spirit, it is capable of expressing deep emotion.

Planets, the name give to such celestial bodies as revolve round the sun in elliptical orbits. The name was first used by the Greeks to indicate their difference from the fixed stars. There are nine planets, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. *See* **F7**.

Plankton, a word which first came into biological use in 1886 to describe the usually microscopic plants and animals floating, swimming, and drifting in the surface waters of the sea. To be distinguished from *nekton* (swimming animals like fishes and squids) and *benthos* (plants and animals living on the sea bottom, like fixed algæ, sponges, oysters, crabs, etc.).

Plantagenets, the kings who reigned in England between 1154 and 1485 and included the Houses of Lancaster and York. More correctly they are styled Angevins, from Anjou, of which Geoffrey, father of Henry II., was Count, and whose badge was a sprig of broom (*planta genista*).

Plassey, Battle of, was fought between the British under Clive and the Indians under Suraj-ud-Daula on June 23, 1757. The British gained a decisive victory over much larger forces.

Plastics, a broad term covering those substances which become plastic when subjected to increased temperatures or pressures. The Plastics Industry is based on synthetic organic examples of this group. There are two classes of plastics: the *thermoplastic*, which become plastic every time they are heated (*e.g.* cellulosic plastics) and *thermosetting*, which undergo chemical change when heated, so that once set they cannot be rendered plastic again (*e.g.* Bakelite).

Plate, the term applied to gold, silver, or plated-ware, such as spoons, knives, forks, dishes, cups etc. (*See* **Goldsmiths Company.**) In recent times it has been the custom to include under the term articles of the baser metals covered with a thin coating of silver and differentiated as "electro-plate."

Platinum, a scarce white metal generally allied with iridium, osmium, ruthenium, and palladium. It can only be melted in an oxyhydrogen or electric furnace, but can be rolled out into a film-like sheet, or drawn out to the finest wire.

Platyhelminthes *or* **Flat-worms**, the phylum of the animal kingdom to which the parasitic flukes and tapeworms and the free-living planarians belong.

Plebeians were the ordinary citizens of Rome as distinct from the patricians. There was a long struggle between the two orders for political equality.

Pleiades, famous cluster of stars in the constellation of Taurus. Of the seven principal stars in the group, one is rather faint, and many myths have sprung up about this "lost pleiad" as it is called.

Pleistocene the geological period that succeeded the Pliocene. It is supposed to have begun more than half a million years ago. During the Pleistocene, also known as the *Great Ice Age*, there were four cold periods, when the ice sheets covered northern Europe and N. America, separated by warm periods when the glaciers drew back into the mountains. *See* **F20**.

Pliocene, the geological period preceding the Pleistocene, and the last major division of the Tertiary strata. It began about fifteen million years ago.

Plough Monday, the first Monday after the Epiphany, when in olden times the rustic population returned to work after the Christmas festivities.

Plover, wading birds, widely distributed over marshy places of Europe. Several species occur in Britain, including the Golden-plover, which breeds on the moors of Devon, Somerset, Wales, N.E. Yorkshire, and is widely distributed over Scotland.

"Plug" Riots were frequent in the manufacturing districts of the North of England about 1842, when there was great distress among factory workers. The rioters attacked mills and, by drawing the plugs from the boilers, stopped the machinery.

Pluto, the last planet to be discovered. Its existence was established by C. W. Tombaugh at the Flagstaff Observatory in Arizona in Jan. 1930 from reckonings made by P. Lowell in 1914. It is the most distant of all the known planets; diameter about 3,650 miles. Its mean distance from the sun is estimated at 3,671 million miles.

Plutonium, a chemical element capable of nuclear fission in the same way as Uranium 235. Not until after it had been synthesised in atomic piles during the second world war was it shown to occur in infinitesimally small traces in nature. Its synthesis in the atomic pile depends on the capture by Uranium 238 nuclei of neutrons; immediate product of this reaction is the element neptunium, but this undergoes rapid radioactive disintegration to plutonium.

Plymouth Brethren, a Nonconformist sect founded about 1830 by J. N. Darby. They are not at great variance with other Protestant Churches, recognise no order of ministers, and receive into communion all who acknowledge Christ.

Poet Laureate is the poet attached to the royal household, an office officially established in 1668, though its origins go back to the early Middle Ages, when minstrels were employed at the courts of English kings. Chaucer, Skelton, and Spenser, though not court poets, were all unofficial poets laureate. Ben Jonson has been described as the first "official laureate," but the office was not officially recognised until 1688, when Dryden was formally granted the office of P.L. It is customary for the Poet Laureate to write verse in celebration of events of national importance. John Masefield succeeded Robert Bridges as P.L. in 1930.

Pogrom. Russian word meaning "destruction." First used to describe the Czarist attacks on the Jews in 1881 in Russia (where they have vanished since the Revolution). In 1938 Hitler ordered a general pogrom in Germany. All synagogues were destroyed and nearly all Jewish shops and homes, Jewish hospitals and children's homes suffered. During the subsequent war Jews of central Europe were systematically exterminated in cold blood by the Nazis.

Poitiers, Battle of, was fought on Sept. 19, 1356, during the Hundred Years' War, when Edward the Black Prince gained a complete victory over John, King of France, who was taken prisoner and brought to London.

Pole-Cat, an animal of a dark-brown colour, about 18 in. in length, exclusive of tail; the ears and face-markings are white or light brown. It is carnivorous and belongs to the weasel family. Like the skunk, it emits an offensive odour.

Pole-Star is of the second magnitude, and the last in the tail of the Little Bear constellation. Being near the North pole of the heavens—never more than about one degree from due north—it always remains visible in the Northern hemisphere; hence its use as a guide to seamen.

Police, a regular force established for the preservation of law and order and the prevention and detection of crime. The powers they have vary from country to country and with the type of government; the more civilised and democratic the state, the less police intervention. England, compared with countries abroad, was slow to develop a police force, and it was not until 1829 that Sir Robert Peel's Metropolitan Police Act established a regular force for the metropolis, later legislation establishing county and borough forces maintained by local police authorities throughout England and Wales. Up to that time police duties were discharged by individual constables and watchmen appointed by local areas in England and Wales. The efficiency of the Police is the concern of the Home Office, and in Scotland of the Scottish Office. *See* C6 (1).

Polka, a dance introduced into England from Bohemia in 1843; it won great popularity, but is now seldom danced.

Poll Tax, a tax levied on every adult—every head or poll—was first imposed in England in 1380, and led to the "Peasants' Revolt," headed by Wat Tyler. It was reimposed at intervals, notably in 1513 and in the reign of Charles II. The poll tax of 1698 was the last of its kind.

Pollution of the atmosphere is due chiefly to the incomplete combustion of fuels, especially coal, large particles of soot being deposited fairly quickly close to their place of origin and smaller particles (including smoke) remaining suspended in the air for a long time. Corrosion of exposed objects and damage to buildings result from the production of sulphuric acid. The introduction of more efficient furnaces and the washing of flue gases have assisted in the abatement of smoke and other forms of pollution. Estimation of polluting substances is carried out systematically in Great Britain by the Department of Scientific and Industrial Research, the dust and matter brought down with the rain being collected in large deposit gauges; automatic filters provide continuous records of the variation of the floating solid impurities; and apparatus is employed to measure the concentration of sulphur dioxide. "**Smog**" (smoke-laden fog), which reduces visibility to zero and affects the respiratory organs, is liable to occur when the air near the earth is cooled below its dew-point temperature by radiation on a still, cloudless night, when an accumulation of smoke over a large city cuts off daylight and produces gloom, and absence of wind or vertical currents prevents the lower layers of the air from getting away. Such conditions are associated with the smoke-laden atmosphere of large industrial towns during a winter anticyclone.

Polonaise *or* **Polacca**, a musical composition in the style of a traditional Polish dance. Chopin is the best-known composer of Polonaises.

Polonium, a radioactive element discovered by Madame Curie in 1898, and named after her native land of Poland.

Polymerisation is the linking together of small molecules to make a large long-chain molecule. The general name for polymers of ethylene is Polythene, a wax-like plastic solid which because of its special qualities is being used in a variety of ways today.

Polytheism, the doctrine of plurality of god-heads.

Pomander, name of a small ball or box containing perfumes and spices, formerly carried suspended from the neck or girdle as a protection against infection so it was believed.

Pomology, the science of fruit-growing.

Poniard, a dagger-like weapon commonly carried about the person by Spaniards and Italians of the 16th and 17th centuries, but never much in vogue in England.

Pontifex, the title assigned in ancient Rome to members of the college of pontifices. "Pontifex maximus" was the official head of Roman religion. It was as "pontifex maximus" that Julius Cæsar revised the calendar in 46 B.C., and when after the rise of Christianity the popes took over the title the revision of the calendar fell to them.

Pontoon, any temporary floating structure that forms part of a bridge across a river. Pontoons are in various forms, mostly cylindrical and hollow, others take the shape of deck-boats locked together. Pontoon bridges capable of supporting railways are a feature of modern military equipment.

Poodle, a well-known variety of domestic dog having a thick curly coat which in France it is the custom to cut close on the lower part of the body. It is an exceptionally intelligent animal, capable of being taught many tricks.

Pope, The, the head of the Roman Catholic Church and successor of St. Peter. He is elected by the body of Cardinals; since 1870 when the King of Italy deposed the holder of the office from temporal power, no Pope had left the

Vatican between appointment and death until 1929, when peace was made between the Church and State in Italy and compensation was paid to the Holy See for the loss of temporal power. Cardinal Roncalli, Patriarch of Venice, was elected Pope John XXIII. in 1958 following the death of Pope Pius XII.

Poplin, a favourite fabric composed of silk and worsted. The industry was introduced into England by Huguenot refugees in 1693.

Poppy Oil, a fixed oil obtained from the seeds of the opium-poppy, and used as a food, for illumination, and in a certain class of soapmaking.

Porcelain. There are three kinds of pottery: earthenware, stoneware, and porcelain; the marks shown in the General Compendium are restricted to those used on porcelain, a word thought to be derived from the Italian *porcelana*, indicating the texture of a piglet. The majority of porcelain made on the continent was of "hard-paste," or true porcelain, similar to that discovered by the Chinese as early as the T'ang Dynasty (A.D. 618–907); it was composed of kaolin (china-clay) and petuntse (china-stone) which when fired at a high temperature formed an extremely hard and translucent material. The recipe of "hard-paste" porcelain remained a secret of the Chinese until 1708, when it was rediscovered in Europe by Johann Böttger of the Meissen factory (popularly known as Dresden). Aided by runaway Meissen workmen factories were soon established at Vienna, Venice and later in many other parts of Germany. During the middle of the 18th century Plymouth and Bristol were the only English factories to make this type of porcelain, elsewhere both in England and France, the material used was known as "soft-paste" or artificial porcelain which was made by blending varying ingredients together with the materials of glass. By the 19th century hard-paste porcelain was used throughout practically the whole of the continent, but in England a hybrid-paste containing bone-ash was introduced and is still the material used to-day.

Porcupine, a rodent whose back is covered with long, sharp, black and white spikes, which form a powerful means of defence. There are two families of porcupines; one is confined to the Old World and the other contains the American porcupines.

Porphyry, a form of crystalline rock of many varieties that in ancient Egypt was quarried and used for the decorative portions of buildings and vessels. The term is applied generally to the eruptive rocks of the porphyritic class.

Porpoise, a marine mammal of the dolphin family, and a common inhabitant of northern seas. Porpoises travel in shoals, their progression being marked by constant leapings and plungings. Their average length is from 4 to 5 ft. There are several species, nearly all being confined to northern oceans.

Port, a special kind of red Portuguese wine, taking its name from Oporto. It was little known in England until the Methuen Treaty of 1703, when it was permitted to be imported at a low duty.

Portcullis, a strong, movable timber or iron grating let into the wall of the gateway to a feudal castle, and capable of being lowered or raised at will. It formed an effective protection against attack in the days before firearms.

Portland Cement is a mixture of about 20 parts of clay with 80 parts of chalk, specially prepared in kilns, and forming a substance which, after admixture with water, will set hard and solid.

Portland Vase, one of the most renowned specimens of Greek Art, long in the possession of the Portland family. In 1810 it was placed on loan in the British Museum, and in 1845 was smashed to pieces with a stone by a maniac; but, having been cleverly restored, it was exhibited in the Jewel room. It was discovered in the 17th century near Rome in a marble sarcophagus, and is supposed ,to have been the cinerary urn of the Emperor Severus. It was purchased from the Barberini family in 1770 by Sir Wm. Hamilton, subsequently sold to the Duchess of Portland. The vase, which is actually a two-handled urn, stands about 10 ins. high, is of transparent dark blue glass, ornamented with figures in relief in white enamel. The vase was removed by the owner from the British Museum in 1929 and sent to Christie's but withdrawn at 29,000 guineas. It was finally purchased by the British Museum in 1945, and restored in 1949.

Portreeve in olden times was an official appointed to superintend a port or harbour, and before the name of mayor was used the chief magistrate of London was styled the Portreeve.

Positivism, a system of philosophy propounded by August Comte (1798–1875), rejecting all metaphysical conceptions; a species of utilitarianism.

Positron, the "positive electron," an atomic particle having the same mass but an electric charge equal but opposite to that of an electron. It was discovered in 1932. *See also* **F12** (1), 13.

Post Office. The mail-carrying system of the British Post Office developed out of the organisation for the conveyance of State despatches by Royal messengers. The first Master of the Post was in office as a Court Official by 1516. In 1635 the State service was extended by Royal proclamation to cater for the conveyance of public correspondence on payment of fixed rates of postage, but the intervention of Civil War delayed the development of the scheme. In 1657, however, Cromwell created the Post Office under the control of a Postmaster-General responsible to Parliament, and Charles II. confirmed this arrangement. Since then the General Post Office has constituted one of the three great revenue-earning Departments. The modern conception of letter post with a uniform rate of postage by weight and irrespective of distance, and prepayment by means of adhesive stamps, dates from 1840, as the result of the great postal reforms of Sir Rowland Hill. The Money Order service was inaugurated in 1792, the Post Office Savings Bank in 1861, the Postal Order service in 1881, and Parcel Post services in 1883. The Telegraph system was taken over and extended in 1870, whilst the Telephone system, apart from the local services still operated under Crown licence by the Hull Corporation and in Jersey and Guernsey, was taken over completely by the Post Office in 1912. The growth of the work of the Post Office since the introduction of Uniform Penny Postage has been phenomenal and has amply justified the measure. *See* **N13** for London Postal Districts.

Potassium, a metal discovered by Sir Humphry Davy in 1807, and now generally obtained by the electrolysis of fused potassium hydroxide or chloride/fluoride mixture. Its principal minerals are carnallite and kainite, and it is relatively common in rocks, accounting for about 2½% of the earth's crust. An essential element for healthy plant growth; the ashes of plants are relatively rich in potassium.

Potsdam Agreement was signed by President Truman, Generalissimo Stalin, and Mr. C. R. Attlee in Aug., 1945. By this Agreement a Council of Foreign Ministers was established, representing the five principal Powers: China, France, Soviet Russia, the United Kingdom, and United States of America, with the task of drawing up the peace treaties for submission to the United Nations. It laid down, *inter alia*, that German militarism and Hitlerism should be destroyed; that industrial power should be so reduced that Germany would never again be in a position to wage aggressive war; that surplus equipment should be destroyed or transferred to replace wrecked plant in allied territories; that Germany should be treated as an economic whole; and that local self-government should be restored on democratic lines as rapidly as was consistent with military security.

Pot-Wallopers, the name applied to certain electors who, prior to the Reform Act of 1832, were permitted to receive the franchise on producing proof that they had, as the phrase went, "boiled their own pot" (were householders) in the constituency.

Poultry Compter was one of the old London City prisons, and stood in what is now called the Poultry. The Poultry Chapel was built on the site of the Old Compter in 1819.

Prado Gallery, the great public picture collection of Madrid, containing a superb collection of paintings by Velasquez, Murillo, Raphael, Titian, Dürer, Van Dyck, Rubens, Holbein, etc.

Pragmatism is the philosophical school of thought

which believes that the test of any theory or belief should be its practical consequences. The American philosopher and psychologist William James (1842–1910) was one of the first Pragmatists. He believed that it was impossible to discover the "real" world outside our senses, and we must therefore concern ourselves primarily with human experience. Since the universe would be a worse place without a belief in human responsibility, morals, and the freedom of the will, it was necessary, he considered, to believe in these concepts. Pragmatism is essentially an American school of thought and has had few supporters elsewhere. John Dewey (1859–1952) has had a great influence on American education and political thought. Dewey believed that we can never know the answer to the fundamental questions of the universe or discover anything outside our immediate experience. Such problems are, therefore, of no importance to us; our main concern must be the practical problems of living.

Prairie Dogs are common rodents in Western America and very like the marmot in general structure. They live in communities in burrows.

Prawns, crustaceans allied to lobsters, shrimps, and cray fishes.

Prebendary, a clergyman who receives a prebend or stipend because of his special connection with a cathedral or cathedral church.

Predestination, the Calvinistic doctrine that God from and to all eternity predestined everything to happen as it does and must happen, even to the fixing of the souls to be rewarded and punished.

Prefect, chief magistrates in ancient Rome. The title is now applied to the chiefs of administration of the departments of France.

Prelude, a piece of music intended to precede another piece, *e.g.*, Prelude and Fugue. The name has been used by many composers (*e.g.*, J. S. Bach, Chopin) to describe short compositions for which no following piece was written.

Pre-Raphaelites, a school of artists formed about 1848, and including among its exponents Millais, Rossetti, Holman Hunt, and others, whose ideal was absolute fidelity to Nature. For a time the school kept well together, and exercised much influence upon art developments; but although much of their work still pleases, the movement was out of date by the end of the century. Ruskin in his writings defended their work. *See* **G57** (1).

Press-Gang, a body of sailors employed to impress men into naval service, frequently resorted to in England, especially during the war with France in the early 19th century. Press gangs were not used after that.

Primogeniture, the right of the first-born male child to inherit the real estate of his father in the absence of direction by will or deed to the contrary.

Primrose League, founded in 1883 to commemorate Lord Beaconsfield's (Disraeli) political work and to promote the principles he advocated. The anniversary of his death, Apr. 19th, is called Primrose Day.

Printing by movable types was first used by Johann Gutenberg, a citizen of Mainz about 1440. The invention is also claimed for Laurens Koster of Haarlem. It was introduced into England by Caxton, who set up a printing press in Westminster in 1476. Gothic characters were first used, being superseded by Roman letters in 1518. In 1798 Earl Stanhope replaced the wood printing press by one of iron. In 1814 Friedrich Koenig applied the principle of steam power to the press. Mr. John Walter, of *The Times* newspaper, was the first to use the steam press which printed 1,100 sheets per hour. Improvements were introduced by Applegath and Cowper in 1828 and great strides were made in 1858 when the Hoe machine, which turned out 20,000 impressions an hour, was put on the market. Then came the Walter press in 1866 which printed on continuous rolls of paper from curved stereotyped plates. Modern Hoe machines can print a 48-page paper at 28,000 copies an hour (max. speed 50,000). The Monotype machine casts single letters and the Linotype whole lines.

Privateers were ships of private individuals licensed in time of war to seize and plunder the ships of the enemy. Privateering was abolished by the Declaration of Paris in 1856.

Privy Council. *See* **C8** (1).

Protestant, as a denominational term, was first applied to the Lutherans, who, in 1529, protested against the encroaching power of papacy.

Protocol, diplomatic term denoting the first draft of any important document to be used for political purposes.

Proton, a basic constituent of the atomic nucleus, positively charged, having a mass about 1840 times that of the electron. *See* **F10** (2), **13**.

Protoplasm, the jelly-like mixture of compounds of which living matter is formed. The elements present in protoplasm in the greatest amounts are carbon, oxygen, hydrogen, and nitrogen. No attempt to make protoplasm synthetically has succeeded. *See* **F58** (1).

Provost, a Scottish official similar to rank to an English mayor. The Provosts of Edinburgh, Glasgow, Aberdeen, Perth, and Dundee are styled Lords Provost. The title of provost is also given to the heads of various English colleges.

Prud'hommes (Prudent Men), **Councils of**, were French trade tribunals, of masters and workmen, formed to decide on disputes. Originally a mediæval institution, they were revived by Napoleon in 1806, and were carried on by the Third Republic.

Psalms, Book of, for many years attributed to David, but present-day scholars are of opinion that the psalms were written by a series of authors at different times and for different purposes, and that few, if any, were written by David. The Holy Scriptures contain 150.

Psychical Research. It need hardly be said that occult happenings and mysteries have been described from the earliest times. But modern spiritualism has a much shorter history, dating, to be precise, from Mar. 31, 1848, when the two Fox sisters of Hydesville, New York, began to produce mysterious rappings which were interpreted as spirit messages. The rapping movement spread like wildfire, and seances became popular, culminating in those of the medium Daniel Dunglas Home (1833–86), who impressed such famous men as Sir William Crookes and Alfred Russel Wallace and so unfavourably impressed the poet Browning. In 1882 the Society for Psychical Research was founded to study the phenomena of spiritualism scientifically, and counted among its members Sir Oliver Lodge, Barrett, Andrew Lang, Myers, and Sidgwick. Many phenomena have been investigated: apparitions, poltergeists, materialisations, telepathy, and precognition, but it is fair to say that no positive proofs of the existence of ghosts or of survival of bodily death have yet been found. Many mediums have been caught out cheating at one time or another—but this does not mean to say that they always cheat. Most moderate enquirers would take the view that many of the phenomena described do occur, but would deny that they are necessarily due to disembodied spirits. (*See also* **Telepathy**.)

Psycho-analysis is the name of the system of psychology devised by Sigmund Freud (1856–1939). Primarily intended as a means of treating neurosis, it resulted in theories as to the nature of mental processes which have, in part, at least, been accepted by the science in general. The basic thesis of the system is that the primitive mind of the child becomes differentiated into three aspects: the unconscious, a reservoir of the instincts and those thoughts and emotions which are unacceptable to the individual or society; the conscious mind or ego, in immediate contact with the world of reality; the superego, which represents the moral traits impressed on the child by its parents in early life. The unconscious is the source of all mental energy, which must, however, be modified in various ways before reaching consciousness by the superego (censor). Thus aggressive desires may be: (1) *expressed*, *i.e.*, allowed expression in their crude form, but on a socially recognised occasion (war, boxing, etc.); (2) *sublimated*, *i.e.*, made "sublime" by expression in a more highly developed form (competition in games, business, etc.); (3) *suppressed*, *i.e.*, held down consciously as being

inappropriate; (4) *repressed, i.e.*, held down and refused recognition unconsciously. In the latter case the desires are liable to lead to neurotic symptoms, since they will find their way into awareness in a less obvious manner (*e.g.*, a morbid interest in cruelty, murders, etc., or an excess fear of losing one's temper). Neurosis is due to conflict between the super-ego and the unconscious. *See also* **Freudian Theory, F36** (2).

Psychology, usually defined as "the study of the mind," has more recently been described as "the study of behaviour," since the term "mind" is somewhat ambiguous. (*See* **Mind.**) The first important psychologists (as distinct from philosophers) were the Germans Wundt and Herbart in the 19th century; the science is, therefore, a comparatively new one. Three phases have been evident from quite early days; (1) An Associationist phase during which an effort was made to isolate the units of mental life; at first these were described as "ideas," but later the Behaviourist school made the reflex its fundamental unit. The Associationists and Behaviourists regarded the mind in a somewhat mechanistic way in terms of stimulus and response, rather like a penny-in-the-slot machine. In fact, the Behaviourists denied the existence, or at any rate the value, of subjective data—they considered that psychology should concentrate on the observation of behaviour. Leading members of this school were Pavlov and J. B. Watson. (2) With Freud and, earlier, Herbart, emphasis was on the dynamic aspects of mind. The mind, it was supposed, must have some driving force behind it—the instincts. The Freudian system is based on this concept. (*See* **Psycho-analysis.**) McDougall was another leader of the dynamic school with views otherwise widely divergent from Freud. Some of the fundamentals of both these views have been discarded by the most recent school of thought represented by: (3) Field theory. This scheme is based on the denial of the Behaviourists' thesis that the mind can be divided up into units—behaviour, it is claimed, can be understood only in its whole social context. This also brings Field theorists into conflict with the Freudians and their belief that all behaviour comes from within—from the unconscious. The most radical form of this approach is Situationism, which holds, more or less, that an individual is nothing but the social roles he plays; his actions are the resultant of many and perhaps conflicting roles as father, son, Protestant or Catholic, employer or employee. But the views of this typically American school are not generally accepted in their entirety elsewhere. It must be remembered, in face of all these conflicting views, that there are very large areas of agreement between all psychologists, and much of the apparent confusion is due not to disagreement over facts but in the fitting of facts into coherent schemes.

Ptarmigan, birds of the grouse family, one species of which occurs in Britain, inhabiting the Scottish Highlands. In the winter assumes a white plumage.

Ptomaines, organic compounds produced during the putrefaction of proteins of animal origin. Not a cause of food poisoning, as was once generally supposed, which is almost invariably due to certain specific bacteria.

Publicans, under the Roman Empire, were people who farmed the public taxes. It is this class of officials that is alluded to in the "publicans and sinners" phrase in the New Testament.

Public Corporations. A method of operating large-scale industries transferred from private to public operation. Thus the Port of London Authority is an independent corporation governed by users of the port and representatives of municipal interests and labour. The Forestry Commission, the Electricity Authorities, the British Transport Commission, the National Coal Board, the Gas Council, and the B.B.C. follow a varied pattern.

Public Schools. The Public Schools Act of 1864 named nine "public" schools: Eton, Harrow, Rugby, Winchester, Westminster, Shrewsbury, Charterhouse, St. Paul's, and Merchant Taylors. Today the term embraces many more, and can be applied to all those schools which are financed by bodies other than the State and whose headmasters belong to the Headmasters' Conference as distinct from the Headmasters' Association. There are about 200 such schools in Britain, including among others: Bedford Grammar School (founded 1552); King Edward's School, Birmingham (1552); Brighton College (1845); Charterhouse School, Godalming (1611); Cheltenham College (1841); Christ's Hospital, West Horsham (1552); City of London School (1442); Clifton College, Bristol (1862); Dulwich College (1619); Eton College (1440); Felsted School (1564); Haileybury College (1862); Harrow School (1571); Malvern College (1865); Manchester Grammar School (1515); Marlborough College (1843); Merchant Taylors' School (1561); Mill Hill School (1807); Oundle (1556); Radley (1847); Repton School, Derbyshire (1557); Rugby School (1567); St. Paul's School (1509); Sherborne School (1550); Shrewsbury School (1552); Stonyhurst College (1594); Tonbridge School (1553); Uppingham School (1584); Wellington College (1859); Westminster School (1339); Winchester College (1387); and Warwick (1123). Public schools for girls include: Christ's Hospital, Hertford (1552), Cheltenham Ladies College (founded by Miss Beale in 1853), North London Collegiate School (founded by Miss Buss in 1850), Roedean (1885), Wycombe Abbey (1896).

Puma, a carnivorous quadruped of N. America, where it is called the "American lion," though smaller than the lion, seldom attaining a greater length than 40 in., exclusive of tail, and a height of 2 ft.

Pumice, a light stone of variable substance, utilised for cleaning purposes, for polishing, and for smoothing surfaces and edges of pasteboard and surfaces of wood, metal, and other material. It is imported from the Lipari Isles.

Puritans, the name originally given to the followers of Calvin in England in the time of Elizabeth. As a political party they were in the ascendant during the Commonwealth period (1649–59).

Pyramids of Egypt, on the west bank of the Nile, are vast stone or brick-built structures with inner chambers and subterranean entrances, built by the Pharaohs as royal tombs and dating from about 3000 B.C. The most celebrated are at Giza built during the 4th dynasty. The largest, originally 481 ft. high, is called the Great Pyramid, one of the seven wonders of the world, built by the Pharaoh Khufu, better known as Cheops, and there he was buried, 300,000 men, according to Herodotus, being employed for 20 years upon it. Chephren, successor of Cheops, erected the second pyramid, and the third was built by Mycerinus, a son of Cheops. The pyramid at Meidum built by King Snefru, founder of the 4th dynasty, is the most imposing of all. (*See also* **Art of Egypt, Section G.**)

Pythian Games were one of the four great Greek festivals in honour of Apollo and Diana, when many contests were held on laurels distributed as prizes. These games took place every fourth year near the temple of Delphi

Pythons, large snakes, non-poisonous, and destroying their prey by crushing it. Some species average 30 ft. in length, and prey upon deer and other small mammals. Found in Asia, Africa, and Australia.

Q

Quadragesima Sunday is the first Sunday in Lent, the fortieth day before Easter.

Quadrant, an astronomical instrument for measuring altitudes, superseded for navigational purposes in modern times by the sextant. It consists of a graduated arc of 90° with a movable radius for measuring angles on it.

Quadrille, adapted from an old French country dance, became fashionable throughout Europe in the early part of the 19th century, but seldom danced now.

Quæstor, a Roman magistrate whose duties were mainly financial, although he was originally concerned with criminal jurisdiction. At first two Quæstors sufficed; then the number was successively increased until under Julius Cæsar there were forty. Under the Empire there were usually twenty.

Quai d'Orsay. An embankment in Paris where the French Foreign Office is situated.

Quail, an edible bird of the partridge family, of which only one species, the Common Quail, is found in England. It is not more than 8 in. long. It is found in most of the warmer regions of the world. In England and Wales the Quail is covered by the Wild Bird Protection Acts.

Quair, an old name for a pamphlet or little book.

Quakers, the popular name for members of the Society of Friends, a religious sect founded by George Fox in the 17th century. In matters of belief they do not differ materially from other Protestant bodies; the chief difference is in worship, Quakers having no prescribed formulas. They assemble in their Meeting Houses, and any one in the congregation speaks when individually prompted, "as the Spirit moves them." Silent meetings are not infrequent. The ordinances of baptism and the Lord's Supper they reject. They object to swear upon oath, and up to 1833 were punishable by law for this refusal; since then they have been permitted to affirm. Until recent times they adopted great simplicity of attire, and in addressing people used the second person singular, but gradually have conformed more to common usage. Many Friends have attained distinction both in public life and in business, and as a body they are highly respected for their honourable dealings. William Penn was one of the most prominent of the early Quakers, and introduced the religion into America. The term Quaker was first applied to the sect because of the founder's frequent use of the word "tremble" in his exhortations.

Quantum Theory. *See* **F12** (2).

Quarrel, the old name for a dart or bolt, shot from a crossbow or catapult in war, before the employment of firearms.

Quartering, in heraldry, is the disposition of various escutcheons or coats of arms in their proper "quarters" of the family shield, in such order as indicates the alliances with other families.

"Quarterly Review," the great Tory quarterly was started in 1809, in opposition to the *Edinburgh Review*, the Whig organ, est. in 1802.

Quartermaster, a military officer charged with the provisioning and superintendence of soldiers in camp or barracks, and holding the equivalent rank to a lieutenant. The Quartermaster-General is an officer who presides over the provisioning department of the whole army. A Quartermaster in the Navy is a petty officer responsible to the Officer of the Watch; at sea for the correct steering of the ship and in harbour for the running of the ship's routine.

Quarter Sessions. *See* **C11** (1), **D6** (1).

Quarter-staff, an old English weapon, consisting of a stout pole some 6½ ft. long, which was grasped in the middle and could be swung with telling force in defence or attack.

Quartet, a musical composition for four voices or instruments. If for stringed instruments (*e.g.*, first and second violin, viola, violoncello) it is called a string quartet. If for three strings and another instrument it is called by the name of the fourth instrument, *e.g.*, piano quartet. The name is often misapplied to the musicians instead of to the music. Thus a four-piece string orchestra will be called a string quartet. This misuse is also found with quintet, sextet, etc.

Quarto, a sheet of paper folded twice to make four leaves, or eight pages; usually abbreviated to "4to."

Quartodecimani, an early Christian community who celebrated the Paschal festival on the 14th day of the month, when the Jews celebrated their Passover. In consequence of the confusion caused, the practice of the Quartodecimani was condemned by the Council of Nicæa in 325.

Quartz is a common and usually colourless mineral, abundantly diffused, and occurring crystallised and massive. In the first form it is in hexagonal prisms, terminating in pyramids. When pure its specific gravity is 2·66. It is one of the constituents of granite, gneiss, etc. Among the quartz varieties are *rock crystal* (colourless), *smoky quartz* (tinged, as *yellow topaz*, *amethyst*, and *sapphire*), ordinary or false, *milky quartz*, and *rose quartz*. Quartz veins in metamorphic rocks often yield rich deposits of gold. Mining for gold in the rock is termed quartz-mining.

Quasi, a Latin prefix to other words implying a somewhat false resemblance.

Quaternary Deposits *or* **Post-Tertiary**, are the latest stratified rocks of the earth's crust, and include the Pleistocene ("Great Ice Age") and recent systems.

Quatrefoil, in architecture an ornament, piercing, or panel, resembling the four petals of a cruciform flower, largely used in English Perpendicular style, and less frequently in the Decorated.

Quaver, a note of music, equal to one-eighth of a semibreve and one-fourth of a minim.

Queen Anne's Bounty, established by Queen Anne in 1704 for the augmentation of the maintenance of the poor clergy. Since April 1, 1948, Queen Anne's Bounty and the Ecclesiastical Commissioners ceased to exist and became embodied in the Church Commissioners for England.

Queen's (or **King's**) **Speech** is the speech prepared by the Government in consultation with the Queen and delivered by Her Majesty in person or by her deputy, at the opening or closing of a Parliamentary session.

Quern, a form of stone hand mill for grinding corn, in use in early times. It consisted of two flat stones, the upper revolving on a pin inserted in the lower.

Quicksilver. (*See* **Mercury**.)

Quills for writing with were first used in the 6th century, and superseded by steel pens in the 19th.

Quince, a well-known hardy orchard tree of the pear family, bearing fragrant, yellow, pear-shaped fruit, largely used for preserves. A mucilage is made from the seeds, which also possess medicinal virtues.

Quindecemvir, one of the fifteen ancient Roman magistrates appointed to keep charge of the Sibylline books, and called priests of Apollo.

Quinine, a vegetable alkaloid obtained from the bark of several trees of the *Cinchona* genus. It is colourless and extremely bitter. The drug, sulphate of quinine, is one of the most valuable medicines, forming a powerful tonic. It is anti-periodic, antipyretic, and antineuralgic. In cases of malaria it is the most efficacious remedy of natural origin known.

Quintain, a tilting post, from the top of which a board was suspended horizontally for the tilters to strike at with their lances.

Quintal Metrique, a French weight of 100 kilogrammes, or 220 lb. avoirdupois.

Quintet, a musical composition for five voices or instruments. If all five instruments are strings the piece is a string quintet. A clarinet quintet, for example, is a piece scored for "four strings" and a clarinet.

Quirinal, one of the seven hills of Rome.

Quisling, term which came into use during the second world war to denote traitor, collaborator, or fifth-columnist. After Vidkun Quisling, who became head of the puppet government after the German invasion of Norway in 1940.

Quiver, a leather receptacle for arrows.

Quorum, the number of members of any body or company necessary to be present at any meeting or commission before business can be transacted. Forty form a quorum in the House of Commons.

Quo Warranto ("By what authority") a form of writ which has existed in England since 1278, and is a direction to the proper authorities to inquire into the circumstances under which any office or franchise is held.

R

Rabbi, a Jewish term applied to specially ordained officials who pronounce upon questions of legal form and ritual, and also generally accorded to any Jewish scholar of eminence.

Rabbit, a rodent burrowing mammal, a native of Europe, but now common in other countries—where it has been introduced and has multiplied enormously, especially in Australia. (*See* **Myxomatosis**.) In its wild state it has a brownish fur, while in its domesticated varieties it is of many colours—grey, white, black, and pied. Wild rabbits have erect ears, but in some do-

mestic breeds the ears are long and droop, hence the term lop-eared. They breed rapidly, rearing several litters a year. The fur is utilised for clothing and other purposes, and the flesh is a popular article of food. *See* **Z17**.

Raccoon, plantigrade carnivorous mammals common to the American continent. There are several species. The common Raccoon (*Procyon lotor*) is about 2 ft. long, with a bushy ringed tail and sharp snout. Its skin is valuable.

Race. In the old text-books anthropologists were much concerned with the differences between the various races of Man: they described the Black Man (Negro), the Yellow Man (Mongol), the Red Man (American Indian), the Brown Man (Indian), and the White Man (European). Those who study Man from this point of view further subdivide each group into others. Thus White Man may be divided into Nordic, Alpine, and Mediterranean; Black Man into Hamitic, Bushman, and so on. Each of these groups tends to have physical traits which its members hold in common, although, of course, there are no *pure* racial types. All existing races have been fairly thoroughly mixed. What, in view of recent experience, is really important, is that races or even nations do not have psychological traits—at least not *innate* traits. The man who says that all Indians are stupid or liars or worse forgets that Indians were highly civilised when our ancestors were dressed in skins and painted blue. Such a man might read with profit what Cicero wrote to a friend in the first century B.C.: "Do not obtain your slaves from Britain, because they are so stupid and so utterly incapable of being taught." Anthropology dismisses all theories of a superior race as unscientific: there is not the slightest evidence that one race differs in any way from another in its psychological potentialities. Jews, Irish, Scots, Italians do differ (so do the inhabitants of Edinburgh and London): but their differences are due to their situation and not to anything inborn. *See* **Physical Environment, F33.**

Raceme, a botanical term indicating a cluster of flowers, the individual blossoms being borne on simple stalks arranged round a single common axis. The youngest flowers are at the tip of this axis.

Radar. See **X16–18.**

Radcliffe Library, Oxford, was founded under the will of Dr. John Radcliffe, who died in 1714, leaving £40,000 for that purpose. The Library was opened in 1749.

Radiation, transfer of energy by electromagnetic waves, the rate of emission by a body depending upon its temperature and surface. The sun radiates energy in the form of short visible waves of light and longer invisible waves of heat. The principal gases of the atmosphere are transparent to practically all of the solar and sky radiation and also that which the earth re-transmits to space. Carbon dioxide and water vapour, however, strongly absorb certain types, the latter, as clouds, playing an important rôle in regulating the temperature of the globe. The cooling of the ground on a clear night is a result of the outgoing long-wave radiation exceeding that coming down from the sky; at sunrise cooling ceases as the incoming radiation becomes sufficient to compensate for the loss of heat.

Radiations, Biological Effects of. *See* **F63.**

Radioactivity. *See* **F60.**

Radiosonde, a weather station in miniature carried aloft by a free balloon to heights normally in the neighbourhood of 10 miles. Signals representative of values of atmospheric pressure, temperature and humidity are transmitted simultaneously by radio to receiving apparatus on the ground. The position of the balloon at any instant can be determined by radar, enabling the speed and direction of the upper winds to be deduced.

Radium, a radioactive metal discovered by Marie and Pierre Curie in 1898. Atomic weight 226. The Radium Institute, founded and equipped by Lord Iveagh and Sir Ernest Cassel, was opened in Aug., 1911, for the treatment of patients and the prosecution of researches into the effect of radium on the human system.

Radon, a colourless radioactive gas formed when radium atoms disintegrate radioactively.

Rail, a well-known genus of the *Rallidae* family—three species of which—the Water Rail, the Moorhen, and the Coot—are resident in the British Isles.

Rain. When moist air rises into lower temperatures and becomes saturated, condensation takes place on the numerous hygroscopic particles present in the atmosphere. If the temperature is above freezing a cloud of small droplets is formed, and as the air continues to rise they grow in size until the weight is great enough to make them fall to the earth as rain. The formation of large raindrops has been attributed to coagulation of smaller drops of different sizes, while another mechanism depends upon the presence in the cloud of ice crystals as well as water drops. In temperate latitudes snowflakes falling from the freezing level melt in the warmer air below, producing large raindrops which grow in their flight through the lower part of the cloud.

Rainbow, a beautiful colour effect visible to an observer with back to the sun and facing a rain shower, caused by the refraction and reflection of sunlight in minute water-droplets in the air. From high in the air it would be possible to see a rainbow as a complete circle, but from the ground the most that can be seen is a semicircle when the sun is just on the horizon; the higher the sun is, the smaller the arc of the rainbow. When conditions are suitable two bows are seen, the secondary with the colours of the spectrum reversed. The colours of the rainbow are seven: red, orange, yellow, green, blue, indigo, and violet—the colours of the spectrum.

Raingauge, an instrument consisting of a deep metal funnel whose stem dips into a graduated glass jar from which the depth of the rain water collected can be read. Continuous records of rainfall are provided by self-registering instruments.

Ramadan, the time of the Mohammedan Lent, the 9th month of the Moslem year, a movable period fixed according to lunar calculations. It lasts for thirty days, and all good Mohammedans fast in Ramadan from sunrise to sunset each day. During the interval from sunset to sunrise they are at liberty to eat, drink, and make merry.

"**Rambler, The,**" published by Dr. Johnson twice a week between 1750 and 1752.

Rambouillet, a royal French château (14th century, rebuilt 18th century), near Paris, and the official summer residence of the President of the French Republic. Also the name of the famous literary salon of the Marquise de Rambouillet (1588–1665).

Rampant, in heraldry, is a term applied to the figure of an animal with forelegs elevated, the dexter uppermost. When the animal is shown side-faced it is *rampant displayed*, when full-face, *rampant guardant*; when looking back, *rampant reguardant*; and when in sitting position *rampant sejant*.

Ranelagh Gardens was a fashionable public garden at Chelsea for concerts and dancing in the 18th century, and existed down to 1804.

Ranz des Vaches, a Swiss herdsman's melody, played on the alpenhorn, as a call to the cows.

Rapacki Plan. A plan proposed by Adam Rapacki, the Polish Foreign minister, on Oct. 2, 1957 in the U.N. General Assembly for a demilitarised zone in E. and W. Germany, Poland and Czechoslovakia. The plan involves a ban on nuclear installations and the use of nuclear weapons against the zone from outside. The plan, though not acceptable to the Western Powers in its original form, has nevertheless been the basis of discussion for talks among the nations on ways of reducing international tension. *See also* **C20.**

Rape, a cruciferous plant yielding coleseed or rapeseed, extensively grown in all parts of Europe and India. Rape oil or colza is made from the seeds, and the leaves and refuse are used for sheep-food. Rape oil is a yellow, thick oil, of considerable commercial importance as a lubricant and for other purposes. It was at one time much used as an illuminant.

Rare Animals. At a meeting of the International Union for the Conservation of Nature held in

Athens in Sept. 1958, it was stated that several wild animals were in danger of extinction, including the Ice Age horse (known to zoologists as Prejalvski's horse), Bactrian camel, Tasmanian wolf, Asian rhinoceros, Monk seal, Asian lion, Cambodian wild cattle, and the giant eland of Africa. Protection was also urged for the black-and-white giant panda of China, and for Clarke's gazelle of British E. Africa, threatened because there is a native belief that the fat of the animal is good for rheumatism.

Rastadt Treaty of Peace, between the French and Germans, signed on March 7, 1714, closed the War of the Spanish Succession and was a preliminary to the Treaty of Utrecht.

Rat, a well-known order of rodent embracing many species. The *brown rat* appeared in Europe early in the 18th century, coming from the East and entering by way of Russia; now it is widespread and met with in Britain and all parts of the Continent. The *black rat*, which was the common rat before the arrival of the brown species, is a smaller animal and now comparatively scarce. There are numerous other kinds, all of them gross feeders, and existing in such numbers in many places as to constitute a pest. *See* **Z13**.

Rationalism. The belief that all matters of fact and all beliefs concerning personal conduct should be founded on reason; that reason should be the guiding factor in life. An apparently simple creed, which, unfortunately, is not so simple. Roman Catholics, for example, who are certainly not rationalists in the ordinary sense of the term, claim to be able to base their religion on rational grounds; indeed, there must be very few people who do not consider their beliefs to be entirely reasonable. The rationalist would say that by "reason" he means the criteria ordinarily accepted as scientific evidence, but he is then faced by the problem whether moral conduct can be based entirely on logic. The most important attempt to do so (Bentham's theory that morals should be based on "the greatest good of the greatest number") has been rather severely dealt with by philosophers in general. Rationalism has something important to contribute to human well-being provided it realises that human beings are not ordinarily rational, and one must be tolerant of what seems illogical in their conduct before beginning (very slowly) to alter their beliefs. Our irrational dreams are, after all, an attempt to make a difficult world easier to live in, and the man in the street may be excused if he says, in effect, to the rationalist, "be careful, you are treading on my dreams." Only by making the world a better place to live in can one begin to convert the superstitious and illogical. The main rationalist body in this country is the Rationalist Press Association, Johnson's Court, Fleet Street, London, E.C.4.

Rattlesnake, venomous snakes which obtain their name from the possession of a rattle in the end of their tail, consisting of horny pieces so arranged that when vibrated they make a rattling sound. They are only found in N. and S. America.

Raven, a black-plumaged bird of the crow family, with raucous voice and massive bill. Occurs in many parts of Europe, Asia, and America. Ravens are easily domesticated and form interesting pets. Dickens had one which he described in *Barnaby Rudge*.

Ray, fish with a very flat body and broad and fleshy pectoral fins, related to the sharks. There are about 140 species. In Britain they are generally called *skate*.

Razorbill, a sea-bird of the auk family, having a high, furrowed bill and black-and-white plumage. It inhabits rocky cliffs during the breeding season, and at other times is mostly out on the open sea. Razorbills pair for life and return to last year's nesting-place.

Recitative, a style of singing only slightly removed from ordinary speaking, used in the narrative portions of operas and oratorios. In older operas "recitativo secco" (dry recitative) was used, the voice being accompanied by the harpsichord alone. After Scarlatti the orchestra was used to give a more dramatic touch to the recitative, while Verdi introduced a type of recitative that was half-way to an aria.

Recorder, a judge of a city or borough having a court of quarter-sessions. The Recorder of the City of London is elected by the Lord Mayor and Aldermen, but other recorders are barristers of eminence appointed by the Crown.

Record Office, in Chancery Lane, London, the place where the Public Records of England are now preserved, including Domesday Book, the various Rolls of Charters, and important historical documents from a remote period.

Rector, in England an ecclesiastical title of the incumbent of a parish where the tithes are not impropriate; also the head officer of some of the Universities and Colleges.

Recusants, people who refused to attend the Anglican Church or to acknowledge the ecclesiastical supremacy of the Crown in the 16th and 17th centuries.

Redan, a fortification consisting of two parapets or mounds of earth in angle form, the apex pointing outward.

Red Army. The Army of the Soviet Union, so-called because it bears the red flag of the Soviet revolution. Its official title is the Red Army of Workers and Peasants.

Redbrick, a term used to denote a university of modern foundation whose buildings are conceived as being built of red brick in contrast to the stone of the ancient universities.

Red Crag, the name given to a strata of gravel or sand, containing certain fossil mollusc deposits, found on the Suffolk and Norfolk coasts.

Red Cross. (*See* **Geneva Convention.**)

Rede Lecture, at Cambridge University, was instituted and endowed in 1524 by Sir Robert Rede, Chief Justice of Common Pleas. These lectures were superseded by an annual oration, which is usually given by an eminent scientist

Red-Letter Day, a Church festival day indicated in the Prayer Book by red letters, now a popular term for any day of special significance.

Redoubt, a term applied to enclosed fortified work, especially to a small area temporarily fortified as a place of retreat for a defending force.

Redstart, a small bird of the Thrush family of handsome plumage and striking song. Two species visit Great Britain; the Common Redstart, with bright chestnut rump and tail, white forehead, and black cheeks, favours wooded country, and the Black Redstart, with black breast and throat, chestnut tail and white wing bars, prefers rocky ground or bombed buildings, and has recently begun to breed in S. England.

Redwing, a bird of the Thrush family which finds its way to this country for the winter. Resembles the song thrush, but distinguished by smaller size, buffish-white eye-stripe, chestnut flanks and underwings. It has bred in Scotland and on Fair Isle.

Redwood *or* **Sequoia.** This genus of coniferous tree comprises two species of Redwoods occurring in N.W. America. Specimens of one species, the Giant Redwood, reach a height of over 300 ft. and a thickness of 36 ft. The age of the largest, the General Sherman tree, is put at 3,500 years.

Reed, the sound-producing agent (of thin cane or metal) of many musical instruments. Reeds are described as *free* or *beating*, and the latter as single or *double*, *i.e.*, two reeds placed together which vibrate when wind is forced between. Reed instruments include clarinet, harmonium, bassoon, oboe, bagpipe, mouth organ.

Referendum and Initiative, two methods by which the wishes of the general body of electors may be expressed with regard to proposed legislation. It is developed to the highest extent in Switzerland. In a referendum some specific matter is referred to the electors. The Initiative is the means by which the electors can compel their elected representatives to consider a specific matter. When it has been considered by the legislature it must then be submitted to the electorate for approval (*i.e.*, a referendum).

Reformation, the great religious movement of the 16th century, which resulted in the establishment of Protestantism. In the previous century Wyclif, Huss, and others had sounded the warning note, and when later on Luther took up the cause in Germany, and Zwingli in Switzerland, adherents soon became numerous. The wholesale vending of indulgences by the Papal agents had incensed the people, and when Luther denounced these things he spoke to

willing ears. After much controversy, the Reformers boldly propounded the principles of the new doctrine, and the struggle for religious supremacy grew bitter. They claimed justification by faith, and the use as well as the authority of the Scriptures, rejecting the doctrine of transubstantiation, the adoration of the Virgin and Saints, and the headship of the Pope. Luther was excommunicated. But the Reformation principles spread, and ultimately a great part of Germany, as well as Switzerland, the Low Countries, Scandinavia, England, and Scotland were won over to the new faith. In England Henry VIII. readily espoused the cause of the Reformation, his own personal quarrel with the Pope acting as an incentive. Under Mary there was a brief and sanguinary reaction, but Elizabeth gave completeness to the work which her father had initiated.

Reformatory Schools, for the reclamation of juvenile offenders, originated in France in 1839. The Philanthropic Society of London founded such an institution at Redhill in Surrey in 1850. Since then many other schools of this class have been opened, under government authority and inspection. The Borstal System for industrial training and reclamation of prisoners between 16 and 23 was begun at Borstal near Rochester in 1902. These Institutions deal with many cases of juvenile delinquency.

Reform Bills. The principal Bills have been passed for the reform of the Parliamentary franchise. The first was that of 1832, which in addition to a sweeping redistribution of seats, granted the franchise to borough householders paying a £10 rental, and in counties to those with a rental of £50. The second Bill was passed in 1867, conferring the franchise on all borough householders paying poor rates, on lodgers paying £10 a year, and to tenants in counties paying £12. A third Bill, passed in 1884, practically gave household suffrage and effected a large measure of redistribution of seats. The Representation of the People (Equal Franchise) Act, 1928, gave women of 21 years of age the right to be registered as Parliamentary electors, thus adding several million names to the register.

Refraction. The change of direction which light rays and other rays undergo when passing from one medium to another. The phenomenon is due to the fact that in different media light (and other forms of radiation) has different speeds.

Regalia, the ensigns of royalty, such as the crown, sceptre, swords of State, etc., which, in the case of the British insignia, are kept in the Tower of London. In its stricter sense it means the prerogatives of royalty.

Regattas, boat or yacht races, were introduced into this country in 1775, when the Thames was the scene of one of these competitions. Since then they have become popular on the river and round the coast. Henley every year has a fashionable Regatta.

Regency Acts were Acts of Parliament passed in the reign of George III., appointing the Prince of Wales (afterwards George IV.) to the Regency during his father's mental incapacity.

Regicides, the commissioners who tried and condemned Charles I. They were 135 in number; 59 only could be induced to sign the death warrant.

Reichsrath, the name given to the Austrian Parliament until 1918. It comprised an Upper House of princes, nobles, and prelates and a Lower House of elected representatives.

Reichstag *or* **Diet**, the name given to the meeting summoned by the rulers of the mediæval Empire. After the unification of Germany the name given to the popularly elected house of the German parliament. The Reichstag building was destroyed by fire in 1933 by the Nazis.

Reign of Terror, a period of anarchy and bloodshed in the French Revolution which began in the spring of 1793 and practically ended with the fall of Robespierre in July, 1794.

Reindeer, a genus of deer horned in both sexes, occurring only in northerly regions. It has an average height of 4 ft. 6 in., is very fleet of foot, and the Laplanders utilise it for draught purposes.

Relativity, the theory in physics associated with the name of Professor Albert Einstein. The theory was published in two parts—the *Restricted Theory* in 1905 and the *General Theory* in 1915. It is based on the hypotheses that (i) space and time are closely connected and dependent on each other, (ii) the interval of space between two objects and the interval of time between two events are not absolute but relative, changing according to the circumstances of the observer, (iii) matter and energy are fundamentally the same, it being possible to convert one into the other. The laws of relativity have been substantially proved and have revolutionised our ideas as to the nature of space, time, matter, and energy and forced us to think along new lines. In 1949 a new theory by Professor Einstein was announced which sets forth in a series of equations the laws governing both gravitation and electromagnetism, which is said to bridge the gap that separates the infinite universe of the stars and galaxies and the equally infinite universe of the atom. At present the one is explained by relativity, and the other rests on the quantum theory. *See* **F14**.

Relief in sculpture is of three kinds—high relief (*alto-relievo*), in which the figures stand out to the extent of one-half of their natural proportions, low-relief (*basso-relievo*) when the figures project but slightly; and middle-relief (*mezzo-relievo*), when the projection is intermediate.

Renaissance, new birth or revival. It was a transitional movement in Europe between the mediæval and the modern which was exemplified by a return to classic ideals in literature, painting, and architecture. It was stimulated by the fall of Constantinople, the invention of printing, and the discovery of America. It began in 14th-century Italy, where it reached its highest glory in the 15th and 16th centuries. From Italy it swept over Western Europe; in England the movement was most notable in literature (Colet, More, Erasmus). *See* **G40–44**.

Rennet, a substance obtained from the fourth stomach of a calf or other suckling quadruped, and used for curdling milk, making junkets, etc.

Repeater, the name applied to a watch that will strike the hour, quarters, and minutes last past on the pressure of a spring.

Representative Peers are peers elected by their fellow peers to sit in the House of Lords—Scotland has 16, elected or re-elected for each Parliament. The number of Irish representative peers at the date of the establishment of the Irish Free State (1922) was 28. Through deaths their number has been reduced to 1 (1960) and the 27 vacancies are unlikely to be filled.

Reptilia, the class of vertebrate animals including tortoises, lizards, snakes, crocodiles. *See* **F24** (2).

Republican Party of the United States, one of the two great parties in U.S.A., the other being the Democratic Party. Sometimes regarded as the more right wing of the two parties but this view must be treated with caution as the parties do not fit a left and right wing pattern. The party before the second world war was predominantly isolationist. Pres. Eisenhower is a Republican and until his election as President in 1952, the Republican Party had not held power for 20 years. *See* **C28** (2).

Requiem. Properly a mass for the dead, the term is extended to cover musical settings by Palestrina, Mozart, Verdi, and others.

Reredos, the ornamental screen at the back of the altar or Communion table. It is often of a highly decorative character and is an architectural feature in many churches in Spain. Other examples are to be found in the following cathedrals in England: St. Paul's, St. Albans, Salisbury, Winchester, Durham, and Liverpool. In All Souls College, Oxford, one is to be seen actually attached to the wall.

Resins, natural resins are vegetable compounds largely employed in the industrial arts. They comprise india-rubber, amber, mastic, copal, etc. "Synthetic resins" is a term sometimes used as a synonym for "plastics."

Rest, a musical term denoting silence or cessation from playing for the period represented by the character of the rest. Thus there are minim, semibreve, quaver, and other rests, which represent the same lengths of silence as the notes themselves would represent in sound.

Retina, the layer of the eye which is sensitive to light.

Reuter, the chief British and international news agency, founded by Baron J. de Reuter in 1849.

Rhapsody, an instrumental composition, not in symphonic form, which suggests that it was composed to express some powerful emotion or ecstasy. Liszt's "Hungarian Rhapsodies" are based on old folk tunes, while it is believed that Gershwin's "Rhapsody in Blue" is intended to express the mood of America at the time it was written.

Rhea, a large flightless bird, the "ostrich" of S. America, distinguished from the ostrich proper by smaller size, longer beak, larger wings, no tail and 3 toes instead of 2. There are 2 species.

Rhinoceros, a large hoofed quadruped, of which there are nine existing species; native to the river and marsh regions of Africa, India, Borneo, and Java. It is remarkable for its thick hide and upturned snout, from which springs a long horn. The white rhinoceros, which is scarce, is the biggest species, attaining a length of 10–12 ft. and a height of from 5 to 6 ft. The black rhinoceros is the most familiar.

Rhodium, a metallic element, discovered by Wollaston in 1804. It is found in platinum ores in small amounts, generally less than 2 per cent. With platinum it gives a very hard and durable alloy. It is also used, instead of silver, in putting the reflecting layer on a mirror.

Rialto, a famous bridge that crosses the Grand Canal at Venice, and dates from 1591.

Ribbon Fish, is a deep-sea fish, deriving its name from the ribbon-like shape. Though many feet in length, it is only an inch or two thick. By reason of its keeping to the ocean depths, the ribbon fish is rarely met with, most of what is known about it having been learnt from specimens occasionally cast ashore during storms.

Ribbon Seal, a kind of seal found in the North Pacific, remarkable for being ornamented with an almost white broad band along its back and around its neck.

Rice, a grain-yielding grass, of which thousands of strains are known today, extensively cultivated in China, India, and certain parts of America, and forming the main food of the peoples of China, Japan, India, and the Malayan regions. Some 95 per cent. of the world's rice is produced and consumed in the Orient. The grain with the husk is known as "paddy." Arrack, an alcoholic liquor, is made from fermented rice seeds.

Richtfest, a traditional German ceremony held when the framework of a new building is completed; a large crown made of pine branches is decorated with coloured streamers and hoisted to the roof, where it remains until the last tile is laid. Afterwards all the workers employed on the site are invited to a feast.

Rider, the popular name of a Dutch gold coin first put into circulation in the 16th century, but not now in use. Its name was derived from its having engraved upon its obverse the figure of a horseman. It weighed about 50 grains. A coin of the same name was issued by James VI. of Scotland, afterwards James I. of England.

"Rights of Man," the title of the declaration of the French National Assembly in 1789, proclaiming that all men have equal rights. Also the title of a famous book by Tom Paine, justifying the Revolution.

Rime, a crystalline deposit of ice formed on objects exposed to wet fog at the same time as frost.

Rinderpest *or* **Cattle Plague**, is a highly contagious disease affecting cattle, sheep, and other ruminants. In Europe the disease has been eradicated, but it was formerly very widespread and caused great loss of life amongst cattle. The disease is caused by a filtrable virus, and is attended by fever and congestion of the mucous membranes.

Ring Dove *or* **Wood Pigeon**, a blue-grey bird, distinguished from other pigeons by larger size (16 in.), white wing-bar, glossy green-and-purple neck, and white half-collar. It is very common in Britain

Riot Act, The, was passed in 1714, its object being to prevent riotous assemblies. In times of disturbance when a breach of the peace is threatened, if a magistrate, justice of the peace, sheriff, or mayor reads a proclamation commanding a crowd of twelve or more persons to disperse, anyone refusing is liable to arrest and a term of imprisonment under this Act.

Rituale, the book of rites used in the Roman Catholic Church for the administration of certain sacraments and other church ceremonies. Like the Roman breviary, it dates in its present form from the Council of Trent.

Ritualists, the term used to designate an extreme High Church section of the Church of England, who brought into the ceremony of public worship coloured vestments, lighted candles, incense, and other features of Romanist worship, and excited much opposition and contention. A Ritual Commission was appointed in 1904 to receive evidence in regard to ceremonial excesses, and attempts have been made to arrive at a basis by which both High Church and Low Church adherents can agree upon the subject of ceremonial. The report of the Ritual Commission, published in 1906, concluded that the law of public worship in the Church of England had become too narrow for the present generation's religious life, and that the machinery for discipline had broken down. The Commissioners favoured the giving of greater power to Bishops for the suppression of objectionable practices.

Roach, a well-known small fresh-water fish of the carp family.

Roaring Forties, name applied to the prevailing westerly winds over the oceans in the temperate latitudes of the Southern Hemisphere.

Robin (or **Redbreast**). A small, very well-known bird with olive-brown upper parts and orange-red forehead, throat, and breast. Its wide European distribution includes the British Isles, where it is a common resident. It also occurs in N. Africa and W. Asia. The nest is placed in a great variety of situations including holes in banks, trees, and walls; in sheds, amongst ivy, and sometimes in old tins. Nesting-boxes are readily adopted, but care should be taken to ensure that the entrance-hole is small enough to exclude starlings. Robins are pugnacious and defend their territories with vigour. Their attractive appearance, trustful disposition, engaging ways, and sweet song make them extremely popular. The name robin is also applied to a number of very different birds, one of which, the American Robin, occasionally wanders to Europe.

Rock Dove, the grey pigeon *Columba livia* of Europe and Asia, ancestor of the domestic pigeons as Darwin was the first to show.

Rockets for use in war were invented by Sir William Congreve early in the 19th century, and proved very destructive in siege operations. Rockets were used as weapons by aircraft, infantry, etc. and the Germans devised the huge V2, carrying a ton of explosive, which was used near the end of the war to bombard London. Since the war rocket propulsion has been much developed. Instruments are carried to high altitudes by rockets to measure atmospheric pressure, density, temperature, and wind velocities and to study the properties of the ionosphere. A Soviet space rocket carrying scientific instruments hit the moon in Sept. 1959. British high-altitude rockets are *Black Knight* and *Skylark*. *See also* **F47**.

Rockoons, rockets raised to firing position in the upper atmosphere by large plastic balloons. During the International Geophysical Year rockoons were fired from the Arctic, Antarctic, and Equator to study geomagnetism and the aurora.

Rod, a measure of length equalling 5½ yd., also called a pole or a perch. 40 sq. rods equal 1 rood.

Roe, the parts of fishes which extend on each side of the ribs in lobes next to the intestines. "Hard roe" is that of the female and consists of eggs; that of the male is the soft roe or milt.

Roebuck, a deer that was formerly common in the forests and parks of Britain, but is now only found at large in the northern parts of Scotland.

Rogation Week begins with Rogation Sunday, the Sunday before Ascension Day, when extra prayers and supplications are offered as a preparation for the Ascension.

Rois Fainéants (King Do-Nothings), the last seven Frankish kings of the Merovingian dynasty, so-called because the officials known as Mayors of the Palace assumed all the power.

Roller, a tropical Old World bird of the *Coraciidæ*

family, allied to the hoopoe and bee-eater, of strikingly brilliant blue, chestnut, greenish-blue plumage. There are fifteen species, one of which breeds in the far north and visits the British Isles on its migrations to and from its winter quarters in Africa.

Roman Catholic Church is the Christian Church whose head is the bishop of Rome, lawful successor of St. Peter, who was appointed by Christ as head of the Church. Its Creed comprises twelve articles, the seven sacraments of Baptism, Confirmation, Eucharist, Penance, Extreme Unction, Orders, and Matrimony; the doctrines include those of Original Sin and Justification, sanctioned by the Council of Trent; the Mass, as a propitiatory sacrifice; Purgatory; Papal Supremacy, etc. It was the established Church of England until the Reformation, after which many disabilities were imposed upon Roman Catholics, and continued in a more or less severe form until the passing of the Emancipation Act of 1829. There are four Roman Catholic Archbishops in England (Westminster, Birmingham, Liverpool, and Cardiff), two in Scotland (St. Andrews and Edinburgh, and Glasgow), and four in Ireland (Armagh, Dublin, Cashel, and Tuam).

Romanesque Architecture, the style of Western European architecture which came into being at the end of the Roman Empire, the outcome of the earlier and simple Basilican form and leading to the later graceful and more complex Gothic. Notable in Romanesque style were the rounded arch and masonry vaulting. *See* **G34**.

Roman Roads, highways constructed by the Romans. They were of great durability. The best known British roads were Ermine Street (London, Lincoln, York), Fosse Way (Lincoln through Leicester, Cirencester, Bath, Exeter), Watling Street (London to Shropshire).

Roman Walls were built as frontier barriers under the Emperors Hadrian (76–138) and Antoninus Pius (86–161). Hadrian's works, linking Wallsend-on-Tyne with Bowness-on-Solway, comprised a twenty-foot stone wall, ditches, turrets, "milecastles," fortresses, and a double earthen mound, or "Vallum." Impressive ruins are still visible at Chesters and Housesteads. Antoninus Pius, Hadrian's successor, made a further advance, but the turf wall which he built between Forth and Clyde was soon abandoned. Septimius Severus (146–211) restored Hadrian's wall after the assassination of Commodus and the subsequent civil wars. It was finally abandoned between 380 and 390.

Rondo, a piece of music in which three distinct airs or melodies occur in a certain order. In the typical Rondo of Beethoven (*e.g.*, third movement of Sonata Pathétique) the order is 1, 2, 1 — 3 — 1, 2, 1.

Rood Screen, an ornamental partition, separating the choir from the nave in a church, and fronting the rood or crucifix.

Rook, a member of the crow family, abounding in most parts of the British Isles and found in Europe, Asia, and N. Africa. It has been introduced into New Zealand. Rooks usually nest in colonies in tall trees. They are highly intelligent birds, and their ways have long been the subject of much careful study.

Rorqual, a marine mammal of the whale order. There are several species. The Common Rorqual is a large animal, reaching a length of 80 ft. or more.

Rosary, a circular chain of beads, used by Catholics when reciting a particular form of sustained prayer. Each bead represents an entire prayer, and the combined prayers constitute the Rosary.

Roses, Wars of the (1455–85), between the rival houses of York and Lancaster, for the possession of the English crown, began in the reign of Henry VI. and ended with the death of Richard III. on Bosworth Field. The emblem or badge of the Lancastrians was the red rose and of the Yorkists the white rose. All rivalry between the Roses ended by the marriage of Henry VII., the Lancastrian, with the Princess Elizabeth, daughter of Edward IV., the Yorkist.

Rosetta Stone, discovered in 1799 by the French at Rosetta in Egypt, and deposited in the British Museum. It is a piece of black basalt about 3 ft. long, and contains a decree of the Egyptian priests of Ptolemy V. Epiphanes (205–181 B.C.) in (1) hieroglyphics, (2) demotic, and (3) Greek characters. It was by means of the three different inscriptions on the same stone that hieroglyphic writing was first able to be deciphered.

Rotten Row, a corruption of *route de roi* (king's drive), the famous riding resort in Hyde Park.

Rouge et Noir, a well-known gambling card game played on a table divided into two sections and marked with two black and two red lozenges. Any number of players can take part, and the money is staked on the red or black spaces. The cards are dealt out, first to Noir, until the pips aggregate more than 30; then in like manner to the Rouge, and the packet coming nearest to 31 wins the stakes.

Roulette, a gambling game played on a table carrying a revolving wheel divided into 37 compartments. Each compartment bears a number, 0 (zero) and 1 to 36. The numbers are mixed and do not follow any particular order. Of these 37 numbers 18 are black and 18 are red, whereas zero is green. The players stake their money on any compartment, colour, or combination of numbers they please. The wheel is whirled round and a ball is set rolling in the opposite direction, dropping finally into one of the compartments, thus deciding the winning number and colour.

Round, a musical composition in several parts, taken up by each participator at a different point from the other, and effecting a harmonious combination throughout. A Catch is similar in form, but usually allied to humorous words.

Roundhead. In the reign of Charles I. and later, a Puritan or member of the Parliamentary party who wore his hair cut short. It was originally a term of derision applied by the Royalists, who usually wore ringlets.

Round Towers are conical erections of considerable height, dating, probably, from some period between the 9th and 13th centuries. These buildings are numerous in Ireland, and three remain in Scotland. It is supposed they were built for ecclesiastical purposes, but there is no direct evidence of this existing.

Royal Academy of Arts was founded in London in 1768, under the patronage of George III. The early exhibitions of the Academy were held first in Pall Mall, and after in Somerset House, where the exhibitions continued to be held until 1836, when the National Gallery being built, the Academy moved its quarters to that building. In 1869 the present Royal Academy at Burlington House was opened. The Academy numbers 58 R.A.s and about 30 A.R.A.s. List of presidents: Sir Joshua Reynolds (1768), Benjamin West (1792), James Wyatt (1805), B. West (1806), Sir Thomas Lawrence (1820), Sir M. A. Shee (1830), Sir C. Eastlake (1850), Sir F. Grant (1866), Lord Leighton (1878), Sir J. E. Millais (1896), Sir E. J. Poynter (1896), Sir Aston Webb (1919), Sir F. Dicksee (1924), Sir William Llewellyn (1928), Sir E. Lutyens (1938), Sir A. J. Munnings (1944), Sir Gerald F. Kelly (1949), Sir A. E. Richardson (1954) and Sir Charles Wheeler (1957). The Academy holds an exhibition of pictures, statuary, and architectural designs every summer, to which non-members can, subject to selection, send their work.

Royal Academy of Music, founded in 1823, has enjoyed a Royal Charter since 1830, and an annual Government grant since 1868. Every form of music is taught there, as well as modern languages. It has valuable scholarships, and has produced many eminent musicians.

Royal Agricultural Society was founded in 1838 and incorporated in 1840. It holds an annual show, at which valuable prizes are offered for the best stock and the most important inventions in agricultural implements. These shows were held at different places each year from 1839 until London was fixed upon as what was hoped would be a permanent show place, and a large tract of ground was secured at Park Royal for that purpose. The shows held at the latter place, however, failed to attract the public, and a reversion was made to the old system in 1906.

Royal College of Music, at South Kensington, was incorporated in 1883. It has a large number of free scholarships for young musicians of outstanding merit. In association with the

Royal Academy of Music it holds annual examinations in several grades all over the country, awarding certificates of proficiency to successful candidates.

Royal Geographical Society, with headquarters in Kensington, supports geographical research in all parts of the world.

Royal Horticultural Society, established 1804; holds exhibitions in Vincent Square, Westminster, the annual flower display at Chelsea, and has gardens at Wisley in Surrey.

Royal Hospital, Chelsea, built by Wren, was opened in 1694 as an institution for invalid soldiers.

Royal Institution, established 1799, and incorporated by Royal Charter in 1800 for "the promotion, extension, and diffusion of Science and of Useful Knowledge." It was in the building of the Institution that Faraday conducted his experiments. It supports four professors: natural philosophy, astronomy, chemistry, and physiology. Famous also for its Christmas lectures designed for a juvenile audience.

Royal Society was founded by Royal Charter in 1662, Viscount Brouncker being the first president. Its *Philosophical Transactions* date from 1665. The meetings are held in Burlington House. Among the presidents have been Sir Christopher Wren, Pepys, Sir Isaac Newton, Sir Joseph Banks, Sir Humphry Davy, Prof. T. H. Huxley, Lord Rayleigh, Sir Archibald Geikie, Sir J. J. Thomson, O.M., Prof. Sir C. S. Sherrington, O.M., G.B.E., Lord Rutherford, O.M., Sir William Henry Bragg, O.M., Sir Henry Dale, O.M., Sir Robert Robinson, O.M., Lord Adrian, O.M., and Sir Cyril Hinshelwood, O.M.

Rubber, produced from the juice of certain trees and shrubs of tropical countries, is in such extensive demand now for tyres and other purposes that rubber plantations have been established in almost every part of the world where rubber can be grown, particularly in Malaya and Indonesia. The best kinds come from the Amazon valley. Great advances were made in the production of synthetic rubber during the second world war.

Rubicon, a small river falling into the Adriatic, and forming one of the Italian boundaries, the crossing of which anciently involved decisive action and constituted a declaration of war. Thus the phrase "crossing the Rubicon" came into general use, denoting an act from which there is no withdrawal.

Rubidium, a metallic element most closely resembling potassium. It is silver-white and very soft, and was discovered in 1861 by Bunsen and Kirchoff, using the spectroscope. It is rare, occurring in small amounts in the mica called lepidolite and in potash salts of the Strassfurt deposits in Germany.

Rubrics are instructions in regard to the ceremonies of the Church, appearing in red in the Prayer Book.

Ruby is a deep red kind of Corundum (aluminium oxide); one of the most valued of precious stones. Burma yields some of the finest, and rubies of inferior colour are found in Siam, Ceylon, South Africa, and Brazil.

Rudd, a fresh-water fish of wide distribution, plentiful in the rivers of Britain, and found in most other parts of Europe, also in Asia Minor. It is of a reddish-gold colour, with a greenish-blue beard.

Rudesheimer, a noted brand of white wine made from grapes grown in the district of Rudesheim on the right bank of the Rhine.

Ruff, a bird related to the common sandpiper, at one time very common in the Fen districts. The males have a ruff of feathers round the neck. The female is called the Reeve.

Ruffe *or* **Pope**, a small fresh-water fish common in most parts of central Europe, and similar in appearance to the ordinary perch. It is found in British rivers.

"**Rule, Britannia!**" the national sea-song of England, was written by James Thomson (1700–48), the author of the "Seasons," and set to music by Dr. Arne about 1740. The poet's words were "Britannia, rule the waves!" but it is usually rendered "Britannia rules the waves."

Rum, an ardent spirit distilled from molasses, and containing from 40 to 50 per cent. of alcohol. It is chiefly manufactured in the West Indies, and derives its special flavour from a volatile oil.

Rumes, the name given to a pleated strip of fine linen worn by men in the breast of the shirt, and fashionable down to the early part of the 19th century.

Ruminants, animals that chew the cud, being provided with a compartmented stomach, enabling them to swallow food, and later to bring it back to the mouth for mastication; *e.g.*, sheep, goats, oxen, etc.

Runcible spoon, a kind of fork used for pickles having three broad prongs. The word was used by Edward Lear about 1870 as a nonsense word and may be derived from *Rouncival* meaning large or huge from the bones said to have been dug up at *Roncesvalles* where Roland fell. Rouncival peas are the large peas called "marrowfats."

Runes *or* **Runic Inscriptions**, the description applied to certain characters discovered cut upon stone monuments and implements found in many parts of Europe, including England. In only a very few instances has it been possible to put any distinct and conclusive interpretation upon them.

Rural Dean, an ecclesiastical officer whose chief duty is to assist the Bishop in the duties of his diocese.

Ruskin College, Oxford, a unique institution founded by Mr. Walter Vrooman, an American, in 1899 to exist for all working men and women.

Rusts, parasitic fungi, some common species of which have reddish spores which in a mass have a rusty appearance. A well-known species is the Wheat Rust (*Puccinia graminis*), which has an alternative host in the barberry.

Ruthenium, a greyish-white metallic element discovered by Claus in 1845. It is harder and more brittle than platinum, in whose ores it occurs.

Rutile, mineral titanium dioxide. It is found in many igneous rocks, and in gneisses and schists. Its commonest colour is reddish-brown.

Rye House Plot, formed in 1683 with the object of assassinating Charles II. and the Duke of York (afterwards James II.), in order to secure the succession of the Duke of Monmouth. The plot was frustrated.

S

Sabaoth, a Hebrew word, meaning an army or host, and applied sometimes to the Supreme Being, *e.g.*, "the Lord of Hosts" (Rom. ix. 29)

Sabbath, the Bible name for the seventh day of the week, designated as the day of rest in the fourth commandment. It corresponds with Saturday in the modern calendar. The Christian "Sunday" is the first day of the week. It is nowhere in Scripture called the Sabbath though this name is sometimes erroneously applied to it.

Sabbatical Year was instituted by the Jews in ancient times for the purpose of giving the soil a rest from cultivation. This was every seventh year.

Sabines were a brave race inhabiting a territory near Rome in early times. The Sabines were absorbed in the Roman people about 290 B.C.

Sable, a furred mammal of the weasel family mainly inhabiting Siberia. It is bright brown in colour, and has a long, bushy tail. American sable is a marten.

Saccharin, a white crystalline solid manufactured from toluene, 550 times as sweet as cane sugar. It is used as a sweetening agent; as a substitute for sugar when sugar is forbidden, as in certain diseases, or when there is a shortage. It has no value as a food.

Saccharimeter, an instrument for determining the amount of sugar in solution by means of polarised light; also called a polarimeter. Used in sugar and jam factories (for control purposes).

Sack, the white dry wines of Spain and Madeira, canary being the most popular.

Sacrament, according to the Protestant Church includes Baptism and the Lord's Supper. In the Roman Catholic Church there are seven Sacraments. (*See also* **Roman Catholic Church**.)

Sacrilege is the breaking into a place of worship and stealing articles therefrom. In olden times this offence was punishable with death, but by Acts passed in the last century it was generally treated as an ordinary burglarious offence. By the Larceny Act, 1916, breaking and entering

any place of divine worship and committing a felony therein is punishable by penal servitude.

Saddles were used by the ancient Greeks and Romans, and were not known in England probably before the 6th century.

Sadducees, a Jewish sect of unbelievers, who held that the soul was mortal, and that there was no hereafter. Alluded to in the New Testament.

Safety Lamp, as used in coal mines, was invented by Sir Humphry Davy in 1816. The flame is enclosed in a cage of fine-meshed wire which allows air to enter and promote burning, but conducts away the heat generated in combustion so that no product of combustion escapes at a temperature high enough to ignite explosive gases in the mine.

Sagittarius *or* **"the Archer,"** one of the celestial constellations situated between Cygnus and Aquila. Sagittarius is another of the zodiacal constellations of 69 stars, which ancient astronomers worked into the representation of an archer. It lies between Scorpio and Capricornus.

Sainfoin, a widely cultivated forage plant, especially adapted for sheep. It is of strong, leafy growth and bears bright red flowers. It belongs to the same order of flowering plants as peas and beans.

St. Andrew's University, the earliest Scottish university (1412) and the third oldest in the United Kingdom.

St. Elmo's Fire, a glowing brush-like discharge of electricity which takes place from sharp-pointed objects on mountains or the masts of ships exposed to the intense electric fields of thunder-clouds.

Salamanders are amphibia superficially resembling lizards, from which they differ in having a moist skin and no scales.

Salic Law was probably instituted in France in the 5th century for the purpose of excluding females from inheriting the Crown. The Bourbons introduced the same law into Spain, but this was abolished by decree in 1830 to enable Isabella II. to succeed.

Salicylic Acid can be obtained from the flowers of the meadow-sweet, and from oil of wintergreen, but is now usually prepared by the action of carbon dioxide on sodium phenate under pressure. The acid is then prepared from the sodium salicylate. It is used as an antiseptic and has been used as a food preservative. Aspirin is a derivative of salicylic acid.

Salmon, a familiar fish notable for its habit of ascending rivers from the sea in the autumn and there depositing its spawn, not returning to the sea until the early spring. The salmon fishing season varies from place to place.

Saltpetre. (*See* **Nitre.**)

Salvarsan, the organic arsenical compound arsphenamine, which Ehrlich discovered was able to kill inside the human body the spirochæte germ that causes syphilis. Also known as "606." It has been superseded by neosalvarsan.

Sanctuaries were places where offenders against the law were free from arrest, and previous to 1697, when sanctuaries were suppressed, several parts of London were treated as sanctuaries. The chief of these refuge localities was in White-friars. There were others in the Minories, Mitre Court, the Savoy, Westminster, and the Mint. Other sanctuaries were at Beverley and at St. Burian's in Cornwall.

Sanderling, small wading bird of sandpiper family; breeds in tundra regions of far north, and is seen on sandy beaches of Britain as a winter visitor. Conspicuous white wing stripe and, like Curlew, Sandpiper, Knot, Dunlin, and other members of sandpiper family, has marked change of plumage between winter and summer.

Sandpiper, small- to medium-sized wading birds of several species whose migratory powers are so great that they are found in most parts of the world. They include the Common Sandpiper, frequently seen in Scotland, a bird about 7 in. long, greenish-brown head and back, white under-parts; beak long and slender. Other species met with in Britain are the Curlew, Green, Purple, and Wood Sandpipers.

Sanhedrin, the ancient Jewish Ecclesiastical Council of 70 members, said to have been originated by Moses when he called together 70 elders to assist him as judges. In modern times the Sanhedrin has been rarely summoned.

Sans-culottes, (French = without knee breeches), a term applied by the French aristocrats to the revolutionary leaders during the French Revolution who wore long trousers instead of knee breeches.

Sanskrit is the language of ancient India, spoken by the Brahmins, and existing in early Oriental literature. It was the language of literature and government and is now confined to temples and places of learning. Its relationship to the modern Indian languages is rather like that of Latin and Greek to modern European languages.

Saponin. The term is a generic one applied to a range of organic compounds which produce frothy, soapy solutions. Saponins are extracted from the soapwort root, horse chestnut seeds, etc. Saponin is the basis of the "foam" used for fire fighting; it can be used like soap to make insecticides and fungicides adhere to the leaves of plants.

Sapphic Verse, a form of verse said to have been invented by Sappho, the lyric poetess of Lesbos, who flourished about 600 B.C. *See* **G20.**

Sapphire, a valuable deep blue variety of Corundum (aluminium oxide) found mostly in India, Ceylon, and Northern Italy.

Saprophytes. A term applied to plants which feed on dead organic matter. Many fungi are saprophytes.

Saracen, the name given in classic times to the Arab tribes of Syria and adjacent territories. In the Middle Ages the current designation among the Christians for their Muslim enemies.

Sarcophagus, the name given to a stone coffin, such as was used by the ancient Egyptians, Greeks, and Romans, for receiving the remains of their famous dead. These sarcophagi were often decorated with rich carvings and sculptures.

Sardonyx, a kind of chalcedony comprising layers of alternating brown, red, white, and other colours. It is much esteemed as a gem.

Sarrusophone, bears the same relation to the Oboe as the Saxophone does to the Clarinet (*i.e.*, it has a metal tube and a double-reed mouthpiece). The Contrabass Sarrusophone is sometimes used instead of the Double Bassoon.

Sassanides were a dynasty of Persian rulers descended from Artaxerxes from 226 to 652.

Satellites are small planets revolving round the larger ones. The moon is the earth's only satellite. Jupiter has eleven; Saturn, nine; Uranus, four; Mars, two; and Neptune, one. A number of artificial earth satellites have been launched by America and Russia since Oct. 1957.

Satin-Bird, the famous "bower bird" of Australia, so named from its habit of constructing a bower-like nest; has a glossy black plumage, with the under parts yellow.

Satinwood, the timber of a tree plentiful in India and Ceylon, and valued for cabinet work. It is of fine grain and very hard. Varieties also exist in the West Indies, Florida, and Tasmania.

Satrap, the name given in ancient times to a Persian Governor of a Province.

Saturday, the seventh day of the week (the Jewish Sabbath), derived its name from Saturn, or, as some hold, is called after the Saxon idol, Saterne, which was worshipped on this day.

Saturn, a planet, the sixth from the sun, from which it is distant about 886 millions of miles, and around which it makes a revolution in about twenty-nine and a half years. It is about 71,500 miles in mean diameter, or nine times as large as the earth, and rotates on its axis in ten and a quarter hours. It is surrounded by a series of rings, meteoric in nature which revolve round the planet. It has nine small satellites.

Saturnalia, festivals held in ancient Rome in honour of the god Saturnus. They were made the scene of the most boisterous festivities, and were continued for several days at the end of December.

Savoy Palace, in London, between the Strand and the Thames, was originally built in the 13th century by Peter of Savoy. It was burnt in the Wat Tyler Rebellion in 1381, and afterwards restored and converted into a hospital in the reign of Henry VII. It was here that the famous but fruitless Savoy Conference was held between the Church and the Presbyterian Party in 1661. The ancient chapel of the Savoy was burnt down in 1864, but rebuilt in 1865.

Sawfish, a large marine ray found in tropical America and Guinea, whose snout often attains the length of several feet, and is provided with saw-like projections. This "saw" is swung from side to side among a shoal of fish which form the food of this ray.

Sawfly. These insects are considered to be the most primitive members of the order (*Hymenoptera*) to which the bees and wasps belong. In appearance they resemble somewhat the latter, but there is no waist separating thorax and abdomen. The ovipositor is never used as a sting; usually it is saw-like so that the female can use it to make incisions into tissues of plants where the eggs are laid. The larvæ look like caterpillars of butterflies and moths, but they have a great number of legs. One of the commonest species occurs on gooseberry bushes.

Saxhorns, large brass instruments on the cornet model invented by Sax. They are much used in military and other brass bands. The Tuba is the Bass Saxhorn in E flat or F. The Euphonium is the Bass Saxhorn in B Flat. The Contrabass Saxhorn in B flat (*i.e.*, one octave lower than the Euphonium) is called the Bombardon, but this term may be applied to the E flat Tuba.

Saxons, a Teutonic race originally inhabiting what is now Holstein. By the 7th century they had, with the Angles and Jutes, conquered and colonised most of England.

Saxophone, a musical instrument best described as a metal clarinet with a wide, curved tube. It is rarely used in serious music but is an important component of dance bands and the like. It is also used in military bands.

Scale (Musical), the series of notes on which a musical composition is built. Most European music is constructed upon the Major and Minor Diatonic Scales (*q.v.*).

Scald, the name of the Norse poets, who were similar to the bards of Wales. They had to celebrate the achievements of their warriors and leaders.

Scallop, marine bivalve molluscs of the genus *Pecten*, which is widely distributed. The scalloped edge to the shell results from a pattern of radiating grooves.

Scandium, an element classed in the rare-earth metals group. It was discovered in 1879 by Nilson, and occurs in small quantities in certain rarer minerals such as wolframite.

Scapular, a vestment hanging from the shoulder to the knees, worn by members of certain Roman Catholic orders. The name is also given to two small pieces of cloth worn over the shoulders by lay members of the Church in honour of the Virgin.

Scarabæus, a genus of beetles (Scarabs) widely distributed through Africa and Asia and the inner parts of Europe. It is to this genus that the "Sacred Beetle" of the Egyptians belongs, and numerous representations of it are found on ancient monuments.

Sceat, a small Anglo-Saxon coin, circulated in the 7th and 8th centuries, and worth nominally a penny; struck sometimes in silver.

Sceptics, a sect of philosophers founded by Pyrrho (*c.* 360–275 B.C.) in ancient Greece. Their philosophy was one of dogmatic doubt. Since nothing can be denied or affirmed, the only attitude to life is one of imperturbability. Pyrrho's doctrines are chiefly known through the works of his disciple Timon.

Sceptre, the staff or rod constituting the symbol of supreme authority. Tarquin, the elder, was the first Roman to assume the sceptre in 468 B.C. The French kings of the 5th century made a golden rod their sceptre.

Scherzo. The word signifies a *joke*. It is used to describe a piece of music in light or jocular vein. Beethoven used the Scherzo as a middle movement in a number of Symphonies and Sonatas, since when it has tended to displace the more formal minuet.

Schism, an ecclesiastical term for division in a church. The Great Schism was the separation of the Greek Church from the Latin, finally established in 1054. The Western Schism was the division in the Roman Catholic Church from 1378 to 1417, when there were two lines of popes, one at Rome and one at Avignon, which arose over the election of Urban VI. and Clement VII. to the papacy and was more a matter of persons and politics than a question of faith.

Schism Act was introduced in 1714 by Bolingbroke. It took away from Dissenters the education of their own children, which was to be handed over to persons licensed by bishops of the Established Church. The Act was repealed in 1719.

Schist, the geological name of certain metamorphic rocks composed for the most part of minerals with thin plate-like crystals (*e.g.*, mica) so that the layers of a schist are closely parallel. Quartz occurs in schists, and where it preponderates the term "quartz schist" is applied.

Schoolmen *or* **Scholastic Philosophers**, were a body who, in the Middle Ages, devoted themselves to the study and exposition of questions of religious inquiry, and attempted to reconcile the teaching of the Church with the dictates of human reason. The chief Schoolmen were Archbishop Anselm, Albertus Magnus, Thomas Aquinas, Peter Lombard, Duns Scotus.

Scorpion. The scorpions constitute an order of the arthropods. Distinctive features are the pair of powerful claws at the head and a "sting" at the tail, which curves over the back in attack or defence so that it points forwards. The poison injected by the sting is potent, causing instant death in spiders, centipedes, etc., and acute discomfort to humans. The idea that a cornered scorpion can sting itself to death is a myth; scorpions are immune to their own poison.

Scorpion Fly. The scorpion fly, of which there are less than 500 species, constitute a separate order of insects, the *Mecoptera*. They have 2 pairs of membranous wings, and gain their popular name because in some species the end of the abdomen is turned up, though it does not function as a sting.

Scotists were followers of the Schoolman, John Duns Scotus (1266–1308), who propounded certain moral laws and doctrines which were at variance with the teachings of the main body of Schoolmen, including Aquinas. (*See* Schoolmen.)

Scotland Yard, the Metropolitan Police Headquarters from which the Force is administered. The original Scotland Yard was a street near Trafalgar Square, so called because a palace stood there given by King Edgar (10th century) to Kenneth II. of Scotland. New Scotland Yard, the present official name for S.Y., is on the Thames Embankment, and the famous "C.I.D." (Criminal Investigation Dept.) has its headquarters there.

Scree *or* **Talus**, the mass of loose, angular rock fragments which accumulate towards the bottom of hill-sides and mountain-sides. These fragments have been detached by weathering processes, in particular frost action.

Scruple, an English apothecaries' weight, comprises 20 grains, or the third of a drachm. In ancient Rome a scruple was the 24th part of an ounce, and also indicated a surface and time measure.

Scutage *or* **Shield-money** was a feudal tax levied from Prelates and Barons in lieu of the military service of their knights enfeoffed upon their lands.

Scyphozoa. (*See* **Jelly Fish.**)

Scythians, a nomadic people of ancient times who inhabited much of Europe and Asiatic Russia. *See* **G6** (2).

Sea Anemones *or* **Actinaria**, an order of marine animals of the cœlenterate class *Anthozia*. They form a large and varied group of about 1,100 species and occur in many beautiful colours, flower-like in form.

Sea Butterfly, marine molluscs which propel themselves by two "wings," which represent lobes of the foot. They constitute the order called *Pteropoda*.

Sea Cow. (*See* **Manatee.**)

Sea Cucumbers *or* **Holothurians.** These animals constitute the class of echinoderms called *Holothuroidea*. They are elongated and worm-like, with a ring of about twenty tentacles round the mouth.

Sea Eagle, a genus of eagles, consisting of five species (more closely related to the kites than to true eagles), two of which occur in Europe. They live on fish and carrion and sometimes seek their prey among living animals.

Sea Elephant *or* **Elephant Seal**, a curious genus of seal, the males of which possess a proboscis a foot or more in length that suggests an elephant's trunk. They are found on the coast of California and in certain parts of the Southern Ocean; their blubber has a commercial value.

Sea Gravimeter, a new instrument to determine the density of the earth's crust beneath the oceans of the world. Designed by Dr. A. Graf of Munich and Dr. J. Lamar Worzel of Columbia University, it can detect changes of one-millionth of the value of gravity at the earth's surface and is being used in the oceanographical research programme of the I.G.Y.

Sea Hare, a genus of molluscs (*Aplysia*), so-called because of resemblance to a crouching hare. The shell is thin curved plate largely sunk in the animal's body. They have four tentacles, occur in Britain in the laminaria or ribbon-wrack zone, and discharge a purple fluid when molested.

Sea Horse, a sea-fish (*Hippocampus*), very numerous in the tropics and comprising some twenty species. Their bodies are ringed and they have prehensile tails. Their heads are horse-shaped, and they swim in a vertical position.

Sea Lily. A class of echinoderms, the sea lilies may be roughly described as "stalked starfishes." There are about 400 living species, and several thousand extinct species are known. Most of the former lose their stalk at maturity and are then free swimming. Otherwise called Crinoids.

Sea Mouse, a genus of marine worms called *Aphrodite*. These are of oval shape, some 8 or 9 in. long and iridescent. They are covered with fine bristles.

Sea Squirts *or* **Tunicates.** These animals are placed in the sub-phylum called *Urochorda*. They are found growing in rounded, jelly-like masses on rocks near low-water level. They get their name through the water jets they discharge.

Sea Urchin. The sea urchins belong to the class of echinoderms called *Echinoidea*. The body is globular and covered with spines which may be used for both defence and locomotion. The main organs of locomotion are, however, the tube feet, as in starfishes. Much has been learnt of recent years by marine biologists from experiments with the purple sea-urchin *Arbacia*.

Seals *or* **Signets**, have been in use from the remotest times. Some impressions of seals of Saxon kings are in the British Museum. The Great Seal of England was first used by Edward the Confessor, and is now used on the writs summoning Parliament, and for sealing all State documents of importance. The Lord Chancellor is the official custodian of the Seal.

Seasons comprise the four natural divisions of the year, and are due to the inclinations of the earth's axis to the plane of the elliptic. (*See* **Equinox.**) The spring season in Britain begins March 21. Autumn about Sept. 22. The summer and winter seasons are governed by the solstices (which see), and begin respectively about June 21 and Dec. 22. *See* **N20.**

Secondary Sexual Characters. Characters of animals which are distinctive of sex, but have no direct connection with the reproductive process. Examples are: the mane of the lion and the antlers of some deer.

Secretary Bird, so called because of the quill-like plumes about its ears, is a bird of prey related to the eagles and vultures; common in Africa, and of considerable service as an exterminator of snakes. It is a large bird about 4 ft. in height.

Sedan Chairs were first made at Sedan in France in the 16th century, and introduced into England in the reign of James I. They were in general use in the 18th century being borne on two side poles by a couple of bearers, and accommodating only one person.

Sedgmoor, Battle of, the deciding battle of the Monmouth Rebellion, fought July 6, 1685, at Sedgmoor in Somersetshire. The Duke of Monmouth was made captive, tried, and beheaded.

Sedimentary Rocks. *See* **F8** (2).

Seismology, the branch of geophysics devoted to the study of earthquakes and other earth movements. The instruments used for the registration of earth tremors are termed seismographs and consist in principle of a pendulum system, the supporting framework following the ground movement and the bob remaining at rest, thus setting up a relative movement between two parts. In order to record the displacements completely, at one station, three seismographs are necessary to show the two horizontal and the vertical components of the motion. Apart from detection and study of waves from earthquakes, sensitive seismographs are now widely used in geophysical prospecting, particularly in the search for possible oilfields.

Selenium, a non-metallic element of a dark red colour, and solid, found associated with sulphur, iron, pyrites, etc., though only in small quantities. Its electrical conductivity is increased when light falls on it, a phenomenon discovered in 1873 by May. Photo-electric cells depending on this property of selenium have been used for automatic control of street lamps that switch on at dusk and off at dawn, etc., but "selenium cells" have now been largely superseded by other photo-electric devices that are more reliable.

Semitic Languages are divided into two main sections; one including the Assyrian, Aramaic, Hebrew, and Phœnician groups; the other embracing the Arabic and the Ethiopian.

Semitone, the smallest interval in music—half a tone in the diatonic scale.

Senate, the higher governing Assembly of a Legislature. The word, applied primarily to the Roman council, is also used to denote the upper chamber in the legislatures of France, the United States, and other countries. In certain universities the governing body is also called the Senate.

Seneschal, a high official of a royal or noble household. The title originated in France in the 10th century, and was afterwards adopted in England and other parts of Europe.

Sensitive Plant. A species of Mimosa (*Mimosa pudica*), whose leaves are extremely sensitive to touch, shaking, and burning.

Separatists, the name given to the Dissenters in the time of Charles II., who pressed several severe measures against them. The term has also been applied to the Irish Home Rule Party.

Sephardim, the name of the descendants of those Jews of Spain and Portugal who left those countries in the 15th and 16th centuries to avoid the persecutions of the Inquisition.

Sepia, the "ink" of the cuttlefish. (*See* **Ink Sac.**)

September, the ninth month of the year, and the seventh of the old Roman calendar; hence the name, from Septimus. The designation was several times changed by the Emperors, but none of the new names survived for long.

Septembrists were participants in the massacre of prisoners in Paris in Sept. 1792 during the French Revolution.

Septet, a musical composition for seven voices or instruments.

Septuagesima Sunday, the third Sunday before Lent.

Septuagint, the Greek translation of the Old Testament.

Sequin, a gold coin of Italy, notably of Venice, which circulated from the 13th to the 18th centuries. It was worth about 9*s*. 3*d*. English.

Serfs, the name given to the slaves formerly existing in Russia, who answered to the condition of the feudal "villeins" of England. They were attached to the soil and were transferred with it in all sales or leases. Serfdom existed in Prussia until 1807 and in Russia until 1861.

Serjeants at Law, the highest degree of barrister rank formerly existing in England; until 1873 it was necessary for all Common Law Judges to be Serjeants before their elevation to the Bench. This qualification was abolished by the Judicature Act of that year. After 1873 appointments ceased and Lord Lindley (*d.* 1921) was the last of them.

Serpentine, a mineral; chemically a hydrous silicate of magnesium. Green serpentine is used as an ornament stone. Fibrous serpentine is called asbestos.

Serval, a small carnivorous animal of the lynx order, with black spots on a tawny ground. It is numerous in Africa, preys upon the smaller animals of the deer family, and is sometimes styled the "Tiger Cat."

Servitor. (*See* **Sizar.**)

Settlement, Act of, passed in 1701, assigned the Crown to the House of Hanover in case of Anne's death without children. The decision represented the determination of the squires and the Anglican Church never again to trust themselves to a Roman Catholic king.

Seven Champions of Christendom, as set forth in mediæval literature, were St. George of England, St. Andrew of Scotland, St. Patrick of Ireland, St. David of Wales, St. James of Spain, St. Denis of France, and St. Anthony of Italy.

Seven Churches of Asia, referred to in the Revelation of St. John, were those of Ephesus, founded by St. Paul in 57, Smyrna, Pergamos, Thyatira, Sardis, Philadelphia (Lydia), and Laodicea (Phrygia), all in W. Asia Minor.

Seven Sages *or* **Seven Wise Men of Greece,** regarded as the chief philosophers of the age before Socrates, were, according to the best authorities, Solon of Athens; Thales of Miletus; Pittaccus of Mitylene; Bias of Priene; Chilo of Sparta; Cleobulus of Lindus; and Periander of Corinth.

Seven Sleepers, of the ancient legend, took refuge from the wrath of the Emperor Decius in a mountain cavern, when they were made to sleep for 300 years.

Seventh-day Adventists, an evangelical Protestant denomination observing the divinely ordained seventh-day Sabbath of the fourth commandment rather than the first day of the week, for which there is no Biblical authority, and ardently looking for the second coming of Christ to right all earth's wrongs.

Seven Wonders of the World were: 1, the Pyramids of Egypt; 2, the tomb of Mausolus, King of Caria (hence the word mausoleum); 3, the Temple of Diana at Ephesus; 4, the Walls and Hanging Gardens of Babylon; 5, the Colossus at Rhodes; 6, the Ivory and Gold Statue of Jupiter Olympus; and 7, the Pharos, or Watch Tower, built at Alexandria by Ptolemy Philadelphus, King of Egypt.

Seven Years' War was waged by Frederick the Great and England against Austria, France, and Russia, from 1756 to 1763. It resulted in the secession of Silesia to Prussia, of Canada to England, and in the strengthening of our Indian Empire.

Sewing Machine, a machine for stitching cloth or other materials, and operated by manual, steam, or other power. Many attempts were made to produce such a machine between 1780 and 1840, but the first really practical invention of the kind was that of Elias Howe, an American, in 1841. Other sewing machines were afterwards introduced, and many improvements have been effected.

Sexagesima Sunday is the 2nd Sunday before Lent.

Sextant, an instrument which has superseded the quadrant as a measurer of angles between distant objects. It is of special importance in navigation and surveying, and contains 60 degrees described on a graduated arc. A small telescope is attached and there are also a couple of mirrors which reflect the distant objects so as to enable them to be accurately observed. The invention is attributed to John Hadley, and to Thomas Godfrey independently, about 1730.

Sextet, a musical composition for six voices or instruments.

Shad, a marine fish belonging to the same genus as the herring. It is found along the Atlantic Coast of the U.S.A., and ascends rivers to spawn.

Shagreen, shark's skin; also a leather of peculiar grain made from skins of wild asses, camels, horses, etc., and mostly manufactured in Astrakhan and Asia Minor.

Shake, a musical embellishment produced by the rapid alternation of two notes.

Shakers were originally an English sect who emigrated to America in 1772, and under the leadership of Ann Lee established themselves in a community at New Lebanon, in New York State. They practise celibacy and oral confession, hold goods in common, and reject baptism and the Lord's Supper. Dancing constitutes a part of their worship.

Shalloon, a kind of cloth manufactured from wool and worsted, and used chiefly for women's dresses and coat linings. It gets its name from the fact that it was originally made at Chalons.

Shamrock, the three-leaved clover-like plant native to Ireland and its national emblem.

Shark, a large and powerful ocean fish, comprising many species, very widely distributed, but most numerous in tropical seas. They have formidable teeth and are the most carnivorous of all fishes. They usually attain a large size, the whale-shark being often of a length of 50 ft. Commercially the shark yields shagreen from its skin, the fins are made into gelatine, and an oil is obtained from the liver.

Sharp. (*See* **Flat.**)

Sheep, a well-known family of ruminants of great utility as wool-producers, and for food. From the earliest times sheep have been a source of wealth to England. So much were they valued in the 15th and 16th centuries that their exportation was frequently prohibited. The chief English varieties are the Leicester, Cotswold, Southdown, and Cheviot breeds. Of the foreign breeds the most valued are the Merino sheep of Spain, which yield a fine long wool. Australia, U.S.S.R., Argentina, India, U.S.A., New Zealand, and S. Africa are the chief wool-producing countries in the world.

Sheldrake, a handsome genus of surface-feeding ducks, one of which, the common sheldrake, is an inhabitant of this country. It is a beautiful white-and-chestnut plumaged bird with dark-green head and neck and red bill. Another species, the ruddy sheldrake, appears in Britain only occasionally.

Shellac. This resin is the secretion of the lac insect (*Coccus lacca*), which occurs in forests of Assam and Siam. It is used for making varnish and in the manufacture of gramophone records.

Sherardizing. Process for coating steel or iron parts with zinc to prevent corrosion; this is done by heating the parts in a closed rotating drum containing zinc dust.

Shibboleth was the test word which Jephthah used to distinguish the Gileadites, his own men, from the Ephraimites as they passed the Jordan. Such as would not give the word were refused passage. The term is now frequently used to designate any special watchword or particular phrase.

Shield, a weapon of defence carried on the arm by soldiers before the invention of firearms, mostly made of metal, leather, or wood. In heraldry the term implies a shield-shaped escutcheon forming the ground on which arms are displayed.

Shilling has been an English coin from Saxon times, but is was not of the value of 12 pence until after the Conquest. The present style of shilling dates from the time of Henry VII.

Ships have existed from prehistoric times. There is mention of one that sailed from Egypt to Greece in 1485 B.C., and in 786 B.C. the Tyrians built a double-decked vessel. No double-decked ship was known in England, however, before the *Royal Harry* was built by Henry VII., and it was not until the 17th century that ship-building was carried on in this country as a prominent industry.

Ship-worm. (*See* **Teredo.**)

Shiva *or* **Siva,** the most worshipped god of the Hindu trinity.

Shoddy, the name given to a kind of cloth mainly composed of woollen or worsted rags, torn up and re-fabricated by powerful machinery. It was first made at Batley in Yorkshire about 1813, and became a very important industry employing many thousands of people at Batley and the neighbouring town of Dewsbury.

Short Parliament, that of Charles I. in 1640, lasting only three weeks.

Shot, the name given to solid projectiles fired from guns. In the time of Henry V. stone shot was used, later leaden shot, then iron shot, and finally steel shot, introduced by Sir Joseph Whitworth.

Shrike, a large and varied family of birds of hawk-like behaviour found in all continents except S. America. The Red-backed Shrike, which winters in Africa, is a breeding visitor to England and Wales. It is commonly called the "Butcher Bird" from the way it impales its prey (small birds and insects) on thorn-twigs. The other species on the British list are the Great Grey Shrike, the Lesser Grey Shrike, the Woodchat Shrike, and the Masked Shrike.

Shrove Tuesday, the day before the first day of Lent, receiving its name from the old custom of shriving, or making confession, on that day. In England the day has always been associated with the making of pancakes.

Sicilian Vespers, the term applied to the terrible massacre of French people in Sicily in 1282. The French under Charles of Anjou were then in occupation of the island, and had been guilty of many cruelties. It began at Palermo on Easter Monday at the hour of vespers and resulted in the expulsion of the French king and the introduction of Spanish rule.

Sikhs (disciples), a religious sect established in the 15th century, which gradually developed into a powerful race, and settled mainly in the Punjab. The sect was founded by Nanak (1469–1539) who preached simplicity, equality and rejected idolatory and caste. He was followed by ten *gurus* (spiritual leaders), the last of whom, Gobind Singh (1666–1708), welded the sect into a nation of warriors. They took the name of Singh (lion). After the death of Ranjit Singh in 1839 many fierce battles were fought against the British who finally subdued them and annexed the Punjab in 1849. They proved among the most loyal of Britain's Indian subjects. In the partition of India in 1947 their country was divided.

Silence, Tower of, or *dakhma*, a tower about 25 ft. high, built by the Parsees for their dead. The corpse is taken inside by professional corpse-bearers and left to be consumed by vultures. Parsees do not burn or bury their dead, and the *dakhma* is to protect the living and the elements from defilement.

Silhouette, a form of black profile portrait, invented by Etienne de Silhouette in 1759, and formed by an outline cutting made with scissors or other sharp instrument from cloth, paper, or other flat substance.

Silicon, an important non-metallic element. Next to oxygen, it is the most abundant constituent of the earth's crust (27% by weight). It occurs in many rocks, and its oxide occurs in many forms (*e.g.*, quartz, sand, flint, agate, chalcedony, opal, etc.).

Silicones are synthetic materials which because of their high resistance to heat and moisture have special uses, *e.g.*, as lubricants, heat-resistant resins and lacquers, and water-repellent finishes. Silicones are compounds in which the molecules consist of chains of atoms of silicon and oxygen alternately. Silicones were developed in the United States from discoveries first made by a British scientist. Manufacture began in Britain in 1950, and in the form of fluids, resins, rubbers, and greases they find wide use in industry. The largest plant in Europe is in Glamorgan.

Silk, the name given to a soft glossy fabric manufactured from the fine thread produced by the silkworm. It was known to, and highly prized by, the ancients, being at one time paid for, weight for weight, with gold. The manufacture of silk was carried on in Sicily in the 12th century, later spreading to Italy, Spain, and the south of France. It was not manufactured in England before 1604; but when certain French refugees established themselves at Spitalfields in 1688, the industry was developed and became of importance. In the 18th century the Lombes of Derby achieved great success in this industry. Japan, China, Italy, Korea, and the Soviet Union are the chief silk-producing countries.

Silkworm, the larva of a species of moth. It is native to China, and has been cultivated with success in India, Persia, Turkey, and Italy. The silkworm of commerce feeds on mulberry leaves and produces a cocoon of silk varying in colour from white to orange. The cocoon is the silken habitation constructed by the worm for its entrance upon the pupa condition, and to obtain the silk the pupa is killed by immersion in hot water.

Silures, an ancient British tribe occupying approximately the counties of Monmouth, Brecon, and Glamorgan. They resisted the Roman conquest fiercely, but were overcome by A.D. 78.

Silurian. This geological period is one of the major subdivisions of the Palæozoic era. Its beginning is estimated at 440 million years ago, and the period lasted about 40 million years. Maximum thickness of the Silurian strata in Britain measures 15,000 ft. *See* **F20**.

Silver, a white precious metal, found in a free state also in certain combinations, and in a variety of ores. The chief silver-producing regions are the Andes and Cordilleras. Peru, Bolivia, and Mexico have yielded vast supplies of the metal since the 16th century, and Colorado and Nevada in the United States have also been very prolific in silver yield. In England standard silver (that used for coinage) formerly contained 92½ per cent. fine silver and 7½ per cent. alloy, but when the price rose to 89½*d*. per oz. and the coins became worth more than face value, the Coinage Act of 1920 was passed, reducing the fineness to half. To provide silver bullion for industry and for a fund towards the redemption of our silver debt to America, it was decided in 1946 to replace the United Kingdom silver coinage by one made of cupro-nickel (75 per cent. copper, 25 per cent. nickel). Maundy money, however, is of the original silver standard.

Silverfish, a primitive wingless insect (*Lepisma*). About half an inch long, with two long antennæ in front and three similar feelers at the tail.

Simnel Conspiracy, occurred in 1486, when Richard Symonds, an Oxford priest, put forward Lambert Simnel, a baker's son, as heir to the throne. He was claimed to be Earl of Warwick, nephew of Edward Plantagenet. In 1487 Henry VII. defeated the rebels. Henry recognised that Simnel had been a tool in Yorkist hands and took him into his own service as a scullion.

Simonian, one who, like Simon Magus (Acts viii. 18), would purchase the gift of the Holy Ghost with money. A trafficker in spiritual things or Church benefices.

Simony, the offence of trading in church offices, has been contrary to English law since the time of Edward VI. Elizabeth also promulgated laws against simony. In 1879 a Royal Commission reported on the law and existing practice as to the sale, exchange, and resignation of benefices. The position is now controlled by the Benefices Act 1898, the Amendment Measure 1923, and the Benefices Rules 1926.

Sinn Fein (*Irish* = ourselves alone), an Irish nationalistic movement founded in 1905 which developed into a mass republican party and triumphed in the establishment of the Irish Free State. A small extremist group has survived which represents politically the outlawed I.R.A.

Sins, The Seven Deadly or **Capital Sins** are pride, avarice, lust, anger, gluttony, envy, sloth.

Sirius, the dog-star, so called because of its situation in the mouth of the Dog (Canis Major): it is the brightest of all the fixed stars, and is also one of the nearest to us.

Sirocco, a warm southerly, often dust-laden, wind blowing across Mediterranean lands from the Sahara, in advance of an eastward-moving depression over the Mediterranean.

Siskin, a small bird of the finch family, common in Northern regions which nests in Britain. The common Siskin has a yellow-green colour and is a lively, swift-flying bird with a very acute bill.

Sistine Chapel, the chapel of the Pope in the Vatican, renowned for its frescoes by Michelangelo.

Six Articles, The Statute of the, was passed in 1539 for compelling adhesion to the chief doctrines of faith; transubstantiation, communion in one kind, vows of chastity, celibacy, of the clergy, private masses, and auricular confession: those who refused to subscribe to the Articles were treated as heretics. The Act was repealed in 1547.

Sizar, a student of Cambridge or Dublin University to whom concessions in regard to college bills are made after having passed a certain examination. He formerly waited on the table, similar students at Oxford are called servitors.

Skate, a genus of sea-fishes related to the Rays.

Skink. The skinks constitute a large family of lizards with large smooth scales, under each of which is a bony plate. The largest species, found in Australia, is about 2 ft. long. Some skinks have adopted a burrowing habit and degeneration of the limbs is associated with this The Common Skink is a small species

about 5 in. long, living in the deserts of N. Africa and Syria.

Skua, falcon-like marine birds related to the gulls. There are five species. The Great Skua breeds as far south as the Shetlands. It is known as the "Robber Bird" because of its habit of pursuing terns, gannets, and gulls until these disgorge their food, which it then catches in mid-air. (This habit is common to all Skuas.) The Arctic Skua breeds as far south as the Scottish mainland. Other species are the Long-tailed Skua, the Pomatorhine Skua, and MacCormick's Skua, which breeds in the Antarctic and is the most southerly of birds.

Skunk, a North American mammal of the weasel family, with short legs and long bushy tail. All fifteen species are black and white, some being striped and the rest spotted. It secretes and ejects at will a foul-smelling fluid. Anything tainted with this fluid retains the odour for days.

Sky. The blue colour of the sky on a summer's day is the result of the scattering of light waves by particles of dust and vapour in the earth's atmosphere. Blue light having almost the smallest wavelength in the spectrum (0·00004 cm.) is scattered laterally about 10 times as much as the red (0·00007 cm.).

Skyscraper; owing to congestion, lack of ground space, and growth of modern cities, buildings are being made higher than broader; hence the name. The structures are constructed of a steel framework usually clothed in concrete or reinforced concrete. Among the highest examples are the Soviet Palace, Moscow (1,365 ft.), the Empire State Building of New York (1,250 ft.) and the Crane Building of Chicago (1,022 ft.).

Slate, fine-grained clayey rocks which have undergone metamorphosis. They cleave easily, and it is this property of cleavage which makes them a valuable source of roofing material. Welsh slates are among the best, there being important quarries at Penrhyn, Llanberis, and Ffestiniog.

Slavery, in its earlier forms, as in the times of the Romans, in the Feudal Ages, when vassalage and villeinage existed, and in the serfdom of Russia and other northern nations, was attended by many inhumanities and evils; but perhaps in the negro slavery system which prevailed in the British Colonies for upwards of 200 years and in certain parts of the United States up to 1865, it attained its highest point of cruelty. Since 1833 no form of slavery has existed within the British Empire. (*See also* **Serfs.**)

Slide Rule, an instrument which in its simplest form consists of two logarithmic scales sliding alongside each other. By its use multiplication, division, extraction of roots, etc., are speedily carried out.

Slings as a weapon of attack find prominent illustration in the Old Testament as the instrument with which David slew Goliath. There were bodies of slingers in the Carthaginian and Roman armies, and slings were used as late as the 17th century, when it was necessary to economise powder.

Sloop, a fore-and-aft rigged, one-masted vessel, carrying jib, fore-staysail, mainsail, and gaff-topsail. A sloop of war used to be a gun-carrying vessel of swift motion and great utility.

Sloth, a curious family of mammals, only found in Central and South America. They dwell almost entirely in the trees, proceeding from branch to branch with their bodies hanging downwards, their weight being supported by their large hook-like claws. They eat foliage.

Slow-Worm, a species of lizard found in Britain which lacks legs. Silver with longitudinal brown stripes, it lives almost entirely on slugs.

Smelting. The process of heating an ore with a reducing agent to convert ore into metal, and with a flux to convert rocky impurities into a slag that will float on top of the molten metal. Slag and metal can then be tapped separately. An example is iron smelting; the reducing agent is coke, and limestone is added as the flux; the smelting is carried out in a blast furnace.

Snake. The snakes constitute the important reptilian order *Ophidia*. Snakes have a scaly cylindrical body, without fore-limbs, and only in some instances possessing rudimentary hind-limbs. Their locomotion is accomplished by means of the excessive mobility of their ribs, which are very numerous. All snakes have teeth which only serve for seizing prey, and the poisonous varieties are furnished with poison fangs in the upper jaw. These fangs are hollow modified teeth and the venom passes into them from a special gland situated behind the angle of the mouth. Some 2,500 species of Snakes are known, divided into 11 families.

Snipe, a wading bird, long-legged, with long, slender, straight bill and brown plumage. The Common Snipe breeds on boggy moors in Scotland; the Great Snipe and small Jack Snipe are occasional visitors. The close season is Feb. 1 to Aug. 11.

Snort (*Ger.* Schnorchel), a tubular device of modern invention used in submarines. It contains two pipes for the intake of air and outlet of gases, and can be maintained above the level of the surface of the water. When a submarine is submerging with snort at the surface it is said to be *snorting*.

Snow. When water vapour condenses at high levels at a temperature below freezing, a cloud of ice particles is formed. If these frozen droplets are small, they fall slowly and gradually assume a feathery crystalline structure, reaching the earth as snowflakes if the temperature remains below freezing.

Socialism, a form of society in which men and women are not divided into opposing economic classes but live together under conditions of approximate social and economic equality, using in common the means that lie to their hands of promoting social welfare. The brotherhood of man inspires the aims of socialism in foreign, colonial, social, and economic policies alike. The British Labour Party believes in peaceful and constitutional change to socialism by democratic methods based upon popular consent.

The word "socialism" first came into general use in England about 1834 in connection with Robert Owen's "village of co-operation" at New Lanark. About the middle of the 19th century Charles Kingsley and others established a form of Christian socialism, and William Morris, John Burns, and others founded a Socialist League in 1886. With the development of Trade Unions the socialist movement took a more practical trend. Fabianism, associated in its early days with the names of Beatrice and Sidney Webb and George Bernard Shaw, aims at the gradual reorganisation of society by creating intelligent public opinion by education and legislation. The first time Labour Party members were returned to Parliament was in 1906, when 29 were elected; 393 members were returned to Parliament in 1945, 315 in 1950, 295 in 1951, 277 in 1955, and 258 in 1959 when the Party polled 12,216,166 votes (43·8% of the electorate). A democratic programme of planned economy and public ownership of certain vital industries and services were features of socialist government from 1945–51 together with a comprehensive system of social security.

Sociology is the study of society, but the science is so vast that sociologists differ in what they consider to be its subject-matter. One of the leading sociologists, however, Professor Ginsberg of London, lists the problems of the worker in this field as follows: (1) the investigation of the quantity of the population and its quality; the study of the various types of social structure and classification of social groups and institutions; (2) social control—the study of law, morals, religion, convention, and fashion—the regulating agencies of society; (3) social processes—study of the various types of interaction between individuals and groups—co-operation, conflict, etc.; (4) social pathology—the study of social maladjustment and disturbances. Sociology, like psychology, has been for long considered a field for arm-chair philosophy; most of the great philosophers from Plato and Aristotle onwards to Marx and Engels have produced theories on the nature of society, but such theories often tell more about the individual who composed them and his political prejudices than about facts. Recently, however, there are signs that sociology is becoming a science in its own right.

Soda, carbonate of soda, is now mainly obtained by certain processes of manufacture from common salt. It was formerly obtained from the ashes of plants. Bicarbonate of soda is the primary product in the Solvay or Ammonia-soda method for commercial manufacture of soda; it is also formed when carbon dioxide is passed into strong soda solution. The bicarbonate is used in medicine and in the preparation of baking powder.

Sodium, a metallic element first obtained by Sir Humphrey Davy in 1807 from caustic soda by means of the electric battery. Its chloride is *common salt*; the deposits of salt (*e.g.*, in Cheshire and at Stassfurt) have come into existence through the drying up of inland seas. Salt occurs in sea-water to the extent of about 3 per cent.; the Dead Sea contains about 22 per cent. The blood of animals is maintained at a level of about 0·6% sodium chloride. That there is sodium in the sun's atmosphere was confirmed in 1859 by Kirchhoff from his spectroscopic observations.

Soil, the upper portion of the crust of the earth, the medium from which all vegetation springs.

Solar System, general term embracing the sun, the planets and their satellites, and all celestial bodies which revolve round the sun. *See* **F7**.

Solstice, an astronomical term indicating the point at which the sun is most distant from the equator. *See* **N20**.

Somerset House, a large Government building stretching from the Strand to the Thames at the corner of Waterloo Bridge, and comprising the headquarters of the Inland Revenue and various other offices and registries. It was built towards the end of the 18th century on the site of an old palace which had belonged to the Protector Somerset.

Sonata. Properly the instrumental equivalent of a Cantata, *i.e.*, an extended piece for a solo instrument, *e.g.*, pianoforte or violin with pianoforte accompaniment. A typical sonata (*e.g.*, Beethoven's Pathétique, Op. 13) consists of three movements. Each movement (*see* **Movement**) consists of two or more subjects interwoven in a characteristic way. The first movement is longer than the others. A solemn introduction leads to an agitated first subject which is connected by a bridge to the second subject. This is followed by a small coda. This first part comprises the Exposition. There follows a short Development of themes found in the Exposition, this leading to a recapitulation of the first and second subjects, the latter with a change of key. The movement ends with a Coda consisting of themes from the Introduction and first subject. This treatment is typical of sonata form. The second movement is in complete contrast and is one of the loveliest slow movements ever written. Its form is that of a simplified Rondo. 1, 2, 1–3–1, Coda. The third movement is again in contrast. It is rapid but has not the tragic character of the first movement. The form is that of a full Rondo.

Sonnet, a favourite form of short poem in which Shakespeare, Milton, Wordsworth, and Keats especially excelled. *See* **M6** (1).

Sophists were the first Athenian teachers of philosophy in the 5th century B.C., who were supposed to base their reasoning on false premises, sacrificing much to mere quibble of rhetoric. They were denounced by Socrates. Plato and Aristotle also railed against the Sophists and the term "Sophism" has in later times been generally applied to fallacious arguments.

Soprano, a female treble (*see* **Treble**). The highest voice in a mixed choir.

Sorcerers were sufficiently numerous in the middle of the 16th century to have severe laws passed against them, and in 1603 James I. made it a capital offence to pretend to gifts of sorcery or witchcraft. The legal definition according to Lord Coke is, "a person who hath conference with the Devil to consult with him or to do some act."

Soundings at sea, to determine depth at any point, have been taken in all seas, and with considerable accuracy. A deep reading was that of the *Challenger* expedition in 1873, near St. Thomas's in the North Atlantic, when 3,875 fathoms were sounded. In 1851 H.M.S. *Challenger* recorded the then maximum ocean depth in the Marianas Trench (W. Pacific) by echo-sounding as between 5,882 and 5,940 fathoms. Another deep was located in the S. Pacific in 1952–53 of 5,814 fathoms in the Tonga Trench, 180 miles S. of Tonga Tabu. In 1957 an even greater depth was recorded, again in the Marianas Trench, of 5,993 fathoms.

Southern Cross, popular name of *Crux*, a constellation of the Southern hemisphere, consisting of four bright stars in the form of a Latin cross. It has been called the pole-star of the south and is indispensable to seafarers.

South Sea Bubble, a project entered upon in 1711 as a financial speculation by what was called the South Sea Company. Harley, Earl of Oxford, who was then in power, conceived the idea of utilising this project for getting together a sufficient sum to pay off the National Debt, then standing at about £51,300,000. The company contracted to redeem the whole debt in 26 years on condition that they were granted a monopoly of the South Sea trade. The idea fascinated the public, fabulous profits being dreamt of, and there was an immense demand for shares, which ran up in value from £100 to £1,000. All classes joined in the gamble, but by the wise policy of Sir Robert Walpole the fraud was exposed in 1720, when the whole scheme collapsed and thousands of people were ruined.

Sovereign, a British gold coin worth 20*s*. It was first coined in 1489, and remained the principal coin of the realm until its withdrawal in 1914. Its weight was fixed at 123·27447 grains troy, and it consists of 22 parts of pure gold to 2 parts of alloy.

Soviet. Russian word meaning "Council." The Russian revolution 1917 was based on workers' and soldiers' councils and they became the organs of the Soviet constitution.

Soya Bean. This is the bean of a leguminous plant (*Glycine soja*) found in Asia. The bean meal, which is rich in protein and oil, is familiar in Britain as "soya flour."

Spanish Civil War, 1936 to 1939. The war commenced by a revolt by the Fascist General Franco against the Republic which had succeeded the Monarchy in 1931. Germany and Italy aided the rebels who besieged Madrid for over 2 years. An International Brigade was formed to help the Republic, but the Spanish Government was faced by the greater part of the Army, and very effective assistance from Italy and Germany. Those powers seized the opportunity to have a curtain-raiser to the world conflict which they intended to precipitate. After a total loss of a million men the Fascists overpowered the Republic.

Sparrow, name given to finch-like birds found in most parts of the world, of which the House Sparrow, *Passer domesticus*, is the most familiar of British birds. Also native to Britain is the rural Tree Sparrow, distinguished by its chestnut crown. Other European species are the Italian, Spanish and Rock Sparrows.

Speaker of the House of Commons, an official who presides over the deliberations of the Lower House of Parliament, and acts as guardian of its privileges. He is elected by his fellow-members, subject to the approval of the Crown, at the beginning of each new parliament, though it is customary for him to serve successive parliaments. The name of a Speaker (Sir Thomas Hungerford) is first recorded in the Rolls of Parliament for Jan. 1377. *See* **C7** (1).

Specific Gravity, defined as the ratio of the mass of a particular volume of a substance to the mass of an equal volume of water at 4° C. (*See* **Hydrometer**.)

"**Spectator.**" Addison's famous periodical publication was first issued on Mar. 1, 1711, the last issue being Dec. 20, 1714. The bulk of papers were contributed by Addison and Steele.

Spectroscope, an instrument for spectrum analysis or observation. It consists of a tube through which the light, in whose spectrum the observer is interested, is conveyed to a collimating lens, which focuses it on to a prism, and a telescope through which to view the spectrum. The first flame spectrometer was constructed by Kirchhoff in 1859.

Spectrum. When light is refracted by a prism the rays of different wave-length are refracted

slightly differently. Thus white light is broken down to give its spectrum colours, ranging from red (longest wave-length) to violet (shortest wave-length). This phenomenon was discovered by Newton in 1672.

Spermatozoa, microscopic cells about $\frac{1}{500}$ in. long which are the generative element in male animals, and possess the power of fertilising the female ovum. In shape they resemble a tadpole, their mobility deriving from the long tail each spermatozoon has.

Sphinx, in Greek mythology a winged creature with a woman's head and a lion's body. The figure of Egyptian religion, which probably originated in Mesopotamia, represented a king in divine form. The Great Sphinx at Giza, probably built in the reign of Chephren (c. 2900 B.C.) is in the form of a lion with the head of a pharaoh.

Spiders were formerly classed as insects, but are now included with the animals of the *Arachnidæ* class. They have eight legs, breathe through pulmonary sacs, have six to eight eyes, and in most species spin webs composed of a viscid fluid.

Spinet, a sort of boudoir harpsichord popular in the 17th century. The name derives from that of its inventor, Spinetti.

Spirituals, negro melodies with religious inspiration and which are still spontaneously created, but have also passed into art-music. Paul Robeson, the American Negro, is the best-known singer of spirituals to-day.

Sponge, a marine organism consisting of a colony of cells, each of which slightly resembles an amœba. While the sponge lives a current of water circulates through the main apertures. It is the dead skeleton of this mass that forms the sponge of commerce. *See* **F24** (1).

Spoonbill, a long-legged marsh bird, closely related to the ibis and stork, remarkable for its snow-white plumage and broad, flat, spoon-shaped bill. The European species has not bred in England since the beginning of the 17th century, but is still a regular summer visitor from Holland, where it nests in colonies in reed-beds and islets.

Sprat, a sea-fish of the herring order, plentiful on all European coasts. It averages from 3 to 4 in. in length. It frequently does duty for the preparation of "anchovy" paste, as its fry does for whitebait.

Spurs have been used by horse riders from ancient times; in the feudal period a knight was allowed to wear gilt spurs, an esquire silver ones.

Sputniks, the name of the Russian earth satellites first launched during the period of the International Geophysical Year. *Sputnik I*, launched 4 Oct. 1957, became the first man made earth satellite. *Sputnik II*, launched a month later, carried a dog as passenger. *Sputnik III*, launched in May 1958, and weighing well over 2 tons, became the first fully-equipped laboratory to operate in the heavens. The sputniks represent a highly significant landmark in the history of scientific research. The father of space travel with rockets was a Russian—Konstantin Eduardovich Tsiolkovsky—the centenary of whose birth practically coincided with the launching of the first earth satellite. *See also* **F47–49**.

Stainless Steel. The development of stainless steel for cutlery manufacture, etc., began with the discovery of Harry Brearsley in 1912 that steel containing 12 per cent. of chromium is rust-proof.

Stalactites are calcium deposits formed on the roofs and sides of limestone caves, and in tunnels, under bridges, and other places where the carbonic acid of rain-water percolates through and partly dissolves the limestone, resulting in the growth of icicle-like forms that often assume groupings. The water that drops from these and rests upon the ground is called *stalagmite*, which accumulates and hardens into a series of sharp mounds or hillocks.

Stamp Duty, a tax imposed in Great Britain on written documents which are evidence of legal rights involved. The payment of the tax is denoted by a stamp which is impressed on or affixed to the document. The Stamp Act of 1891 is still the principal Act governing stamp duties, though most were doubled under the Finance Act, 1947, and many were abolished altogether under the Finance Act, 1949.

Standarding is an arithmetical calculation for ascertaining the value of bullion, that is, converting the gross weight of gold or silver that is not of the standard into its equivalent in weight of standard metal.

Starch is an organic compound occurring in granules in nearly all green plants, and especially in the seeds of dicotyledonous and cereal plants, potatoes, etc. In its pure form starch is a tasteless, odourless white powder, and is a carbohydrate consisting of carbon, hydrogen, and oxygen.

Star Chamber, an ancient tribunal of State in existence in 1486 and possibly earlier, charged with the duty of trying offences against the Government, unfettered by the ordinary rules of law. It was in effect a Privy Council entrusted with judicial functions, and the present Judicial Committee of the Privy Council to some extent represents the older tribunal. Under Charles I. the Star Chamber was used by the King and his party in the most unjust manner to persecute their opponents, and became such a scandal that in 1641 it had to be abolished. (*See* **Privy Council**.)

Starling (*Sturnus vulgaris*), a well-known European bird now common in many parts of the world. It has handsome plumage, shot with greens and purples and nests in holes and crevices. Flocks of starlings are often seen wheeling in the air, thousands roost on buildings in the heart of London. Other European species are the Spotless and Rose-coloured starlings. The latter sometimes wanders to the British Isles.

States-General, national assembly in which the chief estates of the realm were represented as separate bodies. The name, though not the institution, has survived in the Netherlands, where the two houses of parliament are known as states-general. In France the states-general consisted of three orders, clergy, nobility, and commons. Philip IV. first summoned it in 1302 to support him in his quarrel with Pope Boniface VIII. While absolute monarchy was establishing itself it met rarely, and not at all from 1614 until 1789, when it was convoked as a last resort by Louis XVI. But when it met it declared itself the National Assembly which marked the beginning of the revolution.

Statute of Westminster, 1931. An Act of parliament which gave a basis of equality to the British Dominions. The Dominions as well as the United Kingdom were defined by the Balfour Memorandum of 1926 as "autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the Crown, and freely associated as members of the British Commonwealth of Nations." The Statute was the sequel. The Dominions are sovereign States governed solely by their own Parliaments and Governments. They have separate diplomatic representation and the right to secede from any international organisation and from the Empire.

Steam Engine, a machine whereby steam becomes the active agent of the working of machinery, and of very wide application. The leading types of steam engine are: (*a*) condensing, or low-pressure engines, where the steam is generated by a boiler; (*b*) non-condensing, in which the cylinder exhausts its steam into the open air. Engines of the latter type are used where portable engines are required *See also* **F40** (2).

Steam Hammer, invented by the French engineer Bourdon and James Nasmyth in 1839, which proved of great utility in the development of the iron trade. The hammer itself, which is fixed to the end of a piston-rod passing through the bottom of an inverted cylinder, often weighs as much as 80 or 100 tons, and is so perfectly controlled by the steam power that its action can be so accurately gauged that it could be made to crack the glass of a watch without actually breaking it, or brought down upon a mass of molten iron with a force representing many hundreds of tons.

Stearin is the portion of fatty matters and oils which remains solid at an ordinary temperature, and is a compound of stearic acid with glycerine. It is largely used in the manufacture of candles

and for other commercial purposes. With caustic soda stearin forms a soap (sodium stearate), which is present in most commercial soaps which contain sodium palmitate and oleate in addition.

Steel, an alloy of iron and carbon; has been in general use from the earliest times, but how and where first manufactured remains a mystery. There are many varieties of steel, and these can contain manganese, silicon, copper, phosphorus, and sulphur. Other important alloying elements are nickel, chromium, molybdenum, tungsten, and vanadium. The oldest method, and one now generally adopted for the manufacture of steel, is that known as the "cementation or crucible process," but the most important method of all was introduced by Sir Henry Bessemer in 1855. This is known as the "Bessemer process," which consists in first burning all the carbon out of pig iron, and then putting back into it a sufficient quantity of carbon to produce steel containing the required proportion of this element. The metal produced by this process is called "Bessemer steel," which is of the highest value for structural purposes, rails, etc. For the manufacture of tools and weapons steel is indispensable. The United States, Germany, U.S.S.R., and United Kingdom are the leading countries in the world in steel production. (*See also* **Stainless Steel.**)

Stellite, an important alloy for the manufacture of cutting tools. It contains chromium, cobalt, usually some tungsten, and a small quantity of carbon.

Stencil, a wax sheet or metal plate, on which is cut a pattern or set of words. By placing the stencil on a sheet of paper or other substance and applying ink or paint to the cut-out pattern a copy of the pattern is obtained on the paper. Modern business practice has proved the usefulness of stencils. Cut on wax sheets by a typewriter a good stencil can produce as many as 100 copies or duplicates.

Stenography, the art of shorthand writing, was practised by the ancients, but was not in use in England before the 16th century. The systems invented in the 18th century were numerous, but the one that was most widely adopted was that of Mason, as improved by Gurney. In 1837 Pitman's phonographic system was first announced, which was a decided advance on any previous system, establishing a simple series of phonetic signs that was easily learned and admitted of great abbreviation. The average speed is 120 words a minute. This is the system in general use to-day. Its inventor received the honour of knighthood.

Stereotype, a metal cast taken from movable type which has been set up in the ordinary way. The first to introduce the process in practical form in this country was William Ged, of Edinburgh, who made stereotype plates in 1730. An impression of the type matter is first taken by means of a mould of prepared plaster of Paris or moistened sheets of specially prepared paper, and when molten stereo metal is poured upon the mould and allowed to cool and harden, the stereo plate is formed, and can be printed from as a solid block for some time.

Stethoscope, an instrument by which the action of the heart and other organs of the chest can be heard and gauged. It was invented by Laënnec, of Paris, in 1816, and consists of a cylinder, one end having a funnel-shaped opening which is placed against the chest, while the other end is held to the listener's ear. There is also a binaural stethoscope, which has two india-rubber tubes for the ears.

Stibnite, the chief ore of antimony; chemically it is antimony sulphide. Steely-grey in colour.

Stirrup, a loop of metal U-shaped strap suspended from the sides of the saddle, used for mounting and to support the horseman's foot. Some authorities allege their use as far back as the early Iron Age, and it is generally believed that they were used in battle in A.D. 378, when the Gothic cavalry defeated the legionaries of the Emperor Valens at Adrianople. Stirrups relieved the tension on the rider's knees and so enabled him to be armed from top to toe.

Stoat, a slender carnivorous mammal with short legs, related to the weasels. The stoat is distinguished from the latter by its longer tail, which has a black tip. The black tip is retained even in the winter when the animal turns white, the fur then being known as "ermine."

Stoics were the followers of Zeno, a Greek philosopher of the 4th century B.C. They received their name from the fact that they were taught in the Stoa Poikile, or Painted Porch, of Athens. Zeno's doctrine was that since the world is the work of divine wisdom and is governed by divine law, it is man's duty to conform freely to whatever destiny may be his. Zeno's doctrines developed into a great system of metaphysics with schools at Athens, Rhodes, and Alexandria and became the favourite philosophy of the Romans with its emphasis on correct conduct and duty and contempt for science.

Stole, ecclesiastical vestment worn by priests over both shoulders and by deacons over the left shoulder only.

Stoma, the term for the microscopic pores on the surfaces of leaves. The plural of "stoma" is "stomata." It has been estimated, for example, that a single maize plant bears 200 million stomata, which are usually closed at night.

Stone-Flies, comprise the order of insects called *Plecoptera*, which includes some 700 species, of which about thirty occur in Britain. The wings are membranous, and two long, thread-like feelers protrude at the tail end. The larvæ are aquatic.

Stonehenge, a remarkable collection of Bronze Age monuments arranged in two circles, 340 ft. in diameter, standing on Salisbury Plain, Wiltshire. Modern archæological research dates origin back to between 1860 and 1500 B.C. The fallen trilothon and stones of the outer circle were re-erected in 1958.

Stool of Repentance, a seat placed near the pulpit in Scottish churches in former times, on which persons guilty of moral lapse were ordered to sit in expiation during service.

Stork, a family of heron-like birds with long bills, freely distributed over Europe, Asia, Africa, and S. America. The White Stork is an occasional visitor to England, and, more rarely, the Black Stork; these are the only two European storks.

Storting, the Norwegian legislative assembly, is composed of two chambers; the odelsting, which originates Bills, and the lagting, which has the power to approve or reject Bills, but not to amend them.

Stratosphere, a layer of the earth's atmosphere, which begins 6–7 miles above the earth. The attraction of the stratosphere as a medium for air travel rests upon the absence of storms; indeed weather phenomena as commonly understood do not occur, there being no vertical temperature gradient in the stratosphere and no convection currents.

Strings. A collective term for those instruments in an orchestra which are played by drawing a bow across stretched strings, *e.g.*, violin, viola, violoncello, double bass.

Strontium. This silver-white metallic element was discovered by Hope and Klaproth in 1793, and isolated by Sir Humphry Davy in 1808. The chief strontium minerals are celestite (sulphate) and strontianite (carbonate). Compounds of strontium give a brilliant colour to fireworks and signal flares. Radioactive isotopes of strontium (strontium-90) are formed as fission products in nuclear explosions which tend to collect in bone. This genetic hazard is a cause of great alarm.

Stucco, a mixture composed of plaster of Paris and a solution of glue, much used in architectural decoration. It was known to the ancients and freely utilised in Italy in the 16th century.

Study, a piece of music written primarily as a practice-piece for perfecting technique. Many of the Studies (Etudes) of Chopin have considerable merit as music.

Sturgeon, a large fish found in northern seas and rivers with five rows of bony plates along the back and sides and pointed mouth with four barbels. Caviare is prepared from Sturgeon ova. Since the reign of Edward II. all sturgeon caught off the coasts of Britain, except in certain privileged places, have belonged to the Sovereign.

Sublimation, when a solid substance is heated and

turns into vapour without passing through the liquid stage, it is said to "sublime" and the process is called "sublimation." Iodine behaves in this way, and sublimation is used as a method of purifying it.

Submarine, the first submarine, the *Nautilus*, was designed by Robert Fulton and tried out in the river Seine and in the sea off Brest in 1801. The idea was too revolutionary to find acceptance and it was not until electricity for under-water propulsion became available that the submarine underwent extensive development. Britain became interested about 1900 and the Germans developed it and made it into an instrument of warfare. The first voyage under the North Pole was made in 1958 by the American nuclear-powered submarine *Nautilus*.

Subpœna, "under a penalty," a writ of Court commanding the attendance of a witness at a specified time and place. It is called a *subpœna ad testificandum* when requiring verbal testimony only, and a *subpœna tecum* when requiring the production of documents.

Succession, Acts of, have been passed at various periods to secure royal descent in a particular line. That under which our present dynasty reigns, and which established the Protestant Succession, was passed in 1689.

Suez Canal, connecting the Mediterranean and the Red Sea, was built by the French engineer Ferdinand de Lesseps and opened in 1869. An Egyptian company, *Canal Maritime de Suez*, was formed in 1866 with a capital of 200 million francs. The British Government acquired 176,602 shares out of a total of 400,000 for £4 million (value Mar. 31, 1956, £28,982,544). Its length is 101 statute miles, minimum width 196 ft. 10 in. (navigation channel), and the maximum draught of water allowed for vessels using the canal is 34 ft. The average time for transit through the canal is eleven hours seventeen minutes. Under the Convention of 1888 all nations were granted freedom of navigation without discrimination in peace or war. The right was recognised by Egypt in the Anglo-Egyptian Agreement of 1954, under which Britain agreed to give up the Suez base. The Suez Canal Company was nationalised by the Egyptian Government without warning on July 28, 1956.

Suffragette, member of the Women's Suffrage Movement who in the early part of this century agitated to obtain the parliamentary vote. The movement ended in 1918, when women of 30 were given the vote. In 1928 a Bill was passed which granted equal suffrage to men and women. The leaders of the Women's Suffrage Movement were Mrs. Pankhurst and her two daughters, Sylvia and Dame Christabel, Mrs. Fawcett, Nellie Kenny, and others.

Sugar, to the chemist the term is a generic one covering a group of carbohydrates, including cane sugar (sucrose), glucose, fructose, and maltose. In ordinary parlance sugar means sucrose, which is obtained from the sugar cane, sugar beet, or sugar maple.

Sulphur, an elementary brittle crystalline solid abounding in the vicinity of volcanoes. It is yellow in colour. It occurs in combination with other elements, as sulphates and sulphides, and allied with oxygen, hydrogen, chlorine, etc., is of great commercial utility. Used in its pure state it constitutes the inflammable element in gunpowder; it is also used for matches.

Sulphuric Acid, a compound of great commercial importance, used in a variety of manufactures, and composed of sulphur, oxygen, and hydrogen.

Sultan, the title of the Turkish Ruler which was first held by Osman in 1299. The last of the Sultans, Mohammed VI., escaped to Malta in Nov. 1922, and on Oct. 29, 1923, Turkey was declared a republic by the National Assembly.

Summer Time. In 1916 an Act was passed advancing Greenwich Mean Time by one hour during the summer months, calculated to save light and fuel by making use of an extra hour of daylight. This Act was made permanent in 1925, and summer time was to begin on the day following the third Saturday in April, or if that day was Easter Sunday, the day following the second Saturday, and end on the day following the first Saturday in Oct. By the Summer Time Act, 1947, the periods of summer time are now fixed each year by Order in Council.

Sumptuary Laws. Both the Greeks and Romans passed laws against luxury. In England regulations against luxury in food were promulgated under Edward II. and subsequently. A series of Acts of Parliament, beginning in 1363, placed restrictions on apparel, graduated according to rank. In 1603, most of these laws, which had already fallen into abeyance, were repealed.

Sun, one of the millions of stars in the universe, the centre of the solar system, estimated to be distant from the earth 93,004,000 miles, to have a diameter of 865,000 miles, and a volume a million times that of the earth. It rotates on its axis from east to west, though not as a solid, the solar equator turning once in about 25¼ days and the poles in about 34 days. Large spots are observed on the sun—varying in size from 30,000 miles in diameter—which form and disappear at irregular intervals. The area of the disc covered by the spots, however, reaches a maximum roughly every 11 years, when the sun's heat seems rather greater than usual and magnetic storms more frequent. Spectrum analysis show that the sun is composed of many elements found in the earth. Its surface temperature is about 6,000° C. The apparently inexhaustible heat of the sun, which has maintained life on the earth for millions of years, is derived from the destruction of matter, involved in the transmutation of hydrogen nuclei into helium nuclei, in which process about four million tons of matter is destroyed every second. At this rate of conversion the sun will go on radiating for 30,000 million years. The Soviet space rocket *Lunik I*, fired on 2 Jan. 1959, became the first artificial planet of the sun. *See also* **F7**.

Sunday, the first day of the week. In ancient times it was the day on which the sun was worshipped. In the early days of the Church Christians began to observe the first day of the week in honour of the resurrection in addition to keeping the seventh-day Sabbath of the Decalogue. Gradually the seventh-day Sabbath was abandoned and the first day adopted, though without any Biblical authority, as the Christian rest day. The first Sunday law was that of Constantine the Great in A.D. 321, in which it was decreed that all should rest from their labours upon the "venerable day of the sun."

Surface Tension. The surfaces of fluids (*e.g.*, a drop of water) behave as though they were covered by a stretched elastic membrane. This property is called "surface tension."

Surtax is payable in addition to income tax on all incomes exceeding £2,000 (after deduction of certain allowances), the rate increasing from 2*s.* in the £ with the size of the income.

Suttee, the practice prevalent in parts of India, until specially prohibited by a law of 1829, of self-burning of widows on their husband's pyre, the idea being, according to the religion of Brahma, that widows thus immolated passed direct to heaven.

Swans, large, graceful birds which together with the ducks and geese form the family Anatidæ. There are three European species with white plumage; the Mute Swan, distinguished by its orange bill with black knob, being the best known and a familiar sight on the rivers and ornamental lakes of this country. Two wild swans are winter visitors here, the Whooper and Bewick's Swan. The "pen" (female) and "cob" (male) mate for life and the young swans are called "cygnets."

Swan-upping. The annual marketing of the Thames swans which takes place during the third week of July. This ancient ceremony dates back to the 15th century when all the Thames swans were declared to be Royal birds owned by the Crown. Two city guilds—the Vintners' and Dyers' Companies—own one third of the 600 swans now on the Thames. This privilege was granted to them by King Edward IV. in return for money grants. Vintners' birds are marked with a nick on each side of the bill, the Dyers' with a nick on the right side only. The Queen's birds are unmarked.

Sweet Potato. This plant (*Ipomoea batatas*), which is a climbing perennial belonging to the convolvulus family, has thick roots that are

rich in starch, and are eaten like potatoes. A native of the W. Indies and Central America, new varieties of sweet potato have been bred which stand cooler climates and can be grown as far north as Cape Cod. The sweet potato of New Zealand is called the Kumara.

Swift, a bird so-called from the extreme speed of its flight, resembling a swallow but related to the humming-bird. It has long scythe-like wings, sooty-black plumage and greyish-white chin. There are several species inhabiting most parts of the world, particularly the tropics. The British breeding bird is among the latest to return from Africa and the earliest to go. Swifts are the only birds to use saliva for their nests. One oriental species builds its nest entirely from saliva, and this jelly-like substance is much prized by the Chinese for their birds'-nest soup.

Swords, from 20 to 30 in. long, were used by the Romans. The most famous swords of the Middle Ages were those made of Damascus and Ferrara steel.

Symbiosis. When two organisms live together and both derive mutual benefit from the association, the partnership is known as symbiosis. An example is the symbiosis of an alga and a fungus in lichens; another is the ordinary pea plant and the bacteria which live in the nodules on the pea's roots.

Symphony, a "sonata for full orchestra," usually consisting of four movements. In Beethoven's Third Symphony the first movement is in typical sonata form, consisting of an exposition of two subjects followed by a development. The second movement is a funeral march on a ternary plan (*i.e.*, 1–2–1). The third movement is a Scherzo on two subjects, while the fourth movement is an air with variations.

Syncopation, a displacement of the accent in music. For instance, in four-beat time the accent is normally on the first beat. If it were on any of the other beats the music would be syncopated. This device has occasionally been used in classical music, but it is the very essence of jazz.

Syndicalism, a labour movement which demands that industries shall be controlled by those who work them.

Synods, assemblies of heads or representatives of state and ecclesiastics for settling disputes relating to Church authority and government. (*See also* Œcumenical Council.)

Synoptic Charts. These are meteorological charts on which a synopsis of observed weather conditions is recorded using symbols of the international weather code.

T

Tabard, a cloak or outer garment worn in mediæval days by the peasantry. The name was also applied to a garment worn by knights over their armour.

Tabernacle, a place of worship; a sacred place; specifically in Hebrew history the Temple of Solomon which housed the Ark of the Covenant. "Spurgeon's Tabernacle" in London, built for the famous Baptist preacher in 1861, is a familiar non-Jewish example of the application of the name. The Mormon T. in Salt Lake City, Utah, holds several thousand and has an odd-shaped roof.

Tailor-Bird, name of a small group of warblers, familiar in India and China, and remarkable for their habit of sewing leaves together to enclose their nests. The bill is used as needle, vegetable fibre as thread, and a knot is tied to prevent it slipping.

Taiping Rebellion, 1850–65, revolt to overthrow the Manchu dynasty. It was suppressed in 1864 by the aid of Colonel Charles Gordon ("Chinese" Gordon).

Taj Mahal, the white marble mausoleum built at Agra by Shah Jehan in memory of his favourite wife who died in 1629. Over 20,000 men were occupied for over twenty years in its erection.

Takahe or **Notornis**, large New Zealand bird of the rail family which for many years was believed to be extinct. Small colony found in 1948 in remote valley of mountainous part of the S. Island. The bird is strictly protected.

Take-over Bid describes an offer made to all the shareholders of a company to purchase their shares at a named price and conditional upon acceptance by the holders of a named proportion of the total share issue. If accepted the purchaser thus gains control of the company.

Tallage, in Norman times, were taxes levied by the Crown upon lands of the royal demesnes. The levying of tallage was taken away by a statute of 1340 which required the consent of Parliament for all direct taxes.

Tallow, the more solid portions of animal fat, and prepared from beef, mutton, etc., by melting at a low temperature. Stearin is its chief constituent. Used for making candles, soap, etc.

Tally Office, in the Exchequer, was the department of the Government in which tallies were kept, representing the acknowledgment of moneys paid or lent; in 1834 the Houses of Parliament were burnt down through the overheating of a stove with discarded Exchequer tallies.

Talmud, the book containing the civil and canonical laws of the ancient Jews, comprising the Mishna (in Hebrew), a compilation from oral tradition, and the Gemara (in Aramaic), a collection of criticisms and comments of the Mishna by eminent Jewish Rabbis. There are two Talmuds—the Palestinian (or Jerusalem) finished at the beginning of the 5th century, and the Babylonian, at the beginning of the 6th.

Tambourine, a light, small, single-headed drum with loose metal discs let into the side of the hoop so that they jingle when the tambourine is shaken. An older name for it is the timbrel.

Tammany, a New York democratic organisation, sprang out of an old benevolent society named after an Indian chief, and has exerted a powerful influence over political movements in New York. The leaders of the organisation have used their power when their party has been successful at the polls to appoint their nominees to every prominent office, and have exacted bribes for concessions and privileges, and generally Tammany rule has meant wholesale corruption. Of this there is ample evidence in the disclosures of the Tweed and other Tammany frauds, and in the fact that the "Boss" for the time being usually contrives to make himself wealthy.

Tannins are chemical substances obtained from a variety of plants and trees, from oak-bark, and from galls. They are used in the leather trade, the tanning process making the skins resistant to decay.

Tantalum, a scarce bluish metallic element discovered by Ekeberg in 1802. Chemically related to vanadium and columbium, it is usually associated with the latter in nature. For several purposes it can be used in place of platinum, and it finds application in the making of surgical instruments.

Taoism. When Confucius (also founder of a world religion) was, about 530 B.C., a public servant to the prince of Chow—the "Middle Kingdom" of China—he met Lao-Tzŭ, who was treasurer to the state. Lao-Tzŭ was the founder of a religion very dissimilar to Confucianism; for, whereas Taoism is metaphysical, Confucianism is practical. Taoism is concerned with the individual, Confucianism with our relationships with others. *Tao*, the goal of the striver, is "Ultimate and Unconditioned Being" similar to the state of Nirvana of Buddhism. Lao-Tzŭ taught that one must be benevolent and compassionate; in particular, all forms of violence and compulsion are wrong. Idolatry was wrong and foolish, and, like Buddhism, there is little reference to a deity. Man must save his own soul by resignation and non-striving in order to reach the state of perfect Tao. After Lao-Tzŭ's death, however, the religion became corrupt, Lao-Tzŭ himself was deified, and various gods were worshipped—of war, weather, stars, seas, learning, etc. The greatest of Taoist scriptures, the *Tao-tê-ching*, may be read in Arthur Waley's translation *The Way and its Power*—it is one of the world's great devotional books. *See also* G13.

Tapestry, a fabric largely used in former times for wall decoration and hangings. It was known to the ancient Greeks, but in its modern form came into prominence in the 15th and 16th centuries, when it was manufactured in a marked

degree of excellence by the weavers of Flanders, especially those of Arras. The manufacture was introduced into England early in the 17th century, and was attended by considerable success. At the present day the term is applied to worsted cloths for furniture coverings, and there are also various kinds of tapestry carpets now made. The most famous tapestries of olden times were the Aubusson Tapestry and the Savonnerie. The Gobelin Tapestry factory, originated in Paris in the reign of Francis I., is still a national establishment. (*See also* **Bayeux Tapestry.**)

Tapioca, a food-substance yielded by the tuber of a tropical plant, called the manioc or cassava plant, poisonous in its raw state, but purified by roasting.

Tapirs. The tapirs constitute a family close to the horse family in the Ungulate order. They have four toes on the front feet and three on the hind. The snout is drawn out into a short trunk. The largest tapir is the Malayan tapir, which stands 3½ ft. at the shoulder. Four species occur in Central and S. America.

Tar is a dark viscid product obtained from the destructive distillation of wood, coal, peat, etc. Wood tar is acid owing to the presence of acetic acid ("pyroligneous acid"). The highest proportion of coal tar goes into road making. Distillation of coal tar yields many valuable compounds, including benzene, phenol (carbolic acid), naphthalene, and creosote; the final residue after distillation is pitch. Based on the chemical manipulation of compounds from coal tar is the preparation of many perfumes, food essences, drugs, antiseptics, and plastics.

Tarantula, the name given to a large range of big hairy spiders. Music was supposed to cure their sting, hence the Tarantella dance.

Targums, certain Aramaic paraphrases of portions of the Old Testament, first made orally and then written down about A.D. 100.

Tarpeian Rock at Rome received its named from the tradition that Tarpeia, the daughter of the Governor of the Citadel who betrayed the fortress to the Sabines, was crushed to death by their shields and buried beneath the rock. From this height persons guilty of treason were hurled to death.

Tartan, a cloth of woollen or worsted plaid; formerly each clan of the Scottish Highanders had its own tartan.

Tartaric Acid is prepared from tartar (potassium hydrogen tartrate) deposited in wine vats during fermentation. "Cream of tartar" is purified potassium hydrogen tartrate, which is incorporated in baking powder. Tartaric acid is also used in the manufacture of effervescent salts, and in medicine (*e.g.*, "tartar emetic").

Tartars (*or* **Tatars**), an Asiatic race who overran parts of Asia and Europe in the 13th century. Tartar is also a term used to denote a person of irascible temper, a vixen or shrew; to "catch a tartar" was to encounter more than was bargained for.

Tate Gallery, named after its founder, Sir Henry Tate, at Millbank, S.W., was opened in 1897; Sir Henry Tate bore the cost of the building (£80,000) and also contributed the nucleus of the present collection. "The Turner Wing," the gift of Sir Joseph Duveen, was added in 1910. The collection is thoroughly representative of British art and has been extended several times to include modern foreign art.

Taverns were not known before the 13th century. In Edward III.'s time there were only three in London; "one in Chepe, one in Walbrook, and the other in Lombard Street."

Tay Bridge spans the Tay at Dundee, is over two miles in length, and was opened for traffic on June 20, 1887. A previous bridge, completed in 1877, was blown down on Dec. 28, 1879, as a railway train was passing over it, and upwards of eighty people perished.

Tea was introduced into England about the middle of the 17th century, when it was a great luxury, and fetched from £6 to £10 a pound. It is an Asiatic plant, native properly to China, Japan, and India. Up to about 1885 most of the tea imported into this country came from China; the bulk now comes from India and Ceylon.

Teal, the smallest of the European ducks and next to the Mallard the commonest British species. It is a handsome bird and a very swift flier, but not as swift as the Garganey or Summer Teal.

Te Deum, the song of praise ("Te Deum laudamus"—"We praise Thee, O God"), is supposed to have been the composition of St. Ambrose in the 4th century and is used in Roman Catholic and English Church services.

Telecommunications. The sending of messages over a distance. The term is now generally applied to the sending of messages by telegraph, telephone, or wireless, or by a combination of such means. Experiments in electricity and magnetism by the European scientists Ampere, Gauss, Weber, and Steinheil, and those by Morse in America, made communication by telegraph practicable by the middle of the 19th century. In England, Cooke and Wheatstone produced an instrument in 1840, of the type later used by the Post Office, whose monopoly the telegraph service became. At first the electric telegraph (as distinct from the old semaphore, or optical telegraph) was used only by railway companies; under the patent of Cooke and Wheatstone, the first public line was laid from Paddington to Slough in 1843. The first submarine telegraph cable between England and France was laid in 1850 and, following Hertz's investigations into the production of electric waves, Marconi's invention led to this country being linked with Europe by wireless telegraphy in 1899. The first permanently successful telegraph cable across the Atlantic was laid in 1866. The first telephone service between London and Paris was opened in 1891. The electro-magnetic *Telephone* was invented by Alexander Graham Bell, a Scottish-born American, in 1876. Elisha Gray of the Western Union registered his patent only a few hours after Bell, and Thomas Edison was also active in the development of the telephone. In America the Edison-Bell interests were soon merged, but in Britain there were two rival companies until 1912, when the Post Office telephone system was established. The first submarine telephone cable to span the Atlantic was laid in 1955 and speech can now be transmitted over a distance of 2,000 miles. Before that, transatlantic communication was by radiotelephone, the first circuit being opened in 1927, and ship to shore telephonic communication in 1930. London is an international switching centre, through which telephonic communication is maintained by land lines, submarine cables, and wireless channels combined. During the second world war great strides were made in the development of wireless communications, the scope of which ranged from world-wide broadcasts of news and propaganda to the transmission of code messages by secret agents, from the linking of headquarters to units, to the carrying of small "walkie-talkie" sets by individual soldiers. In peace, as in war, ships and aircraft are now largely controlled by wireless signals; broadcasts of weather reports help shipping, aircraft, and farmers. Communication by short-wave radio is an important aid to modern police work.

Telemetry, measurement at remote distances by means of a radio-link from the object (missile or satellite) to the ground. The third Russian sputnik, for instance, carried apparatus for measuring, among other things, the pressure and composition of the atmosphere, and the intensity of different kinds of radiation from the sun. Its radio transmitter, powered by solar-energy batteries, sent out the information in coded form by means of uninterrupted signals at 20·005 megacycles with a duration of 150–300 milli-seconds.

Telepathy. The alleged ability of minds to communicate other than through the ordinary senses —"thought-transference." For a long time this was thought to be a mysterious process accepted by many laymen but denied by the scientist; it still remains mysterious, but is accepted by a certain number of scientists who have studied the matter. The first serious work on telepathy was done by the Society for Psychical Research (*see* **Psychical Research**), but a new era in discovery was ushered in by the publication of the book *Extrasensory Perception*, by the American scientist J. B. Rhine. Dr. Rhine claimed to have demonstrated the

faculty of telepathy in many normal people in a series of prolonged experiments in the laboratory. His method was to use a pack of cards ("Zener cards"), with four simple designs; the cards were lifted off the pack one at a time by the operator, and the person experimented on was asked to call out the name of the card being looked at by the operator. The results were surprising: one student guessed nine cards in succession out of the pack of twenty-five (a two million to one chance); a child of twelve guessed the whole pack correctly (something like six hundred million, million to one). Most results were, of course, less striking, but certainly seemed to justify the claim that telepathy was proven fact. Unfortunately, matters are less simple than this, and other workers have not obtained such satisfactory results.

Teleprinter, a telegraph transmitter with a typewriter keyboard, by which characters of a message are transmitted electrically in combinations of 5 units, being recorded similarly by the receiving instrument, which then translates the matter mechanically into printed characters. The telex or public teleprinter service provides direct person-to-person transmission of written messages.

Telescope, an optical instrument for viewing objects at a distance, "the astronomer's intelligencer." Lippershey is credited with construction of the first in 1608; Galileo constructed several from 1609 and Newton was the first to construct a reflecting telescope. The ordinary telescope consists of an object-glass and an eyelens, with two intermediates to bring the object into an erect position. A lens brings it near to us, and the magnifier enlarges it for inspection. A refracting telescope gathers the rays together near the eye-piece and is necessarily limited as to size, but the reflecting telescope collects the rays on a larger mirror, and these are thrown back to the eye-piece. The world's largest reflectors are at Mount Palomar Observatory, California (200 in.), Mount Wilson Observatory, California (100 in.), the McDonald Observatory at Mount Locke, Texas (82 in.), and the Victoria B.C. Observatory (72 in.). At the Royal Observatory, formerly at Greenwich, now at Herstmonceux, Sussex, a 98 in. *Isaac Newton* telescope is being installed. The *Hale* 200 in. telescope at Mount Palomar is the largest ever made and has revealed objects never before photographed; it is able to probe space and photograph remote galaxies out to a limiting distance of 2,000 million light years. The *Schmidt* telescope at Mount Palomar is to be used to make a huge photographic map of the universe. Manchester University has constructed at Jodrell Bank, Cheshire, a completely steerable radio-telescope with a paraboloid aerial 250 ft. in diameter. This telescope is the largest of its kind in the world. Early in its career it tracked the Russian earth satellites and the American lunar probes. *See also* **Observatories.**

Television, or the transmission of images of moving objects by radio. True television was first demonstrated by J. L. Baird at the Royal Institution in London in 1926. The B.B.C. began television broadcasts in 1930. *See* **Section X.**

Tellurium, a relatively scarce element discovered in 1782 by Reichenstein. Chemically it behaves rather like sulphur; its salts are known as tellurides. It occurs chiefly combined with metals in ores of gold, silver, copper, and lead.

Temperature of the Body. *See* **P61** (2).

Templars were soldier knights organised in the 12th century for the purpose of protecting pilgrims in their journeyings to and from Jerusalem, and obtained their name from having had granted to them by Baldwin II. a temple for their accommodation. At first they were non-military, and wore neither crests nor helmets, but a long wide mantle and a red cross on the left shoulder. They were established in England about 1180. During the crusades they rendered valuable service, showing great bravery and devotion. In the 12th century they founded numerous religious houses in various parts of Europe and became possessed of considerable wealth. It was this that caused their downfall. Kings and Popes alike grew jealous of their influence, and they were subjected to much persecution, and Pope Clement V. abolished the Order in 1312. Edward II. in 1308 seized all the property of the English Templars. The English possessions of the Order were transferred to the Hospitallers of St. John, afterwards called the Knights of Malta. The London Temple is on the site of the chief seat of the Order in this country. (*See also* **Hospitallers, Knights, Teutonic Order.**)

Temple, a building dedicated to the worship of a deity or deities. Those built by the ancient Greeks at Olympia, Athens, and Delphi were the most famous. The Temple of Diana at Ephesus was another. The Temple of Solomon at Jerusalem was destroyed and rebuilt several times; Herod's Temple was destroyed by the Romans in A.D. 70.

Temple Bar, an historic gateway that until 1879 stood at the western entrance to Fleet Street near the bottom of Chancery Lane. In olden times it was the custom to impale the heads of traitors over this gateway. It has been at Theobald's Park, Cheshunt, since 1888.

Tempo, a musical expression referring to the pace at which a composition is to be played, and generally used in combination with a qualifying word, as "Tempo Ordinario," ordinary time.

Tench, a familiar fresh-water fish of the Carp family, averaging some three pounds in weight, and of a mingled green and olive colour.

Tenor, the third voice in a male voice choir, *i.e.*, between alto and bass. The name is also applied to instruments of equivalent pitch, *e.g.*, tenor saxophone.

Terbium, an element, discovered in 1842 by Mosander, belonging to the group of rare-earth metals.

Teredo, the scientific name of the ship-worm, a peculiar bivalve mollusc, which lodges itself when young on the bottoms of wooden ships, and bores its way inwards, causing much injury.

Termites, also known as *White Ants*, though they are not related to the true ants and are placed in an entirely different insect order (*Isoptera*). They abound in the tropics and also occur in temperate countries, though only two species are common in Europe. There is no British species. They live in colonies and their nests take the form of mounds of earth and wood, cemented together with saliva, and up to 20 ft. in height. Five separate castes are recognised, three of them being capable of reproduction, and the other two are sterile.

Tern. This slender, gull-like bird has long pointed wings, a deeply-forked tail, pale grey and white plumage, black cap, and is a very graceful flier. There are several species, most of which are summer migrants to Britain. The Arctic tern winters in the Antarctic, returning to find a nesting place in the spring.

Terrapin, a kind of fresh-water tortoise. There are several species widely distributed in the Northern Hemisphere.

Territorial Army. The Territorial Force of the British Army came into being on Apr. 1, 1908, when the Volunteer Force and the Imperial Yeomanry combined; later in 1921 it was renamed the Territorial Army. This citizen army was administered by the various County Associations, voluntary bodies responsible for recruiting, clothing, quartering, and mobilising the T.A. units. On Sept. 1, 1939, the strength of the T.A. was 420,000 officers and other ranks, and thousands were ready to man the anti-aircraft, coastal defence, and searchlight stations at the outbreak of war. During the war the T.A. lost its independent existence and became merged into the Regular Army. After the war the Territorial Army was reorganised and in addition to its six infantry divisions, it had two armoured divisions, an airborne division, anti-aircraft and coastal defence formations, and independent armoured and infantry brigades. Under the Government's plans for the future organisation of the Army, published as a White Paper in July 1957, the Territorial Army battalions of regiments to be amalgamated are to retain their identity and existing titles.

Tertiary Rocks, in geology the rocks formed during the Caenozoic era comprising the Eocene, Oligocene, Miocene, Pliocene and Pleistocene periods. *See* **Geological Time Scale, F20.**

Terylene, trade name of the synthetic fibre discovered by two British scientists, J. R. Whin-

field and J. T. Dickson (Imperial Chemical Industries). It is marketed in the U.S.A. under the trade name *Dacron*. Full-scale production in Britain began in 1954. *Terylene* is a polyester fibre and textiles made from it are very strong, crease-resistant and mothproof and as the fibre is also resistant to chemical action and abrasion, it is finding a wide use in industry.

Tesla Coil, a type of induction coil.

Test Act, passed in 1673, prescribed that all government officers, civil and military, should be compelled to receive the sacrament according to the forms of the Church. It was repealed in 1828.

Testudo, the name given to a military movement in use by the ancient Roman soldiers. It consisted of a defensive screen formed by troops standing close together and massing their shields above their heads.

Teutonic Order, of German military knights, was founded in the Holy Land at the end of the 12th century for succouring the wounded of the Christian army before Acre. They were dispersed in the 15th century but the Order continued to exist until 1809, when Napoleon I. confiscated its properties. In 1840 the order was resuscitated in Austria as a semi-religious knighthood. (*See also* **Hospitallers, Knights, Templars.**)

Thaler, a German silver coin which has existed since the 16th century. The dollar is its derivative.

Thallium, a blue-grey metallic element discovered by Crookes in 1861. It is obtained from the flue dust resulting from the burning of pyrites for sulphuric acid manufacture.

Thallophytes *or* **Thallophyta**, the second largest division of the Plant Kingdom, which includes fungi, algae, and bacteria. These plants are not differentiated into roots, stems, and leaves, such an undifferentiated body being called a *thallus*.

Thames, the principal river of England, rising in the Cotswold Hills, and passing through Wiltshire, Berkshire, and Oxfordshire, and pursuing its ever-broadening seaward course through Reading, Windsor, Richmond, London, Greenwich, and Gravesend. It is about 210 miles long, and at the Nore, where it joins the sea, 6 miles wide. Commercially, it is the most important river of Great Britain. The tidal portion of the river is administered by the Port of London Authority and above Teddington by the Thames Conservancy, the lighthouse and pilotage by Trinity House. In the winter of 1683–84 the Thames was frozen for such a long spell that a *frost* fair was held upon the ice.

Thane *or* **Thegn**, a title of nobility used in Anglo-Saxon times, and in the reign of Athelstan conferred upon any free man who possessed five hides of land.

Theatres are buildings in which plays are performed. The theatres of the ancient Greeks and Romans were generally circular, with tiers of stone seats around them, and roofless. The first authorised theatre in England was that of Burbage, built in Shoreditch in 1574. Other theatres were erected at Bankside, in Southwark—the Globe, where some of Shakespeare's plays were first produced, and the Blackfriars. From 1642 to 1660 all London theatres were closed, but at the Restoration they were opened again, and for the first time women were allowed to appear on the stage, female parts having previously been played by young beardless men.

Theism, belief in a personal Deity.

Theodolite. The instrument used by surveyors for measuring angles in the horizontal and vertical planes. A *transit theodolite* is one which can be completely rotated around its horizontal axis.

Therm. The charges for gas for lighting and heating (formerly reckoned at per cubic foot) are now based on the calorific, or heat, value of the gas, and the unit used is termed a therm. The therm is 100,000 British thermal units.

Thermodynamics, a term first applied by Joule to designate that branch of physical science which treats of the relations of heat to work. What is called the first law of thermodynamics is thus stated by Clerk Maxwell: "When work is transformed into heat, or heat into work, the quantity of work is mechanically equivalent to the quantity of heat." The second law asserts that "the heat tends to flow from a body of hotter temperature to one that is colder, and will not naturally flow in any other way." *See* F15 (2).

Thermometer, an instrument by which the temperature of bodies is ascertained. The most familiar kind of thermometer consists of a glass tube with a very small bore, containing, in general, mercury or alcohol. This expands or contracts with variation in the temperature, and the length of the thread of mercury or alcohol gives the temperature reading on a scale graduated in degrees. Various forms of thermometer are used for particular purposes.

Thirty-nine Articles. (*See* **Articles.**)

Thirty Years' War, between the Roman Catholics and Protestants in Germany (1618–48). Before its termination involved most of the countries of western Europe. Concluded by the Treaty of Westphalia.

Thistle, Order of. (*See* **Knighthood.**)

Thorium, a scarce, dark grey metal discovered by Berzelius in 1828. All substances containing thorium are radioactive. Chief source of thorium is monazite sand, big deposits of which occur in Travancore (India), Brazil, and the U.S.A. Considered important as a potential source of atomic energy since the discovery that it can be transmuted into U233, which is capable of fission like U235.

Thorough Bass, a musical term applied to a voice part accompanied by numerals, showing the chord applicable to each note. The term also refers to the entire science of harmonic composition.

Thrush, a large family of song-birds related to the warblers, distributed all over the world. The British species include the robin, redstart, nightingale, song-thrush (or mavis), blackbird, missel-thrush, ring-ouzel of the mountains, and large numbers of migrant fieldfares and redwings from northern Europe are winter visitors.

Thumb-Screw, an instrument of torture used in olden times to extort confessions from prisoners. It consisted of a frame of three upright bars, between which the thumb of the victim was inserted; then a screw was turned on with sufficient force to give intense pain without jeopardising life.

Thunder, the sound heard after the occurrence of a lightning flash. It is due to vibrations of the air along the path of the flash, which are set up by the sudden heating (and expansion) followed by the rapid cooling (and contraction) to which the air is subjected. It is unusual for thunder to be heard more than 10 miles away, the distance being estimated roughly by allowing 1 mile for every 5 seconds which elapse between seeing the flash and hearing the thunder. Continued rolling of thunder results from the zig-zag nature of the flash and the multiple strokes of which it is composed, variations in the energy developed along the path, and echo effects. Thunderstorms are caused by powerful rising currents of air within towering cumulonimbus clouds and are most frequent during the afternoons and evenings of sunny summer days

Thursday, the 5th day of the week, named after Thor, the Scandinavian deity. To the ancient Romans Thursday was *dies Jovis*, or Jupiter's day.

Thyrsus, a staff carried in ancient Greece by the Bacchantes during their festivities. It frequently appears in ancient sculptures.

Tides, the periodical rise and fall of the waters of the ocean and its arms, are due to the attraction of the moon and sun. Newton was the first to give a general explanation of the phenomenon of the tides. He supposed the ocean to cover the whole earth, and to assume at each instant a figure of equilibrium, under the combined gravitational influence of earth, sun, and moon, thus making and controlling the tides. At most places there are two tides a day, and the times of high- and low-water vary according to the positions of the sun and moon relative to the earth. When earth, moon, and sun are in line (at full moon and new moon) the gravitational pull is greatest and we get "spring" tides. When sun and moon are at right angles (first

and third quarters of the moon's phases) we get the smaller "neap" tides.

Tiers Etat, the lowest of the three estates of the realm as reckoned in France—nobility, clergy, and *tiers état*—prior to the Revolution.

Tiger, a powerful carnivorous animal of the cat family, which occurs in India and certain other parts of Asia. Its skin is of a tawny yellow, relieved by black stripings of great beauty of formation. The tiger is hunted in India, and its ferocious disposition renders the sport both exciting and dangerous. The prey of the tiger includes buffaloes, antelopes, and occasionally human beings, though the man-eating tiger is the exception rather than the rule. Some tigers attain a length of from 9 to 12 ft.

Time based upon the sun being exactly south at noon is referred to as local apparent time (L.A.T.). As the apparent solar day is, however, of variable length the interval between successive transits of an imaginary "mean sun" is adopted as the unit, being designated local mean time (L.M.T.). The latter is derived from the former by adding or subtracting the so-called "equation of time" which varies from $+ 14°$ minutes in the middle of Feb. to $- 16\frac{1}{2}°$ minutes at the beginning of Nov. By common consent the meridian of Greenwich is accepted as the prime meridian; local mean time at Greenwich (G.M.T.) is the standard to which other mean times are usually referred. One degree of longitude corresponds with 4 minutes of time. Countries east of Greenwich keep their clocks in advance of G.M.T., countries to the west keep them slower. To avoid the inconvenience of local time variations, Standard Time has been adopted by most countries, whereby clocks are adjusted to an hourly system of changes based on a geographical succession of the meridians, 15° apart.

Times, The, daily newspaper founded in 1785 by John Walter (1739–1812), as *The Daily Universal Register*, renamed *The Times* in 1788. The business was transferred to the younger son, John Walter (1776–1847), in 1803 and his enterprise, ability and independence made the paper world-famous. Considerable changes took place in 1908 and Lord Northcliffe took over financial control. On his death in 1922 the paper came under the control of John Walter, great-great-grandson of the founder, and Col. the Hon. John Astor (now Lord Astor), who is now chairman of the Times Publishing Company. Sir William Haley was appointed editor in 1952.

Timpani, the kettledrums in an orchestra. (*See* **Drums**.)

Tin is a white metal, whose commonest ore is cassiterite (tin oxide), which occurs in Malaya, Indonesia, Bolivia, Belgian Congo, Nigeria, and Cornwall. It protects iron from rusting, and the tin coating on tinplate is applied by dipping the thin steel sheet in molten tin or by electrolysis. Tin alloys of importance include solder, bronze, pewter, Britannia metal, etc.

Tit *or* **Titmouse**, a small insectivorous bird of the woodlands and forests, bright of plumage and very active and agile, often seen hanging upside down searching for food. There are over fifty species, eight of which occur in Britain: the Great and Blue Tits, familiar in gardens and countryside, the Cole Tit, Marsh Tit, Willow Tit, Bearded Tit, Long-tailed or "Bottle" Tit, and the Scottish Crested Tit.

Titanium, a scarce metal difficult to extract from ores, found in association with oxygen in rutile, anatase, and brookite, as well as with certain magnetic iron ores. It combines with nitrogen at a high temperature. Discovered by the Rev. William Gregor in 1791. Titanium alloys, being very resistant to stress and corrosion, and combining strength with lightness, are finding wide application not only in marine and chemical engineering but in the building of aircraft, rockets, and the nuclear-energy field.

Tithes, an ecclesiastical tax consisting of a tenth part of the annual produce known to the ancient Jews, and first imposed by Christian authorities in the 4th century, although not made compulsory in England before the 9th century. Tithes derived from land are termed "prædial," those derived from cattle being styled "mixed," while others are personal. After the passing of the Tithes' Commutation Act of 1836, tithes were gradually converted into rent charges, and to-day the old form of tithes exists only to a small degree. Consult Tithe Act of 1936.

Toad. The frogs and toads are grouped together in the same category of amphibians, and the two terms are not based on any sharp scientific distinction between them. As a rough guide it can be said that toads have a more squat appearance and their skins are warty. Two toads occur in Britain, the Common Toad and the Natterjack. The latter can be identified by the narrow light stripe running down the middle of the back.

Tobacco is made from the leaves of various narcotic plants of the *Nicotiana* family, which contain a volatile oil and an alkaloid called nicotine. Tobacco is largely grown in America, India, Japan, Turkey, Greece, Canada, Italy, Indonesia, Bulgaria, Philippines, France, Belgian Congo, China, S. and N. Rhodesia, S. Africa, S. America, and other countries of a warm climate. It undergoes various processes of preparation. The leaves are first dried, then cut into small pieces, moistened and compressed, and in this form it is known as cut or "shag" tobacco; when moistened with syrup or treacle and pressed into cakes, it is Cavendish; when twisted into string form, it is "twist" or "pigtail." For cigars the midribs of the dry leaves are removed, and what is left is moistened and rolled into cylindrical shape. For snuff, the tobacco leaves are moistened and allowed to ferment, then dried, powdered and scented.

Toga, an outer robe worn by the ancient Romans and corresponding to the pallium of the Greeks. It was white and made of wool.

Toleration Act was passed in 1689, to relieve Protestant dissenters from the more serious of the disabilities under which they had previously laboured.

Tolls. Payments for privileges of passage were first exacted in respect of ships passing up rivers, tolls being demanded on the Elbe in 1109. Tolls for land passage are said to have originated in England in 1269, toll-bars being erected at certain distances on the high-roads in the 17th century, where toll had to be paid for all vehicles passing to and fro. After about 1825 they began to disappear, but still linger on some country roads and bridges. Tolls on London river bridges ceased in 1878–79.

Tone Poem *or* **Symphonic Poem**, a musical work of a serious nature and of symphonic dimensions in which the composer has not adopted the forms and conventions of the true symphony.

Tonic Sol-Fa, a system of musical notation in which monosyllables are substituted for notes. Thus the major diatonic scale is represented by Doh, Ray, Me, Fah, Soh, La, Te, Doh. The system was invented by a Miss Glover of Norwich in about 1840 and has proved of great assistance in the teaching of music in schools.

Tonsure, the shaven part of the head of a Roman Catholic ecclesiastic, dates from the 5th or 6th century. In the Roman Catholic Churches only a circle, or a crown, is shaved, while in the Greek Church shaving is forbidden.

Topaz, a transparent mineral gem, being a silicate and fluoride of aluminium and generally found in granitic rocks. Its colour is yellow, but it also occurs in pink and blue shades. The best kinds come from Brazil.

Topiary, the art of clipping and trimming trees, shrubs, etc., into ornamental shapes. This art goes back to Elizabethan times when gardens were formal and the shapes simple and symmetrical. By the end of Queen Anne's reign topiary had become much more elaborate, and all kinds of fanciful shapes were produced.

Tornado, a violent whirlwind, characterised by a black funnel-shaped cloud hanging from heavy cumulonimbus. Usually tornadoes are only a few hundred feet in diameter and occur frequently in the Mississippi region of the U.S.A., where it has been estimated that the wind speeds within them may exceed 200 m.p.h. In West Africa the term is applied to thundery squalls.

Tortoises and **Turtles**, are cold-blooded reptiles, four-footed, and encased in a strong shell protection, the shells of some species being of beautifully horny substance and design, in much demand for combs, spectacle frames, and

ornamental work. It is the custom to designate the land species as tortoises and the aquatic kinds as turtles. The green turtle, so called because its fat has a green tinge, is in great demand for soup. Together the tortoises and turtles make up the reptilian order called *Chelonia*, the biggest representatives of which are the giant land tortoises of the Galapagos Islands, reaching a weight of 500 lb. and living a century. Some of these giant tortoises are even said to have reached 200 or 300 years of age.

Toucan, a South and Central American family of brilliantly coloured birds, remarkable for their huge bills, which often attain a length of from 6 to 8 in. Toucans live on fruit, are of arboreal habits, and nest in holes.

Touchstone, a kind of jasper called by the ancients "Lydian stone," of economic value in testing the quality of metal alloys, especially gold alloys. The testing process is very simple. The alloy is drawn across the broken surface of the Touchstone, and from the nature of the mark or streak it makes the quality of the alloy can be ascertained.

Tourmaline, a mineral occurring in different colours in prismatic crystals, and remarkable for its action on light, having the power of polarising light rays under certain conditions. It is a double silicate of aluminium and boron, and occurs in Cornwall, Devon, South America, and Asia.

Tournaments were equestrian contests between military knights and others armed with lances, and frequent in the Middle Ages. The Normans introduced them to England.

Tower of London was a royal palace from the time of the Conqueror, who began the building of the White Tower in 1078. Later kings made considerable additions. Between the 15th and 18th centuries many princes and nobles were executed or imprisoned here, and here Henry VI., Edward V., and his brother were put to death. The Crown Jewels are kept at the Tower, and in the Armoury a fine collection of armour of various dates is preserved. The attendant staff are called Yeomen Warders of the Tower. Their style of dress is of the Tudor period.

Tractarianism, a term that came into use from about 1833 in reference to a religious movement (the Oxford Movement) headed by Pusey, Keble, Newman, and other Oxford high churchmen, who published "Tracts for the Times." Among other things, they advocated a higher degree of ceremonial in worship, and their enthusiasm put new activity into the Church, although the secession to Rome of some of their more prominent members showed the tendency of the movement.

Trade-Mark, a mark used in relation to goods for the purpose of indicating a connection in the course of trade between the goods and some person having the right, either as a proprietor or registered user, to use the mark. Trade-marks can be registered, the registration holding good for 7 years and being renewable thereafter indefinitely for periods of 14 years. Infringement of a registered trade-mark renders the infringer liable to damages.

Trade Winds form part of the circulation of air round the great permanent anticyclones of the tropics and blow inwards from north-east and south-east towards the equatorial region of low pressure. Atlantic trades are more regular than those of the Pacific. The belts may extend over 1,500 miles of latitude and, together with the Doldrums, move north and south in sympathy with the seasonal changes in the sun's declination, the average annual range being about 5 degrees of latitude. The discovery of the regularity of the trade winds is usually credited to Columbus.

Trafalgar, Battle of, was fought off Cape Trafalgar on Oct. 21, 1805, between the British under Nelson and the French and Spanish under Villeneuve and Gravina. It was a complete victory for the British, but Nelson was killed.

Trafalgar Square. The site has often been referred to as the finest in Europe. It was conceived originally as a square by John Nash (1752–1835) when the project was considered of linking Whitehall with Bloomsbury and the British Museum. It was to be named after the new monarch as King William the Fourth's Square but on the suggestion of George Ledwell Taylor (a property owner near the site) alteration to the more popular name Trafalgar Square was agreed to by the King. On the north side the National Gallery was planned by Nash and erected by William Wilkins on the place of the Royal Mews—a work of William Kent a century before. The lay-out was the idea of Charles Barry but he did not approve the erection of the Nelson column (which see). His idea was for the square to have a grand flight of steps from the north side with sculptural figures of Wellington and Nelson but the Commons decided otherwise and the column as designed by William Railton was begun in 1840. The two fountains by Barry were supplanted in 1948 by ones designed (1938) by Sir Edwin Lutyens. Executed in Portland stone they are flanked by some bronze sculptures. In the same year memorial busts of Lords Jellicoe and Beatty were placed by the north wall.

Transcendentalism, a term applied to a system of philosophy which transcends ordinary experience. It originated in Germany, and had for its chief apostles Richter, Fichte, and Schelling. In America Emerson propounded transcendental theories.

Transept, the portion of a church which extends across the interior between the nave and the choir.

Transistors. *See* **F66.**

Transubstantiation, a term which first came into recognised use in the controversy between Berengarius and Lanfranc in the 11th century, indicating the supposed conversion of the bread and wine of the Eucharist into the body and blood of Christ, and called the doctrine of the "Real Presence."

Trappist. (*See* **Cistercians.**)

Treadmill, a large cylindrical machine provided with a series of steps, and maintained in rotary motion by the pressure of men's weight. A rail is fixed outside the wheel, and to this the workers of the treadmill hold by their hands, while their feet are kept continually in motion from step to step, the weight of their bodies keeping the machinery revolving. It is no longer used in prisons as a form of punishment.

Treasure-Trove, a legal term applying to money, plate, or bullion found hidden in the earth, or elsewhere, and for which there is no owner. The treasure legally belongs to the Crown, but it is the practice to reward the finder with the full value of the property on its being delivered up. Coroners Act, 1887, provides that inquests may be held, but not as to title as between the Crown and any other claimant.

Treble, the highest voice in a male voice choir. This is, of course, a boy's voice, the highest adult male voice being the alto. In a mixed choir the treble part is sung by sopranos.

Tree Frog. The true tree frog occurs most commonly in America and Australasia. The common European tree frog is a brilliant green animal, the adhesive discs at the tips of its fingers and toes enabling it to cling to trees, etc., with ease.

Tree Shrew, an arboreal insectivorous mammal of Asia belonging to the family *Tupaiidae*. Tree shrews are related to the shrews, though in appearance they resemble squirrels except for their sharply pointed snout. They occur in Borneo, Siam, China, and Malaya.

Trematodes *or* **Trematoda,** the class of flat worms comprising the parasitic flukes. The liver fluke of sheep is the best-known species.

Trent, Council of, the longest and one of the most important in the history of the Roman Catholic Church, was convened to combat the doctrines of Martin Luther. It first sat in 1545, the last sitting being in 1563. At this Council the general policy, principles, and dogmas of the Roman Catholic Church were authoritatively settled.

Triangle, in music a metal percussion instrument in the form of a triangle which, when struck by a metal rod, emits a sound of no particular pitch.

Triassic *or* **Trias,** the earliest geological period in the Mesozoic era, which began some 225 million years ago. Triassic formations 25,000 ft. thick occur in the Alps. *See* **F20.**

Modern insects were appearing, and also small reptile-like mammals. Other important Triassic animals were: dinosaurs, ichthyosaurs (marine reptiles), and pterosaurs (flying reptiles).

Tribunes, name assigned to officers of different descriptions in ancient Rome. The original tribunes were the commanders of contingents of cavalry and infantry. The most important tribunes were the tribunes of the plebs, first elected in 494 B.C. as the outcome of the struggle between the patrician and the plebeian orders. They held the power of veto and their persons were sacred.

Trichoptera. This is the insect order comprising the Caddis-flies. These are moth-like insects, having hairs on the wings. They are usually found fluttering weakly near water. The larvæ are aquatic and are remarkable for the cases (caddis cases) which they build out of sticks, small stones, sand grains, and shells.

Tricolour, the flag of the French Republic since 1789, consisting of three nearly equal vertical bands of blue, white, and red (ratio 90 : 99 : 111).

Triennial Act, which fixed the duration of Parliament to three years, was passed in 1641. Charles II. repealed this Act, it was re-enacted in 1694; in 1716 the Septennial Act was passed. In 1911 it was made five years' duration.

Trilobites, extinct aquatic arthropods, most abundant in the Cambrian and Ordovician systems. Their appearance may be roughly described as resembling that of a woodlouse, and like that animal the trilobites were capable of rolling their bodies up into a ball.

Trimurti, the Hindu triad, Brahma, Vishnu, and Siva, symbolised as an entity. In the depictions of the Trimurti three distinct heads are represented, the theological unity combining Brahma, the creative power, Vishnu, the preserving element, and Siva, the destroying principle, in one supreme unification.

Trinity, the term applied to the Godhead, "three persons and one God," as it is expressed in the Litany—Father, Son, and Holy Ghost. The doctrine of the Trinity has general acceptance among Christian communities, and has been explained in different ways. One of the earlier statements of it is the Athanasian: "We worship one God in Trinity, and Trinity in unity: neither confounding the Persons, nor dividing the substance."

Trinity House, on Tower Hill, London, was incorporated in 1514 as an association for piloting ships, and has ever since been entrusted with various matters connected with the regulation of British navigation. Since 1854 the lighthouses of the country have been under its supervision. The acting Elder Brethren act as Nautical Assessors in Marine causes which are tried by the High Court of Justice.

Trio, strictly a musical composition for three voices or instruments. The third movement, of a classical symphony is usually in three-beat time and the second subject of the movement, which is of ternary form, is often called the Trio. Thus, Minuet and Trio, Scherzo and Trio.

Triptych, a picture, carving, or other representation, with two swing doors, by which it could be closed in; frequently used as an altar-piece. Also a writing tablet in three parts, two of which folded over the one in the centre.

Trireme, an ancient vessel with three rows of oars, of great effectuality in early naval warfare. Mentioned by Thucydides. It was a long, narrow vessel propelled by 170 rowers. The Romans copied it from the Greeks.

Trisagion ("thrice holy"), an ancient Jewish hymn, still regularly sung in the service of the Greek Church. A version of it—"Tersanctus"—also forms part of the Anglican Eucharistic service.

Tritium, a radioactive isotope of hydrogen which has three times the weight of the ordinary hydrogen atom. It is produced by bombarding an isotope of lithium with neutrons and has a half-life of 12½ years, decaying with the emission of β-particles (electrons).

Triumvirate, a term used to denote a coalition of three persons in the exercise of supreme authority. The first Roman triumvirate was that of Pompey, Julius Cæsar, and Crassus, 60 B.C.; the second was that of Mark Antony, Octavus, and Lepidus, 43 B.C.

Trombone, a bass wind instrument which has a tube of variable length. By moving the slide, which shortens or lengthens the tube, the player causes the trombone to emit different notes.

Tropic-Bird, a long-tailed sea bird, of which there are 3 species (the Red-billed, the White-tailed, and the Red-tailed), frequenting the tropical regions of the Atlantic, Pacific, and Indian oceans. They are commonly called Bo'sun Birds.

Troposphere. The atmospheric layer which extends from the earth's surface to the stratosphere. As a general rule the temperature in the troposphere falls as altitude increases. (*See* **Atmosphere.**)

Troubadours, lyric poets who flourished from the 11th to the end of the 13th century, chiefly in Provence and the north of Italy. They were often knightly amateurs, and cultivated a lyrical poetry intricate in metre and rhyme and usually of a romantic amatory strain. They did much to cultivate the romantic sentiment in days when society was somewhat barbaric and helped considerably in the formation of those unwritten codes of honour which served to mitigate the rudeness of mediæval days. *See also* **G39** (1).

Trouvère *or* **Trouveur,** mediæval poet of northern France, whose compositions were of a more elaborate character—epics, romances, fables, and chansons de geste—than those of the troubadour of the south. Flourished between the 11th and 14th centuries.

Truffles are subterranean edible fungi much esteemed for seasoning purposes. There are many species, and they are found in considerable quantities in France and Italy, less commonly in Britain. They are often met with under beech or oak trees, and prefer calcareous soils, but there are no positive indications on the surface to show where they are, and they are not to be cultivated. Hogs, and sometimes dogs, are used to scent them out, the former, by reason of their rooting propensities, being the most successful in the work.

Trumpet, a brass wind musical instrument in which different notes are produced by the operation of three "valves."

Tsetse, an African dipterous fly belonging to the same family as the house-fly. It is a serious economic pest as it transmits the protozoon causing African sleeping sickness when it pierces human skin in order to suck blood, which forms its food.

Tuatara or *Sphenodon punctatum*, a primitive lizard found in New Zealand. It has a rudimentary third eye on the top of the head; this is called the pineal eye and corresponds to tissue which in mammals forms the pineal gland.

Tuba, an alternative name for the Bass Saxhorn in E flat or F. (*See* Saxhorn.)

Tube Foot, the characteristic organ of locomotion of starfishes and kindred animals. They are arranged in pairs along the underside of the arms, and their sucker-like ends can grip a surface very tightly. The action of the suckers depends on hydraulic pressure.

Tudor Period extends from 1485 to 1603. The first Tudor sovereign was Henry VII., descended from Owen Tudor; then followed Henry VIII., Edward VI., Mary, and Elizabeth, the last of the line.

Tuesday, the third day of the week, named from the Saxon deity Tuisto, Tiw, or Teusco. To the Romans it was the day of Mars.

Tuileries, a French royal and imperial palace dating from 1564. It was attacked by insurgents during the outbreaks of 1793, 1830, and 1848, and was burned down during the Commune of Paris in 1871.

Tumulus, a mound of earth raised over the bodies of the dead. The mound of Marathon, enclosing the bodies of the Athenians who were killed in the famous battle with the Persians, is a celebrated tumulus. Such mounds were commonly raised over the tombs of the distinguished dead in ancient times, and sometimes enclosed heavy structures of masonry. The Roman "barrows" were tumuli. Evidences of such mounds are frequent in prehistoric remains.

Tun, a liquid measure formerly in general use, but now obsolete. A tun of ale was 216 gallons.

Tuna *or* **Tunny,** a large marine fish belonging to the mackerel family, frequenting the warm waters

of the Atlantic, Pacific, and Mediterranean. Tuna fisheries are an important industry.

Tundra is the name of a vast treeless plain of Northern Russia with small lakes and morasses scattered here and there, but almost devoid of vegetation. It is a cold, bare region, where only the reindeer can find sufficient sustenance.

Tungsten, a hard, brittle metal, silver to grey in colour. Its chief ores are wolframite (iron and manganese tungstate) and scheelite (calcium tungstate). Tungsten is alloyed in steel for the manufacture of cutting tools; also in the non-ferrous alloy stellite (*vide*). Electric lamp filaments are made from tungsten. Tungsten carbide is one of the hardest substances known and is used for tipping tools.

Turbines propelled by steam provide power for the propulsion of many ships, and on land steam turbines are a principal source of power, being used in large central electricity stations, for instance, to convert heat energy into electrical energy. Gas turbines have recently come into use in aeroplanes, and gas-turbine railway locomotives are being developed. The first gas-turbine ship had its trials in 1947, just half a century after the first steam-turbine ship.

Turbot, a large flat fish, highly valued as food. It often attains from 30 to 40 lb. in weight. Its flesh is white and firm. It is confined to European waters, and is caught by line or trawl.

Turkey, a fowl of American origin, brought to Europe from America soon after the discovery of that country. It was a domesticated bird in England in the first half of the 16th century. *See* **Y11–12.**

Turpentine, an oily substance obtained from coniferous trees, mostly pines and firs. It is widely used especially in making paints and varnishes, and also has medicinal properties.

Turquoise, formerly called Turkey-Stone, is a blue or greenish-blue precious stone, the earliest and best specimens of which came from Persia. It is composed of a phosphate of aluminium, with small proportions of copper and iron. India, Tibet, and Silesia yield turquoises, and a variety is found in New Mexico and Nevada. It derives its name from the fact that the first specimens were imported through Turkey.

Turtle Dove, a beautiful fan-tailed pigeon, a summer visitor from Africa to southern England. It is a small, slender bird with reddish-brown upper parts, pinkish throat, black tail with white edges.

Tweed. A rough-surfaced fabric of the twilled type, usually all-wool, though cheaper kinds may include cotton. Of a soft, open, flexible texture, it may have a check, twill, or herringbone pattern. Harris, Lewis, Bannockburn, and Donegal tweeds are well known. "Tweeds" is said to have been written in error by a clerk for "twills."

Twelfth Night is the eve of the feast of the Epiphany, and in olden times was made the occasion of many festivities. It was the most popular festival next to Christmas, but is now little observed.

Twilight is the light which is reflected from the upper portion of the earth's atmosphere when the sun is below the horizon (before sunrise or after sunset). The term is most usually understood to refer, however, to the evening light; the morning light we call dawn. The twilight varies in duration in different countries, according to the position of the sun. In tropical countries it is short; in the extreme north it continues through the night.

Tyburn, a former small tributary of the Thames, which gave its name to the district where now stands the Marble Arch, Hyde Park. Here public executions formerly took place.

Tycoon, the title by which the commander-in chief of the Japanese army (virtually the ruler of Japan) was formerly described by foreigners. (In Japanese *taikun* means great lord or prince.) The term is now applied, usually in a derogatory sense, to an influential business magnate.

Tympanum is, in architectural phraseology, the triangular space at the back of a pediment, or, indeed, any space in a similar position, as over window or between the lintel and the arch of a doorway. In ecclesiastical edifices the tympanum is often utilised for sculptured ornamentation.

Tynwald, the title given to the Parliament of the Isle of Man, which includes the Governor and Council (the Upper House), and the House of Keys, the representative assembly. This practically constitutes Home Rule, the Acts passed by the Tynwald simply requiring the assent of the Sovereign.

Typhoon. (*See* **Cyclone.**)

U

Uhlan, a light cavalry soldier armed with lance, pistol, and sabre and employed chiefly as skirmisher or scout. Marshal Saxe had a corps of them in the French Army; and in the Franco-German war of 1870 the Prussian Uhlans won fame.

Ultramarine, a sky-blue pigment obtained from *lapis lazuli*, a stone found in Tibet, Persia, Siberia, and some other countries. A cheaper ultramarine is now produced by grinding and heating a mixture of clay, sulphur, carbonate of soda, and resin.

Ultramontanism is the term applied to the views of Roman Catholics who desire that absolute authority in religious affairs should be vested in the Pope, subordinate only to the Œcumenical Council.

Ultrasonics *or* **Supersonics,** the term applied to waves of frequencies greater than those of audible sound waves and less than those of radio waves. The first instrument for producing supersonic waves was Galton's Whistle; this showed that cats and dogs, for instance, can hear "sounds" which are inaudible to humans. The commonest type of supersonic generator depends on the piezo-electric effect of crystals, which start vibrating when an alternating current is applied to them. (The crystals usually used are of quartz, Rochelle salt, or tourmaline.) Supersonic echo-sounders have been used for detecting submarines, wrecks, shoals of fish, etc., and they are invaluable instruments for measuring the depth of the sea. The term "ultrasonics" is superseding "supersonics," owing to the increasing use of the word "supersonic" in aeronautics, where it is applied to speeds exceeding the velocity of sound.

Ultra-Violet Rays. These are invisible rays whose wave-lengths are less than 3,900 Angstrom units (this unit is one hundredth of a millionth of a centimetre). The sun's radiation is rich in ultra-violet light, but much of it never reaches the earth, being absorbed by molecules of atmospheric gases (in particular, ozone) as well as by soot and smoke particles. One beneficial effect of ultra-violet light on human beings is that it brings about synthesis of vitamin-D from certain fatty substances (called sterols) in the skin. The wave-lengths which effect this vitamin synthesis also cause sun tan and sun burn. Ultra-violet lamps (which are mercury-vapour discharge lamps) are also used for sterilising the air inside buildings, their rays being lethal to bacteria. Many substances fluoresce under ultra-violet light; for instance, zinc silicate glows green, while cadmium borate throws out red light. This phenomenon is applied practically in fluorescent lamps, the light of requisite hue being secured by judicious mixture of the fluorescent materials which coat the lamp. (*See* **Electric Light.**)

Uncials were a form of written characters used in times prior to the 10th century; while smaller than capitals they were larger than the later minuscule. The term uncial was a misapplication of St. Jerome's *literæ uniciales*, "inch-high" letters.

Unction, the act of anointing with oil, a symbol of consecration practised in the Roman Catholic, Greek, and other Churches, but not in the Protestant. *Extreme unction* is the rite of anointing a dying person with holy oil. This function consists in anointing the eyes, ears, nostrils, mouth, the palms of the hands, and the soles of the feet.

Underground Gasification, the process of converting coal into gas underground. Briefly an "underground gasworks" comprises two approximately vertical shafts connected by a gallery through the coal seam, which is ignited. Air is led down one of the shafts, and the gas produced is drawn off from the second shaft.

The technique was worked out by the British chemist, Sir William Ramsay, but it was not until 1933 that it was tried seriously—in the Donetz coalfield in Russia. America, Italy, and Belgium are experimenting with underground gasification; British experiments ended in 1959.

Unicorn, a fabulous single-horned animal. In heraldry its form is horse-like, with the tail of a lion and pointed single horn growing out of the forehead.

Union Jack. *See* **N10.**

Union of Great Britain and Ireland was proposed in the Irish Parliament in Jan. 1799 after the 1798 Rebellion and came into force on Jan. 1, 1801. The troubled history of Ireland, associated with the question of self-government, nationalism, land, and religion, culminated in the Easter revolution of 1916. A treaty giving the 26 southern counties independence in 1921, as the Irish Free State, was followed by a period of internal dissention. In 1937 a new constitution was enacted in Eire in which no reference was made to the Crown. This, however, left in force the External Relations Act of 1936 and with its repeal in 1948, Eire separated itself from the British Crown and thus severed the last constitutional link with the Commonwealth, and became an independent Republic.

Union, Treaty of, was the treaty by which Scotland became formally united to England, the two countries being incorporated as the United Kingdom of Great Britain, the same Parliament to represent both, Scotland electing sixteen peers and forty-five members of the House of Commons. Uniformity of coins, weights, and measures was provided for, Scottish trade laws and customs were assimilated to those of England, and as regards religion and the practices of the law, Scotland was to continue as before. This Act was ratified on May 1, 1707.

United Nations. *See* **C16–21.**

Universe in astronomy means not only the star system (of which the sun and planets are a small part) but all the countless star systems or nebulae which may be separated from each other by millions of light-years. *See* **F3–7.**

Universities are institutions of higher education whose principal objects are the increase of knowledge over a wide field through original thought and research and its extension by the teaching of students. Such societies existed in the ancient world, notably in Greece and India, but the origin of the University as we know it today lies in mediaeval Europe, the word *universitas* being a contraction of the Latin term for corporations of teachers and students organised for the promotion of higher learning. The earliest bodies to become recognised under this description were at Bologna and Paris in the first half of the 12th century; Oxford was founded by an early migration of scholars from Paris, and Cambridge began with a further migration from Oxford. Other Universities sprang up all over Europe, including three in Scotland—St. Andrews (1412), Glasgow (1451), and Aberdeen (1494)—which were followed by Edinburgh in 1582. These six bodies remained the only Universities in Great Britain until the foundation in 1826–29 of University and King's Colleges in London (resulting in the establishment of the University of London in 1836) and of the University of Durham in 1832. The period since 1850 has been a great century of academic growth, in which the new Universities of Belfast, Birmingham, Bristol, Exeter, Hull, Leeds, Liverpool, Manchester, Nottingham, Reading, Sheffield, Southampton, and Wales were founded, the latest creation being that of Leicester in 1957. There are now 22 Universities in Great Britain and Northern Ireland and one University College (North Staffordshire). The Republic of Ireland has Trinity College, Dublin (founded in 1592), and the National University of Ireland, with its three constituent University Colleges at Dublin, Cork, and Galway. The 19th century also saw a wide extension of the University movement throughout the British Empire, the early important foundations being McGill (1821), Toronto (1827), and Laval (1852) in Canada; Sydney (1850) and Melbourne (1853) in Australia; New Zealand (1870); South Africa (1873); Bombay, Calcutta, and Madras in 1857 in India; and the University of the Punjab (1882) in the present Pakistan. There are now seventy-nine Universities of full status in Commonwealth countries outside the United Kingdom; three of these are in the Colonies (Hong Kong, Malaya, and Malta), and since the war University Colleges have been instituted in the West Indies and in East and West Africa and Rhodesia. In the U.S.A. the development of higher education has left the Universities less sharply defined than in Europe and the Commonwealth, but there are nearly 1,900 institutions of higher education covering 2,297,000 students, the best-known Universities being Harvard, Yale, Princeton, Columbia, and Chicago. The range of studies that may be pursued at a University covers humanities and sciences, and includes training for the liberal professions. It is customary for Universities to confer degrees on students who reach certain educational standards, the principal titles being those of Bachelor, Master, and Doctor in the particular discipline. In England a certain emphasis has always been placed on the provision of residential facilities for students; the ancient Universities of Oxford and Cambridge are entirely collegiate in character, while the modern Universities have halls of residence for a growing proportion of their students. In Great Britain in 1958–59 there were over 100,000 full-time University students (one quarter women) compared with 50,000 in 1939; 75% held scholarships or other financial awards. Through the University Grants Committee H. M. Treasury subsidises the recurrent expenditure of Universities to the extent of more than £36 million per annum, but they are self-governing institutions free from State control. An International Association of Universities was founded under UNESCO auspices, with headquarters in Paris, in 1950. The Association of Universities of the British Commonwealth, established in 1912, holds quinquennial Congresses (the most recent at Montreal in July 1958) and publishes the *Commonwealth Universities Yearbook* as a detailed work of reference; its office is in London. *See also* **N23–26.**

University Boat-race. *See* **U37.**

Ur of the Chaldees, and probably the site of Abraham's early home, is an ancient Sumerian site where important excavations have been conducted by Taylor in 1854 and by Hall and Woolley in this century. The excavated graves and other discoveries have thrown valuable light on the period subsequent to the "Flood" and have added much to modern archæology. *See also* **G17** (2).

Uræus, the sacred serpent of the ancient Egyptians, always represented on the head-dresses of divinities and royal personages. It was the symbol of supreme power, and was in the form of an asp.

Uralite, a mineral produced when a pyroxene rock is metamorphosed into hornblende.

Uranium, a metal discovered by Klaproth in 1789 in pitch-blende. It is a white metal which tarnishes readily in air. Great developments have followed the discovery that the nucleus of the uranium isotope Uranium 235 undergoes fission, and uranium minerals have become very important since it was found that atomic energy could be released controllably by taking advantage of fission. (*See* **Atomic Bomb, Atomic Pile.**) Previous to the second world war the uranium content of all the uranium ores that were mined was estimated at 1,000 tons. Since then uranium mining has been surrounded by military secrecy, and no figures are being published. Before atomic energy work began to take the major part of the world's output of uranium minerals, the chief users of uranium compounds were the ceramics and textile industries. *See also* **Nuclear Fission, F11** (1).

Uranus. This planet was discovered by Herschel in 1781. Its diameter is 32,000 miles and its average distance from the sun is 1,783 million miles. It has four small satellites.

Ursa Major, the Greater Bear, or "Charles's Wain," a constellation familiar to all observers because of the brilliance of the seven stars forming its outline. It never sets in these latitudes.

Ursa Minor, the Lesser Bear Constellation, has, like Ursa Major, seven prominent stars, of which the pole star is the brightest.

Usquebaugh, is the old Celtic name for spirit, distilled originally from barley. The name is still used in Scotland. Burns, in *Tam o' Shanter*, wrote, "Wi' usquebae we'll face the de'il."

Utilitarianism is a term that originated with the Italian philosopher Beccaria, and has for its aim "the greatest happiness of the greatest number," and insists that this should be the sole aim of all public action. Jeremy Bentham was the chief propounder of the philosophy, and in more recent times John Stuart Mill advocated it with much acceptance. Herbert Spencer's exposition of the theory represented a still higher development of it.

Utopia was the imaginary island of Sir Thomas More's ideal state, where the conditions of life and government were perfect. The work, published in 1516, was the forerunner of a host of such books by Bacon, Lytton, Bellamy, and, of the 20th century H. G. Wells.

Utrecht, Treaty of, was the treaty which concluded the war of the Spanish Succession in 1713.

V

Vaccination, a system of inoculation against small-pox discovered by Dr. Jenner in the 18th century. In Great Britain it is usual for all infants within 6 months of birth to be vaccinated unless the parent conscientiously believes that it would be harmful to the infant's health. *See* **P63** (2).

Vagrancy was the subject of stringent punishment under the old English laws. Various penalties were branding, setting in the stocks, mutilation of the ears, and transporting to the Colonies. The Vagrancy Act of 1824 repealed all former laws. Many Acts have since been passed.

Valentine's Day, the 14th Feb., is a festival in celebration of St. Valentine, one of the Christian martyrs of the 3rd century. A sweetheart or Valentine is chosen on that day and letters or tokens sent secretly to the object of affection.

Valhalla, in Scandinavian mythology, is the special Paradise to which the souls of warriors slain in battle were transported. The term is also generally used to designate a burial place of great men.

Valkyries, the chosen handmaidens of Odin, appointed to serve at the Valhalla banquets. Their most important office, however, according to the Norse mythology was to ride through the air at a time of battle and point out the heroes who were to fall. It is one of these Valkyries who is made the heroine of Wagner's opera "Die Walküre."

Vampire *or* **Werewolf,** according to ancient superstition, was a spectre in human form which rose from its grave in the night-time and preyed upon the living as they slept, sucking their blood, and then returning to the grave.

Vampire-Bats, blood-eating bats of tropical America. They puncture the skin with their incisor teeth, leaving a wound that bleeds profusely. The blood is lapped up by the bat, not sucked.

Vanadium, a scarce metallic element whose chief ores are carnotite and patronite. Some iron ores contain it. Most of the vanadium commercially produced finds its way into vanadium steels, which are used for tools and parts of vehicles, being hard, tough, and very resistant to shocks.

Vandals were a Teutonic race who ravaged Gaul, Spain, and North Africa in the 5th century, and finally attacked the city of Rome, drawing down upon themselves universal opprobrium for their wanton destruction of beautiful objects and monuments.

Vanilla, a climbing orchid of tropical America, found also in Asia; the dried fruit of certain species furnishes the agreeable aromatic vanilla of commerce, though most vanilla essence now used is prepared synthetically.

Varnish is of two leading kinds: spirit varnish, made from resinous substances dissolved in spirit; and oil varnish, in which the dissolving agent is linseed oil and turpentine.

Vatican, the Papal residence at Rome, a famous palace on the hill adjacent to St. Peter's. Its museum is a rich treasure-house of literary and artistic objects.

Vauxhall Gardens, a famous London pleasure resort from the early part of the 18th to the middle of the 19th century. It was here that many great singers appeared, where the earliest balloon ascents were made, and where there were fine displays of fireworks.

Vedas, the sacred writings of the ancient Hindus, comprising hymns, sacred formulæ, and prayers, and the oldest books in existence.

Vehmgericht, a mediæval tribunal said to have been founded by Charlemagne in the 9th century. It dealt with cases in which the penalty of death was involved. The last of these courts was held in 1568, by which time the suppression of the tribunal had become a public necessity.

Ventilation is a process of supplying fresh air to and removing contaminated air from rooms and buildings. It is a science that has been much studied in recent years and has led to the adoption of methods of air renewal by which the public health has been greatly improved. A recent development of the study of ventilation is air-conditioning. Being independent of outside atmospheric conditions, the air can be kept pure and at a suitable temperature.

Ventriloquism, the art of speaking in many voices and at apparent different distances, without seeming motion of the lips. The art was practised by the ancient Greeks and Romans.

Venus, the planet second in order from the sun and distant from that orb 67,200,000 miles. It is 7,760 miles in diameter. At wide intervals Venus passes between the earth and the sun, when what is called the "Transit of Venus" takes place. The last transit was in 1882. There will not be another until 2004.

Venus' Fly-trap, a well-known insectivorous plant (*Dionæa muscipula*) occurring in Carolina in damp mossy places. It is related to the Sundew. The leaf is the organ that catches the insects. The leaf blade is in two halves, hinged along the centre line. Each half bears three sensitive hairs called "trigger hairs." When an insect touches a trigger, the two halves of the leaf clap together, trapping the insect between them, when it is digested by a secretion from the leaf, which afterwards absorbs the soluble products.

Vera (vision electronic recording apparatus), a new British invention of recording television programmes on magnetic tape instead of, as formerly, by photographic film. The great advantage of the new "telerecording" machine is that it dispenses with the need for processing, and so avoids delay, and is particularly suitable for newscasts, outside broadcasting and TV talks.

Verdigris, a green deposit formed upon copper when exposed to the air. Verdigris is used both as a mordant and as a pigment.

Vermilion, a pigment obtained from cinnabar, but generally made artificially from a mixture of one part of sulphur with four of mercury. It yields a bright red colour.

Vernalization. Seeds which, after being exposed to a low temperature, produce plants that flower earlier than usual are said to have been "vernalized." This technique of seed treatment devised by Lysenko is called vernalization. It is claimed to have been widely used in Russia to obtain cereal crops in places where climatic conditions are favourable for only a short season.

Versailles, Treaty of. The Peace Treaty, 1919, ending the First World War. The first half was devoted to the organisation of the League of Nations. Among the territorial changes Germany ceded Alsace-Lorraine to France, Posen and the Corridor to Poland. Germany undertook to disarm, to abolish universal military service, to keep only a small army of 100,000 and a small navy. Her colonies were to be shared out among the Allies under League Mandates. Reparations were to be paid, but were gradually reduced and entirely ceased in 1932. Hitler took unilateral action against the Treaty especially in regard to rearmament and the annexation of Austria. Hitler's attempt to change the eastern frontiers was the immediate cause of the Second World War.

Verst, a Russian measure of length equal to 3,500 ft., *i.e.*, about two-thirds of an English mile.

Vestals were priestesses of ancient Rome, appointed to guard the perpetual fire consecrated to Vesta, goddess of hearth and home. They were required to take vows of chastity, and during the thousand years from Numa, 710 B.C., to Theodosius, A.D. 394, when the order was abolished, only 18 vestals were condemned for incontinence.

Viaticum (literally "provision for a journey"), an expression designating the ministering of Holy Communion to one on the point of death.

Vicar of Bray, the original of the ballad of that name was Simon Alleyn, vicar of Bray between 1540–85, who was "twice a Papist and twice a Protestant," as Fuller asserts, serving under four monarchs, Henry VIII., Edward VI., Mary I., and Elizabeth.

Victoria and Albert Museum, in Kensington, London, was begun in 1852 as the Museum of Ornamental Art at Marlborough House. The present building was completed in 1909, and has the following nine departments: Architecture and Sculpture; Ceramics; Engraving, Illustration and Design; Metalwork; Paintings; Woodwork; Textiles; Library (of books on art) and Book-production; and the Dept. of Circulation. The Bethnal Green Museum is a branch of the V. and A.

Victoria Cross, an order of merit for conspicuous valour, awarded to members of the Army, Navy, and Air Force, was established in 1856. In July 1959 it was announced that all holders of the V.C. for whom the British Government is responsible would receive a tax-free annuity of £100.

Vicuna, a large mammal of the camel family, found wild in the mountain regions of Bolivia and Chile. It yields a wool which is made into dress fabrics.

Vienna Congress, sat at Vienna from Sept. 1814 to June 1815, and settled the delimination of the territories of the various European nations after the defeat of Napoleon. The Treaty of Vienna which resulted gave Ceylon, Mauritius, Cape Colony, Heligoland, Malta, and part of Guiana to England; France was not permitted to hold more territory than she had possessed at the outbreak of the Revolution in 1789; Austria took Northern Italy; Russia part of Poland; and Prussia, part of Saxony and the Rhenish province. Except for one or two changes the clauses of the treaty were maintained for over forty years.

Viet-Minh, the Indo-Chinese (Annamite) national movement led by Ho Chi-Minh which resisted French rule from 1945 to 1954, when agreement was reached at the Geneva Conference.

Vikings were Scandinavian sea-plunderers who, from the 8th to the 10th centuries, were the terror of northern waters. They excelled in shipbuilding, were fine sailors and splendid craftsmen. *See also* **G32** (2).

Vinegar. This condiment and preservative is a weak solution of acetic acid (3–9%) formed by the oxidation of ethyl alcohol by the action of bacteria on alcoholic liquor (wine, beer, cider, fermented fruit juices, or malted cereals). Wine vinegar is usually red; malt vinegar is brown. (*See also* **Acetic Acid.**)

Viola, a stringed instrument of the violin type but rather larger than the violin. Music for the viola is written mainly in the alto clef, though the treble clef is used for the higher notes.

Violin, a stringed instrument rather smaller than the ancient viol from which it derives. It is held under the chin for playing, the right hand bowing while the left hand "stops" the strings. The violin has been used in its present form since the 16th century, the most famous maker being Antonio Stradivari of Cremona.

Violoncello, a member of the violin family of stringed instruments whose pitch corresponds with that of the bass voice. It is played while between the knees as was the old *viola da gamba*.

Viper, a family of poisonous snakes of which there is one example in Britain, the common viper or adder, only found in very dry localities.

Virginal, an English keyboard instrument of the harpsichord type greatly in vogue during Elizabethan times.

Virgo, the 6th constellation of the Zodiac, lying between Leo and Libra. It has seven prominent stars ranged in the form of the letter "Y." One of these stars is of the first magnitude, the other six being of the third magnitude.

Virtues, Cardinal. *See* **Cardinal Virtues.**

Visibility is defined by the distance at which the farthest of a series of objects, specially selected to show against the skyline or in good contrast with their background, can be distinguished. Visibility depends chiefly upon the concentration of water or dust particles suspended in the air. Instruments are available to measure the obscurity of the atmosphere more directly, including that at night. A large lapse rate of temperature and a strong wind are favourable to good visibility; a small lapse rate, calm or light wind favourable to bad visibility. Fog is when the visibility is less than 1,100 yds.; mist or haze when it is between 1,100 and 2,200 yds. (*See* **Pollution.**)

Viscount, a title of rank coming between that of Earl and Baron. The title originally stood for deputy-earl. The first English Viscount was Viscount Beaumont, created in 1440.

Vishnu. The second person of the Hindu Trinity, representing a principle of stability, to whom the creation of the world is sometimes attributed.

Vitamins, name of a group of organic substances found in relatively minute amounts in certain foodstuffs, essential for growth and the maintenance of normal bodily structure and function. The Hungarian biochemist Szent-Györgyi, who first isolated vitamin C or ascorbic acid, defined the vitamin as "a substance that makes you ill if you don't eat it!" *See* **P42** (2), **70.**

Vitriol, the old name of sulphuric acid, represented in its pure form by oil of vitriol. Sulphate of copper forms blue vitriol; sulphate of iron, green vitriol; and sulphate of zinc, white vitriol.

Vivandière, a female camp follower informally attached to French military regiments, and acting as vendor of liquors, fruits, etc.

Vivisection, the dissection for scientific purposes of living animals. The practice has been strongly opposed by humanitarians, and Acts have been passed for restricting vivisection to authorised persons.

Vizier, more correctly **Vizir,** literally "burden bearer" or helper, originally the chief minister of the Abbasid (second of the two great dynasties of the Mohammedan empire) Caliphs.

Volcanoes are mountains or mounds beneath which, in the depths of the earth, there is a continual fire that at intervals throws up flame, molten rock (lava), ashes, etc. The most active volcanoes of modern times have been those of Ætna, Vesuvius, and Stromboli, in Italy; Hekla in Iceland; and Mont Pelée in Martinique. The last-named was in violent eruption in 1902, when the chief town of St. Pierre was completely destroyed and many lives were lost.

Vole. There are three species of British vole: the Field-vole, the Bank-vole, and the Water-vole.

Volt, the electro-motive force unit, named after Volta, and defined in terms of the ohm and the ampere. *See* **N13** (1).

Voltmeter, instrument for measuring voltages.

Vraic, a name for seaweed in the Channel Islands, where it is extensively used as a manure.

Vulgate, a term used to designate the Latin version of the Scriptures sanctioned by the Council of Trent.

Vulture, a famous bird of prey of two distinctive groups; that of the Old World, which has the nostrils divided by a mass of bone, and the New World vulture, which has no such division. Vultures feed on carrion and are the great scavengers of tropical regions. The European species are the Griffon Vulture and the Egyptian Vulture, which, however, have seldom been known to visit England. Vultures have no feathers on the head and neck.

W

Wading Birds, an order of migratory, long-legged, long-billed birds, frequenting marshes and shallow waters. They include the plovers, avocets, stilts, oystercatchers, curlews, phalaropes, godwits, dunlins, sandpipers, redshanks, greenshanks, snipe, woodcocks, the pratincole of the Mediterranean, and the sun bittern of tropical America. Many species breed in Britain.

Wagtail, a familiar long-tailed small bird, of which four species are British, the Pied (or Water), Grey, Yellow, and White Wagtails, while the Blue-headed Wagtail also occasionally makes his appearance. Wagtails nest in ruts, and are active of habit.

Waits, the night minstrels who sing carols at Christmas in the open, a remnant of the old-time minstrels attached to Courts and feudal dwellings.

Wakes were originally parish festivals in celebration of the patron saint's day and the dedication of the church in the all-night vigil. Regulated by law in 1536, they gradually fell into desuetude, or became divorced from their former significance; also vigils for the dead before interment.

Waldenses, the name given to an heretical Christian sect which arose in the south of France in the second half of the 12th century in protest against the worldliness of the clergy. Their leader, Peter Waldo of Lyons, had a translation of the New Testament made into Provencal, and his teaching stirred men to lead more holy lives. They were persecuted but not destroyed and survive to this day in the valleys of Piedmont. Cromwell interceded and obtained for them increased toleration, and Milton used his pen on their behalf. Since 1848 they have had full freedom of worship, and membership has steadily increased. They have a theological school at Florence.

Walloons, name given to the French-speaking population of the southern provinces of Belgium, in contrast to the Flemings or Dutch-speaking population of the northern provinces. The Walloon areas contain the mining and heavy industries of the country; the Flemish regions are more agricultural. The number of Walloons is estimated at about 3 millions; the number of Flemings at about 5 millions.

Walpurgis Night, the night before May 1st, when witches and creatures of evil are supposed to have liberty to roam. Named after St. Walpurgis, an English nun, who went on a mission to Germany in the 8th century. There is a famous Walpurgis night scene in Goethe's *Faust*.

Walrus, a very large marine mammal, related to the seals but having in the upper jaw two large curved tusks, which average in length from 15 in. to 2 ft. It lives on fish, and inhabits the Arctic seas. An adult walrus can exceed 12 ft. in length and weigh over a ton.

Waltz, a popular round dance, danced in couples, introduced into England from the Continent in 1813.

Wapentake, the ancient name given in the northern counties to territorial divisions corresponding to the Hundreds of southern counties.

Wapinschaw, an ancient Scottish custom of assembling the people for the purpose of testing their capacity for bearing arms and their readiness to take the field.

Wapiti, a large North American deer, often, but erroneously, styled the elk; once abundant, but now surviving only under protection.

Warblers, a family of small, lively song-birds, closely related to the flycatchers and thrushes. Represented in Britain by 34 species, including the chiffchaff, one of the earliest spring visitors, willow-wren, wood-warbler, blackcap, garden-warbler, whitethroats, sedge- and grasshopper-warbler.

Wasps. Some wasps are social insects, others are solitary. The former build nests of papier maché, produced by chewing wood. The solitary wasps either build nests of mud or burrow in the ground. The sting of wasps, found only in females, is acid and needs to be neutralised with an alkaline substance, *e.g.*, the traditional "blue bag," baking soda, etc.

Water Boatman, a common aquatic bug which rows with its oar-shaped hind legs.

Water Deer, the Chinese musk deer, an animal of small size and aquatic habits, and hornless.

Waterloo, Battle of, was fought on June 18th, 1815. The Allies (British, German, and Dutch) under Wellington and Blücher defeated the French under Napoleon. This ended Napoleon's career.

Waterloo Bridge, crossing the Thames, was built by Rennie, and opened in 1817. It had nine arches, each of 120 ft. span, was built of granite, and had a length (including approaches) of 2,456 ft. The present bridge, completed in 1942, and formally opened Dec. 10, 1945, is a fine example of reinforced concrete construction. (Architect, Sir Giles Gilbert-Scott.)

Water-Spider, an interesting little animal which spins a sac of silk on a water-plant, which it uses as a sort of diving bell. Into this bell it introduces bubbles of air, one at a time; thus the spider is enabled to remain below the surface a considerable time.

Waterspout, whirling tornado-like cloud, occurring at sea. It begins as a cone of cloud tapering slowly downwards, the sea surface becoming disturbed; on reaching the centre of the cloud of spray the spout takes on the appearance of a column of water. A number of these vortices may form fairly close together at about the same time, their duration ranging up to 30 minutes.

Watling Street, the name of the old Roman road which ran from the Channel ports by way of London to Shropshire. (*See also* **Roman Roads.**)

Watt. A metric unit of electrical power equivalent to 1 joule (10 million ergs) of work per second. 746 watts equal 1 horse-power, and the kilowatt (1,000 watts) is about 1⅓ horse-power. *See* **N13** (1).

Wax, the name applied to certain plant substances or mixtures, and used for various purposes, such as the making of wax candles, bleaching, and making artificial flowers, anatomical models, etc., also in pharmacy for blending in the composition of plasters, ointment, etc. The best-known natural wax is beeswax, and there are others, such as spermaceti, obtained from the sperm whale, and Chinese wax, which is a cerotyl cerotate.

Waxbill, a small Oriental and African bird of the *Ploceidæ* family, with wax-like bill and beautifully variegated plumage. The Java sparrow, the South African Grosbeak, and the Blue-breasted waxbill are attractive, and often find their way into cages.

Wayz-Goose, the name generally given to a festive gathering of people employed in printing and other works, so called from the fact that in earlier times a goose was the principal dish of the feast.

Weasel. A carnivore mammal found in Britain, smallest member of the group including the Stoat, Polecat, and Pine-marten, about 8 in. long. Its fur is reddish on the upper side of the animal, white on the under side; it may all turn white in winter with the exception of the tail.

Weather, the factors determining to-morrow's weather are so manifold, variable, and complex that the task of the meteorologist is no easy one. There are still people who cling to the idea that weather is determined by the phase of the moon, but their predictions have no scientific backing, and can be dismissed. Changes in temperature, humidity, and speed of air masses can best be measured by instruments designed for the purpose. Weather forecasts are now a regular feature of the B.B.C. broadcast, the information being supplied by the meteorological staff of the Air Ministry. By taking into account the peculiar character of any part of the country, whether coastal, high- or low-lying, industrial, sheltered, precise forecasts for that particular region can be made up to twenty-four hours ahead and sometimes longer. The British Isles lie in the path of depressions moving north-eastward across the Atlantic. It is the frequency, intensity, and speed of these centres of low pressure, which give these islands such changeable weather. On the other hand, when an anticyclone builds up and embraces the British Isles, settled weather is fairly certain, the type of weather, whether dull or cloudless, warm or cold, depending mainly on the direction of the wind in the particular area concerned and the time of year. An American earth satellite, *Vanguard II*, was launched in Feb. 1959 to serve as the first "weather-eye" in space.

Weather Lore. Before instruments were invented to measure atmospheric conditions, man relied on his own observation of wind and sky, behaviour of birds and animals, and came to associate certain phenomena with types of

weather. Many popular weather rhymes have survived the centuries, and as long as forecasting is confined to the next 24 hours there is perhaps something to be said for them, particularly those dealing with the winds. What is very unlikely is that next year's summer can be predicted from this year's winter, or that one month's weather is related to that of another. The study of past records reveals too many exceptions for such predictions to be of much use in forecasting.

Weaver Bird, the popular name for a large group of finch-like birds belonging to the family *Ploceidæ*, found principally in Africa but also in Southern Asia and Australia and remarkable for their habit of building nests formed of blades of grass dexterously interwoven and suspended from the boughs of trees.

Weaving has been practised since before any times of which we have record. The Egyptians credit the invention to Isis, the Grecians to Minerva. The main principle of the weaving loom is the same to-day as it was thousands of years ago; a warp extends lengthwise through the loom, the threads being held in separate regular order by being passed through a reed or "slay," while the weft is crossed through alternating threads of the warp by means of a shuttle which holds the weft. Thus the fabric is built up. Weaving was done by hand up to the early part of the 19th century, when Cartwright's steam-power loom was introduced, and is now in universal use. The Jacquard loom for weaving figured designs dates from 1801.

Wedding Anniversaries are: first, Cotton; second, Paper; third, Leather; fourth, Fruit and Flower; fifth, Wooden; sixth, Sugar; seventh, Woollen; eighth, Salt; ninth, Copper; tenth, Tin; twelfth, Silk and Fine Linen; fifteenth, Crystal; twentieth, China; twenty-fifth, Silver; thirtieth, Pearl; fortieth, Ruby; fiftieth, Golden; sixtieth, Diamond.

Wednesday, the 4th day of the week, derived its name from Woden or Odin, the Norse god of war.

Weever, a species of sea-fishes which possess the power of inflicting stings by means of the dorsal fin and a spine on the gill cover.

Weevil. The term is applied to members of a group (called Rhynchophora) of beetles with a snout at the end of which is the mouth. Certain weevils are serious pests in granaries, while the cotton-boll weevil does enormous damage.

Weights and Measures. Crude standards of weights and measures existed in the ancient world, and the degree of standardisation increased as civilisation progressed. Weight was taken from the grain, which is still the smallest unit. Ancient measures were based on the natural proportions of the human body, the digit or breadth of the middle part of the first joint of the forefinger being taken as the lowest unit. Under Richard I. standards of weights and measures had to be provided for the whole kingdom by the sheriffs of London. Today the Standards Department of the Board of Trade is responsible for the national standards of weights and measures. *See* **N11–13**.

Werewolf, a man or woman, who according to mediaeval belief, could be turned by witchcraft or magic into a wolf, eat human flesh or drink human blood, and turn into himself again. This belief was widely held in Europe, and similar superstitions prevail among most primitive peoples, *e.g.*, the "leopard man" of certain African tribes. Lycanthropy (from Gr. = wolf-man) is a form of madness in which the patient imagines himself a beast.

Western Church, the catholic church (Rome), as distinct from the eastern or orthodox church (Constantinople); 1054 marks the date of the final separation of eastern and western Christendom.

Westminster Abbey stands on the site of an old church and Benedictine foundation of the 7th century. It was rebuilt under Edward the Confessor, and again under Henry III., and important additions were made by Edward II., Edward III., Richard II., Richard III., and Henry VII., the latter erecting the beautiful eastern chapel in the perpendicular style which bears his name. The western towers and front were rebuilt by Wren in the 18th century. It contains tombs of many sovereigns, of the Unknown Warrior, and many other illustrious men are commemorated by monuments.

Westminster Cathedral, seat of the Roman Catholic Archbishop of Westminster. It was designed by J. F. Bentley and built between 1895 and 1910. It is of red brick, in early Christian Byzantine style with a domed campanile, 283 ft. high, and a decorative interior.

Westminster Hall, adjoining the Houses of Parliament, was built as a Banqueting Hall by William Rufus, and many courtly festivals were held there in succeeding centuries. King John established the Law Courts there. It now forms a gigantic hallway, leading to the Houses of Parliament, but was used as a Banqueting Hall in Aug. 1905, when the then Prime Minister, Mr. Balfour, entertained the officers of the French Fleet there. Many famous people (Charles I., Sir Thomas More, Warren Hastings) have been tried there.

Whale, a completely aquatic mammal; the fore-limbs are modified to form fin-like paddles and there is virtually no external trace of the hind-limbs. There are two major groups of whales—the *Toothed Whales*, including the Sperm-whale (Cachalot), Dolphins, Killer-whales, and Porpoises; and the *Whalebone Whales*. In the latter a series of whalebone plates grow down from the roof of the mouth, and, being frayed at their edges into a hairy fringe, together constitute a filtering mechanism. The animal takes in sea water containing minute organisms on which it feeds; the mouth is then closed and the tongue raised when the water is forced out through the filter, on which is left the food. As the tongue is lowered, the whalebone plates straighten up, flicking the food on to the tongue, which transfers it to the gut. Most whale oil is obtained from the thick layer of fat under the skin (blubber), but in the Sperm-whale there is a large reserve of oil in the head. The oil is used for making candles, margarine, and soap. Ambergris used in perfumery comes from the intestine of whales. The number of whales that may be killed in a Season is limited by International Convention.

Whigs, a political name which came into use in the time of Charles II., and designated the progressive party down to the passing of the Reform Bill of 1832, when it was superseded by the term Liberal.

Whimbrel, a bird of the Curlew family, more common in Scotland than in England.

Whinchat, a small migratory bird, which is a breeding visitor to Britain (Apr. to Oct.); bright brown plumage, spotted with darker brown.

Whip, an M.P. responsible to his Party for the organisation of the voting M.P.s. He is responsible for ensuring the presence of (or whipping up) a sufficient number of members to carry the vote through.

Whip-poor-Will, the name of the American nightjar, which gets its name from its three-syllable call-note. It is a nocturnal bird, catching its insect food on the wing.

Whirlpool, a circling current of water often of great power, capable of drawing into its centre and submerging small vessels. The most famous whirlpool is the maelstrom on the Norwegian coast.

Whirlwind, a sudden circular rush of opposing winds, which often causes much damage.

Whisky, an ardent spirit distilled from malt or other grain, and containing a large percentage of alcohol. It has a greater consumption than any other spirit, and is of many kinds, Scotch and Irish whiskies being chiefly consumed in this country, and being of pot still or patent still production, or a blend of the two. Whisky is the most heavily taxed product; in 1661 a duty of 4*d.* a gallon was imposed, today the duty is £10 10*s.* 10*d.* on a proof gallon. American whiskies are mostly distilled from corn or rye.

Whitebait, the name given in Great Britain to young fish, mainly herring and sprat, sold and eaten when about 2 in. long. In New Zealand the whitebait is the juvenile of a native fish called "inanga." It is about 2 in. long, wholly transparent, and belongs to the family of fresh-water fish *Galaxia*.

White Elephant, a term in common use to designate

a gift that causes the recipient more trouble or cost than it is worth; derived from an old-time custom of the Kings of Siam who presented a white elephant to a courtier whom it was desired to ruin.

Whitehall Palace, erected within sight of Westminster Abbey in the 13th century, was the residence of the Archbishops of York until Henry VIII. took possession of it in 1530. Thenceforward to 1697, when it was burned down, it continued to be the favourite town residence of royalty, and to the Stuarts especially it was a great centre of court festivities. In those days, with its grounds, it extended from the Strand to the river. The only portion of Whitehall now standing is the Banqueting Hall built by Inigo Jones, on a scaffold projected from the front of which Charles I. was beheaded. A block of new government buildings has recently been built on part of the site of the old Palace.

White House, the official residence at Washington of the President of the United States.

Whitsuntide, the festival celebrating the descent of the Holy Ghost and occurring seven weeks after Easter.

Whole-tone Scale, a musical scale all of whose intervals are tones. This scale has been popularised by Debussy.

Whydah Bird, the widow-bird of Equatorial Africa. The Paradise Whydah is remarkable for the long tail and handsome black-and-scarlet plumage of the male during mating season.

Widow Bird, certain species of African weaver birds with predominantly black plumage. In the breeding season the male birds are strikingly beautiful, with scarlet and buff markings and long tail feathers.

Wigeon, a surface-feeding duck of northern Europe, known in Britain more as a winter visitor than a nesting bird. It feeds in flocks in the muddy estuaries and has a characteristic "whee-oo" call.

Willow, a water-side-loving tree of the genus *Salix*, to which the osiers belong. The best cricket-bat blades are made from a white willow, *S. alba* var. *cœrulea*, a fine tree with bluish-green leaves, mostly found in Essex. Willow is also used for polo balls. Weeping willow, *S. babylonica*, is native to China and is the willow seen on Old China willow-pattern plates. It was introduced into England at the end of the 17th century.

Wimple, an antique outdoor covering for the neck, chin, and sides of the face, of silk or linen, worn by women in Anglo-Saxon and Norman days; and still retained as a Conventual dress for nuns in some places. It was bound on the forehead by a golden and jewelled fillet.

Winchester College, a famous school for boys, founded by William of Wykeham in 1387.

Wind, air set in motion by special atmospheric conditions, is of various degrees, from a slight rustling breeze to a hurricane. Winds are *constant*, as in trade winds or anti-trade winds; *periodic*, as in monsoons and other wind-visitations occurring according to influences of season; *cyclonic* and *anti-cyclonic*, when their motion is spiral; *whirlwinds*, *hurricanes*, and *tornados*, when high temperature and great density induce extreme agitation. Ordinarily, a wind is named from the point of the compass from which it blows, or it may be expressed in degrees from true north. The *sirocco*, the *mistral*, and the *simoom* are local forms of winds of great velocity. A *blizzard* is a biting blast of icy temperature. *See also* **N10**.

Windmills were in use in the East in ancient times, but were not much seen in Europe before the 13th century. Wind sawmills were invented by a Dutchman in the 17th century, and one was erected near the Strand in London in 1633. Great improvements have been made in these mills in recent years, especially in the United States, where, by the application of the wind-shaft principle, much space is saved and the mills can be used for pumping, grinding, and other purposes.

Windows, originally apertures for the admission of the wind into dwellings, began to be made of glass and used only for the admission of light in very early times. There is evidence of glass windows having been used at Pompeii, but they did not become common in England before the 12th century. A window tax was imposed in 1697 and again at later dates for special revenue purposes. It was repealed in 1851 and a tax on inhabited houses substituted.

Windsor Castle, the famous British royal residence on the banks of the Thames, as it now stands, was mainly built by Henry III., though a royal residence had existed there from the time of the Conqueror. Additions were made by Henry VIII., Elizabeth, and Charles II. Windsor Park and Forest comprise over 13,000 acres.

Wine, the fermented juice of the freshly-gathered grape. There are innumerable varieties, each obtaining its distinctive character from the species of wine producing the grape, the locality of the vineyard, method of cultivation, etc. Wines are of three main kinds: *sparkling*, as in champagne, due to their having been bottled before fermentation is complete; *beverage*, when the must has been fermented out before bottling. Such wines include the famous red and white wines of Burgundy, Bordeaux and the Rhone valley and the white wines of the Rhine Moselle and Loire valleys. Wines are *fortified* by the addition of brandy before fermentation is complete, examples being Port and Sherry. The principal wine-producing areas of the world are: France, Italy, Algeria, Spain, Portugal, Rumania, Argentine, Yugoslavia, U.S.S.R., Greece, Germany, Hungary. *See* **S39–42**.

Wireworm, the larva of the click beetles. Wireworms are a serious pest of grass, cereal crops, potatoes, etc.

Witchcraft, the practice of sorcery or magic based on superstitition and flourishing where people are ignorant of the causes of natural phenomena. Belief in witches takes many different forms, varying with time and place. In Europe witchcraft flourished from the 14th to the 18th centuries and gradually decayed with the spread of scientific knowledge. Johann Weyer (1515–88), a German physician, showed that the majority of "witches" were mentally ill but his views were denounced by the Catholic Church. Heresy was confused with sorcery and many thousands were persecuted and suffered death under the Inquisition, including those interested in scientific experiment. In England and Scotland all Witchcraft Acts were repealed in 1736, in Ireland not until 1821. *See also* **Sorcerers** and **Magic**.

Witan *or* **Witenagemot**, the name given to the Great Council of the Anglo-Saxons, "the Council of the Wise Men," and composed of the leading nobility.

Woad, a plant (*I satis tinctoria*) that in olden days was largely used in England for the blue dye obtained from it. It is a biennial plant belonging to the same natural order of flowering plants as the wallflower and is still cultivated in some parts.

Wolves, well-known carnivorous animals still found in many parts of Europe, but not existing in Britain since the middle of the 17th century.

Woodcock, a wading bird, greatly valued for its flesh. It is a member of the snipe family, and breeds in Britain. The parent bird is able to carry its young between its thigh and body when flying to and from the feeding spots. It is one of the birds protected by the Game Laws.

Wood-Louse, any terrestrial isopod crustacean of the *Oniscidæ* family. They have segmented bodies and many legs, and feed mostly on decaying matter, animal and vegetable. The best known is the Pill Wood-louse (*Armadillidium*), which rolls itself into a ball when touched.

Woodpecker, a familiar tree-climbing bird of conspicuous plumage, of which three species are found in Britain, the green woodpecker or yaffle (because of its harsh cry), the great and lesser spotted woodpeckers. It builds in the hollows of trees and feeds on insects which it obtains from the trunk of trees by digging into the wood, for which purpose it has a strong chisel-shaped beak and a tongue which it can shoot out to catch the insects. The metallic drumming sound made by the birds in spring is thought to be caused by their beaks hammering away at some hard resounding substance.

Wood's Metal, an alloy with a very low melting point (65° C., which is under 150° F.) so that a

spoon made of it will melt when used to stir a cup of tea. Contains bismuth 4 parts, lead 2 parts, tin 1 part, cadmium 1 part.

Wool has been largely grown and used in the manufacture of cloth in England since before the Roman invasion. It is grown on the backs of sheep, and is of various kinds, according to the breed of sheep from which it is derived. Wool differs from hair in that it has a wavy, serrated fibre, its curl being a notable characteristic, whereas hair has a smooth surface comparatively free from serratures. Long wools are mostly used for the manufacture of worsted goods, and short wools for woollen cloths, though the improvements in machinery in recent years have enabled manufacturers to utilise short wools to a great extent for dress fabrics as well as for woollens. The finest wools are obtained from the fleece of the Spanish merino sheep. Australia, New Zealand, and the Argentine are the greatest wool-producing countries.

Woolsack, the name given to the seat occupied by the Lord Chancellor in the House of Lords. It is a large square bag of wool, without back or arms, covered with red cloth. At the time when it was first used, in the reign of Edward III., wool was the great staple commodity of the country and, it is said, chosen for the seat of judges as a constant reminder of the main source of the national wealth. The Lord Chancellor is said to be "appointed to the woolsack."

Work is the transference or conversion of energy. Movement against resistance, the giving of acceleration to a body, or the change from one energy state into another, all require the expenditure of work. It is measured by the product of the force and the displacement of its point of application in the line of action in units of ft.-lb., erg, or joule. The ft.-lb. is the work done in moving 1 lb. through 1 ft. The erg, the unit in the c.g.s. system, is the work done by a force of 1 dyne acting through a distance of 1 cm. and the joule is the work done in 1 second by a current of 1 ampere flowing through a resistance of 1 ohm, equal to 10^7 ergs, 1 watt-second or 0·737 ft.-lb. In a rotating body work done is measured by the product of the moment and the angular displacement.

Worsted, a fabric made from long wools or wools mixed with cotton or other fibrous material. It was first manufactured at, and derived its name from, Worstead in Norfolk, in the 14th century. Norwich was, until the latter part of the 18th century, the headquarters of this industry, but now for more than 100 years the worsted manufacturing centre has been Bradford.

Wren, a class of small passerine birds possessing upturned tails and most abundant in South America. The British species is an interesting singing bird with a surprisingly loud note for its size.

Wryneck, a tree-creeping bird related to the woodpecker, of grey-brown plumage. It is a summer visitor to Britain, and gains its name from the snake-like way it curves its neck.

X

Xenon a rare element, occurring in minute quantities in the atmosphere, grouped with the inert gases helium, neon, argon, krypton, and radon; discovered by Sir William Ramsay and M. W. Travers in 1898.

Xoanon, the name given to sculptured wooden images of the time of the ancient Greeks.

X-Rays were discovered in 1895 by Professor Röntgen, of Wurzburg, while experimenting with a Crookes vacuum tube, when the fact was accidentally revealed that a photographic plate, contained in a dark box and exposed to its rays, was affected. To the X-rays the box was transparent. X-ray photographs are now commonly taken to obtain information about objects enclosed within solid bodies; they enable bullets and any solid bodies of metal, as well as bones, etc., in the body to be perfectly located and investigated. The discovery has proved of great advantage in surgical operations. *See* **F11** (1), **60** (2).

Xylem, the woody tissue of higher plants. The function of the xylem is to conduct water and mineral salts upwards, and to provide mechanical support.

Xylograph, the name given to an engraving on wood or an impression thereof.

Xylophone, a musical instrument consisting of a series of tuned wooden bars of varying dimensions. It is played by striking the bars with wooden hammers held in the hands.

Y

Yacht, a light vessel now much used for pleasure trips and racing. The first yachting club was the Cork Harbour Club, started about 1720; and in 1812 the Royal Yacht Squadron was founded at Cowes. The Royal Thames Yacht Club dates from 1823. The most famous international yachting trophy is *The America's Cup*, which was won by America in every contest between 1851 and 1937, and again in 1958. The most famous English challengers were Sir Thomas Lipton and T. O. M. Sopwith.

Yak, a curious, long-haired ox, found in Tibet, and there employed as a beast of burden.

Yale University was established in 1701, and is one of the leading universities of the United States. It received its name from Elihu Yale, who endowed it largely in 1716.

Yam, the root of the 150 species of *Dioscorea*, which grows in Asia, America, Africa, and Australia; used as a substitute for the potato, roasted or boiled. It also furnishes a flour for bread or pudding making.

Yard, a standard measure of 36 in., the word being derived from the Saxon gyrd, or rod. The yard was anciently regarded as the circumference of the body, but Henry I. decreed it should be the length of his arm.

Yarn is the textile thread or fibre spun into the form of weft or warp ready to be woven into fabrics.

Yawl, the jolly boat of a ship; also the name given to any small yacht of the cutter class.

Year. (*See* **Calendar.**)

Yearling, a young horse or other animal in the second year of its age.

Yeast, a unicellular fungus which sets up fermentation. In brewing and wine-making the yeasts are important. The baker uses yeast to make bread rise; yeast is incorporated in the dough and ferments some of the starch present, yielding carbon dioxide gas which expands and aerates the bread in the baking process.

Yellowhammer, a common British bird of the bunting family, of lemon-yellow and brown plumage. Nests on or near the ground.

Yeomen of the Guard are a body of Foot Guards established in the reign of Henry VII. for the protection of the Royal Person. Yeomen are now about 100 in number, and their duties consist in being present on ceremonial State occasions, the yearly distribution of Maundy Money, and the searching of the vaults of the Houses of Parliament on Guy Fawkes' day. "Beefeater" is the nickname of both Yeomen of the Guard and Yeomen Warders of the Tower, and they both wear the style of dress of the Tudor period, but with one distinction, the Yeomen of the Guard wear a cross belt, the Warders do not.

Yew, an evergreen tree, the wood of which was in former days in very great demand for bow-making.

Yoga, one of the leading systems of Hindu philosophy which proclaims the emancipation of the soul through union with the universal spirit.

Yogi, a Hindu religious ascetic who practises Yoga.

York Minster, one of the oldest and finest of English cathedrals, is 524 ft. long, its nave is 240 ft broad, and the central tower is 16 ft. high The present edifice, in parts, dates back to the 12th century, but a church stood on the site in the 7th century. In 1829 it was set on fire by a lunatic named Jonathan Martin, and the destruction that then took place cost £60,000 to restore.

Ytterbium, a chemical element discovered by Urbain in 1907. It is one of the group of rare earth metals.

Yttrium, a chemical element discovered by Mosander in 1842. It is found in a few rare minerals such as gadolinite, xenotine, fergusonite, and euxenite. One of the group of rare-earth metals.

Z

Zaibatsu, great and powerful family trusts, including the Mitsui, Mitsubishi, Sumitomo, and Yasuda, who held a position of unparalleled influence in Japan before the second world war, for in their hands was concentrated almost the entire economy of the Japanese nation. It was a major war aim of the Allies to break these trusts, but their economic power has been largely restored.

Zamboni Pile, a dry galvanic battery, which can provide small amounts of high-voltage current over a very long time. At Oxford a couple of Zamboni Piles have kept a bell ringing for over a hundred years. These Piles in the second world war were perfected and produced in quantity, being the most convenient source of current for infra-red signalling devices.

Zebra, an African quadruped of whitish-grey colour, with regular black stripings, perhaps the most beautiful member of the Equine family. Rather larger than an ass and smaller than the horse, it has a tufted tail, is of light build, wild, and fleet of foot; there are several species, and the Quagga and Burchell's Zebra (ground colouring yellow), as well as the True Zebra, belong to the group.

Zebu, a species of oxen having a large hump on the shoulder and short horns. In India and some parts of Africa these animals are domesticated and used as beasts of burden. They are of a light grey colour and very docile. Their flesh makes good food-meat; the Hindus, however, do not slay them but regard them with much veneration.

Zend-Avesta, the name given to ancient sacred books of the Zoroastrians or Parsees. They originally numbered twenty-one, but only three survive.

Zenith, the highest point in the heavens above an observer's head, the opposite pole to the Nadir.

Zeriba, *or* **Zareeba**, a military enclosure of prickly brushwood, used by the British in Egypt in 1884.

Zero, the cypher signifying nothing. The West is indebted to the Arabs for it, who probably got it from the Hindus and passed it to European mathematicians towards the end of the Middle Ages. The Greeks had no such symbol, which hindered the development of their mathematics. The use of zero led to the invention of decimal fractions and to the later developments in astronomy, physics and chemistry. Absolute zero on the temperature scale is the lowest temperature theoretically possible (when no heat whatever is present) and equal to $-273{\cdot}15°$ C.

Zeta, the name given in former times to the closet or room, above a church porch, where the sexton lived and guarded the documents of the church. Zeta is also the name of the machine at Harwell (zero energy thermometer assembly) designed to solve some of the problems of thermonuclear reactions. *See* **F51** (2).

Zinc, a familiar metal, known to the ancients, and used by them in the making of brass. It occurs as the sulphide, carbonate, etc. The ores of zinc are crushed, roasted, and reduced with coal. In combination with copper it constitutes the familiar alloy called brass, and zinc itself is much used for roofing and other protective purposes. Zinc ores are mined in Canada, the U.S.A., Mexico, Poland, Australia, Russia, Italy, Spain, and many other parts of the world. Zinc smelting is carried on in most industrial countries, including Great Britain.

Zion, Protocols of. These are a series of lectures purported to have been given by an "elder of Zion" revealing a Jewish plot for international domination. They have been extensively published in Europe since 1900, but conclusive evidence was produced in 1921 to show they were a forgery.

Zionism, the name of the movement, whose object has been to re-establish a Jewish National Home in Palestine. The movement was founded in 1897 by Theodor Herzl, a Viennese journalist and playwright. The Balfour Declaration promising facilities for the realisation of its objects was issued by the British Government in 1917. Thanks to the activity of the Zionist Organisation, largely under the leadership of Chaim Weizmann, the Jewish population in Palestine has considerably increased and many agricultural settlements have been established in various parts of the country. The Hebrew University was inaugurated in 1925, and great developments have taken place in all branches of industrial and commercial activity as well as in agriculture. Until 1948, when Britain handed the mandate to U.N.O., the country was administered by a High Commissioner appointed by the British Government. Since then the Jews have proclaimed a State of Israel and the Zionists' aims have been realised.

Zirconium was discovered by Klaproth in the sand of the rivers of Ceylon in 1789. The crystalline metal is white, soft, and ductile; in its amorphous condition it is a blue-black powder Zirconium is used in atomic reactors.

Zither, an ancient musical instrument consisting of strings stretched on a frame which is held in the left hand. The right hand plucks the strings with a plectrum.

Zodiac, an imaginary zone or belt of the sky enclosing the circuit over which the principal planets travel. It is divided into 12 equal spaces of 30 degrees each, comprising respectively the 12 signs of the zodiac—Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Pisces. The idea of the zodiac originated with the Babylonians about 2000 B.C. and passed by way of the Greeks to the Western world.

Zodiacal Light, a faint cone of light occasionally seen stretching along the zodiac from the western horizon after evening twilight or the eastern horizon before morning twilight. It is believed to be due to the scattering of the sun's light by some rare gas which extends outwards from the sun and rotates round it.

Zollverein, any of the customs unions successively formed under the leadership of Prussia among certain German states for maintaining uniform duties and tariffs against foreign countries and free trade among themselves. The administration was finally merged in the German Empire of 1871.

Zonda, a warm moist wind in Argentina of great velocity blowing from the north or northwest, and, like the Sirocco in Southern Europe, causes much discomfort. It happens when a depression is moving across the pampas, bringing with it a mass of air from the humid tropics. It is followed by a refreshing wind from the south-east.

Zone, an imaginary geographical belt encircling the earth. There are five zones—the Torrid Zone, from tropic to tropic; two Temperate Zones, from the tropics to the Polar Circles; and two Frigid Zones, from the Polar Circles to the North and South Poles respectively.

Zoological Gardens of London were opened in 1828, and belong to the Zoological Society of London. They contain one of the largest and most varied collections of living animals in the world. The Society maintains an open-air zoo at Whipsnade, on the edge of Dunstable Downs; this was opened in 1931.

Zoology, the science of animal biology, treating of the structure, classification, and distribution of the various members of the animal kingdom.

Zoophyte, the name applied to invertebrate animals which have a plant-like appearance or mode of growth, *e.g.*, sea anemones, corals, sponges. The term Zoophyta was used in old classifications to include all such animals, but is now obsolete.

Zouaves, a body of French soldiers first organised in Algeria, and then consisting exclusively of Berber natives. As now constituted, the Zouave regiments are almost exclusively French.

Zulus, a native African people occupying Zululand, which later became part of Natal, Union of S. Africa. They are a brave race, and in a war with Great Britain in 1879 inflicted severe defeats upon our troops. The Zulu king, Cetewayo, was finally defeated and taken prisoner, and his country annexed.

NOBEL PRIZE WINNERS (1901–1959)

These prizes, founded by the will of Dr. Alfred B. Nobel (1833–96), are five, and are awarded each year for the most important discovery or development in (1) physics, (2) chemistry, (3) physiology and medicine, (4) the most distinguished literary work, (5) the best effort towards the promotion of peace.

Year.	Physics.	Chemistry.	Physiology and Medicine.	Literature.	Peace.
1901	W. C. Roentgen (G).	J. H. van't Hoff (D).	E. v. Behring (G).	R. F. A. Sully Prudhomme (F).	H. Dunant (Sw), F. Passy (F).
1902	H. A. Lorentz (D), P. Zeeman (D).	E. Fischer (G).	R. Ross (B).	T. Mommsen (G).	E. Ducommun (Sw), A. Gobat (Sw).
1903	H. Becquerel (F), P. Curie (F), Marie Curie (F).	S. Arrhenius (S).	N. R. Finsen (Da).	B. Björnson (N).	Sir W. R. Cremer (B).
1904	Lord J. W. S. Rayleigh (B).	W. Ramsay (B).	I. P. Pavlov (R).	F. Mistral (F), J. Echegaray (Sp).	Institut de Droit International.
1905	P. Lenard (G).	A. v. Bayer (G).	R. Koch (G).	H. Sienkiewicz (P).	Bertha von Suttner (Au).
1906	J. J. Thomson (B).	H. Moissan (F).	C. Golgi (I), S. R. y Cajal (Sp).	G. Carducci (I).	T. Roosevelt (A).
1907	A. A. Michelson (A).	E. Buchner (G).	C. L. A. Laveran (F).	Rudyard Kipling (B).	E. T. Moneta (I), L. Renault (F).
1908	G. Lippmann (F).	E. Rutherford (B).	P. Ehrlich (G), E. Metchnikoff (R).	R. Eucken (G).	K. P. Arnoldson (S), F. Bajer (Da).
1909	F. Braun (G), G. Marconi (I).	W. Ostwald (G).	T. Kocher (Sw).	S. Lagerlöf (S).	A. M. F. Beernaert (Be), Baron d'Estournelles de Constant de Rebecque (F).
1910	J. D. van der Waals (D).	O. Wallach (G).	A. Kossel (G).	P. Heyse (G).	The Bureau International Permanent de la Paix, Berne.
1911	W. Wien (G).	Marie Curie (F).	A. Gullstrand (S).	M. Maeterlinck (Be).	T. M. C. Asser (D), A. H. Fried (Au).
1912	G. Dalén (S).	V. Grignard (F), P. Sabatier (F).	A. Carrel (A).	G. Hauptmann (G).	E. Root (A).
1913	H. Kamerlingh Onnes (D).	A. Werner (Sw).	C. Richet (F).	R. Tagore (In).	H. la Fontaine (Be).
1914	M. v. Laue (G).	T. W. Richards (A).	R. Bárány (Au).	—	—
1915	W. H. Bragg (B), W. L. Bragg (B).	R. Willstaetter (G.).	—	R. Roland (F).	—
1916	—	—	—	V. von Heidenstam (S).	—
1917	C. G. Barkla (B).	—	—	K. Gjellerup (Da), H. Pontoppidan (Da).	Comité International de la Croix-Rouge, Geneva.
1918	M. Planck (G).	F. Haber (G).	—	—	—
1919	J. Stark (G).	—	J. Bordet (Be).	C. Spitteler (Sw).	W. Wilson (A).
1920	C. E. Guillaume (F).	W. Nernst (G).	A. Krogh (Da).	K. Hamsun (N).	L. Bourgeois (F).
1921	A. Einstein (G).	F. Soddy (B).	—	A. France (F).	K. H. Branting (S), C. L. Lange (N).
1922	N. Bohr (Da).	F. W. Aston (B).	A. Hill (B), O. Meyerhof (G).	J. Benavente (Sp).	F. Nansen (N).
1923	R. A. Millikan (A).	F. Pregl (Au).	F. G. Banting (C), J. R. Macleod (C).	W. B. Yeats (Ir).	—
1924	M. Siegbahn (S).	—	W. E. Einthoven (D).	W. Reymont (P).	—
1925	J. Franck (G), G. Hertz (G).	R. Zsigmondy (G).	—	G. B. Shaw (B).	Sir A. Chamberlain (B), C. G. Dawes (A).
1926	J. Perrin (F).	T. Svedberg (S).	J. Fibiger (Da).	G. Deledda (I).	A. Briand (F), G. Stresemann (G).
1927	A. H. Compton (A), C. T. R. Wilson (B).	H. Wieland (G).	J. Wagner-Jauregg (Au).	H. Bergson (F).	F. Buisson (F), L. Quidde (G).
1928	O. W. Richardson (B).	A. Windaus (G).	C. Nicolle (F).	S. Undset (N).	—
1929	L. de Broglie (F).	H. v. Euler-Chelpin (S), A. Harden (B).	C. Eijkman (D), F. G. Hopkins (B).	T. Mann (G).	F. B. Kellogg (A).
1930	C. V. Raman (In).	H. Fischer (G).	K. Landsteiner (Au).	S. Lewis (A).	L. O. J. Söderblom (S).
1931	—	F. Bergius (G), K. Bosch (G).	O. Warburg (G).	E. A. Karlfeldt (S).	Jane Addams (A), N. M. Butler (A).
1932	W. Heisenberg (G).	I. Langmuir (A).	C. S. Sherrington (B), E. D. Adrian (B).	J. Galsworthy (B).	—
1933	P. A. M. Dirac (B), E. Schroedinger (Au).	—	T. H. Morgan (A).	Bunin (R).	Sir Norman Angell (B).

NOBEL PRIZE WINNERS (1901–1959), *continued*

Year.	Physics.	Chemistry.	Physiology and Medicine.	Literature.	Peace.
1934	—	H. C. Urey (A).	G. Minot (A), W. Murphy (A), G. Whipple (A).	L. Pirandello (I).	Arthur Henderson (B).
1935	J. Chadwick (B).	F. Joliot (F), I. Joliot-Curie (F).	H. Spemann (G).	—	C. von Ossietzky (G).
1936	V. F. Hess (Au), C. D. Anderson (A).	P. Debye (D).	Sir H. H. Dale (B), O. Loewi (G).	E. O'Neill (A).	C. de S. Lamas (Ar).
1937	C. J. Davisson (A), G. P. Thomson (B).	W. N. Haworth (B), P. Karrer (Sw).	A. v. Szent-Dyörgyi (H).	R. Martin du Gard (F).	Viscount Cecil of Chelwood (B).
1938	E. Fermi (I).	R. Kuhn (G).	C. Heymans (Be).	Pearl S. Buck (A).	Office International Nansen pour les Refugies.
1939	E. O. Lawrence (A).	A. F. Butenandt (G), L. Ruzicka (Sw).	G. Domagk (G)	F. E. Sillanpää (Fi).	—
1940–42	—	—	—	—	—
1943	O. Stern (A).	G. Hevsey (H).	H. Dam (Da), E. A. Doisy (A).	—	—
1944	I. I. Rabi (A).	O. Hahn (G).	E. J. Erlanger (A), H. S. Gasser (A).	J. V. Jensen (Da).	Comité International de la Croix-Rouge, Geneva.
1945	W. Pauli (Au).	A. Virtanen (Fi).	Sir A. Fleming (B), Sir H. Florey (B), E. B. Chain (B).	G. Mistral (Ch).	Cordell Hull (A).
1946	P. W. Bridgman (A).	J. B. Sumner (A), J. H. Northrop (A), W. M. Stanley (A).	H. J. Muller (A).	H. Hesse (Sw).	Emily G. Balch (A), J. R. Mott (A).
1947	Sir Edward Appleton (B).	Sir Robert Robinson (B).	B. A. Houssay (Ar), C. F. Cori (A), G. T. Cori (A).	André Gide (F).	American and British Quaker Organisations.
1948	P. M. S. Blackett (B).	A. Tiselius (S).	P. Müller (Sw).	T. S. Eliot (B).	—
1949	H. Yukawa (J).	W. F. Giauque (A).	W. R. Hess (Sw), A. E. Moniz (Po).	W. Faulkner (A).	Lord Boyd-Orr (B).
1950	Cecil F. Powell (B).	Otto Diels (G), K. Alder (G).	E. C. Kendall (A), P. S. Hench (A), R. Reichstein (Sw).	Lord Russell (B).	Ralph Bunche (A).
1951	Sir J. Cockcroft (B), E. T. S. Walton (Ir).	E. M. MacMillan (A), G. T. Seaborg (A).	M. Theiler (A).	P. Lagerkvist (S).	Léon Jouhaux (F).
1952	E. Purcell (A), F. Bloch (A).	A. J. P. Martin (B), R. L. M. Synge (B).	S. Waksman (A).	F. Mauriac (F).	A. Schweitzer (F).
1953	F. Zernike (D).	H. Staudinger (G).	H. A. Krebs (B), F. A. Lipmann (A).	Sir W. S. Churchill (B).	Gen. G. Marshall (A).
1954	M. Born (B), W. Bothe (G).	L. Pauling (A).	J. F. Enders (A), F. C. Robins (A), T. H. Weller (A).	E. Hemingway (A).	U.N. High Commission for Refugees.
1955	W. E. Lamb (A), P. Kusch (A).	Vicent du Vigneaud (A).	Hugo Theorell (S).	Halldor Laxness (Ic).	—
1956	W. Shockley (A), J. Bardeen (A), W. H. Brattain (A).	Sir Cyril Hinshelwood (B), N. Semenov (R).	A. F. Cournaud (A), D. W. Richards (A), W. Forssmann (G).	J. Ramón Jiménez (Sp).	—
1957	T. Dao-lee (Chi), C. Ning-yang (Chi).	Sir Alexander Todd (B).	D. Bovet (I).	A. Camus (F).	L. B. Pearson (C).
1958	P. A. Čerenkov (R), I. M. Frank (R), I. Tamm (R).	F. Sanger (B).	G. W. Beadle (A), E. Tatum (A), J. Lederberg (A).	B. Pasternak (R).	Father George Pire (Be).
1959	E. Segré (A), O. Chamberlain (A).	J. Heyrovsky (Cz).	S. Ochoa (A), A. Kornberg (A).	S. Quasimodo (I).	P. J. Noel-Baker (B).

A = American, Ar = Argentine, Au = Austrian, B = British, Be = Belgian, C = Canadian, Ch = Chilean, Chi = Chinese, Cz = Czech, D = Dutch, Da = Danish, F = French, Fi = Finnish, G = German, H = Hungarian, I = Italian, Ic = Icelandic, In = Indian, Ir = Irish, J = Japanese, N = Norwegian, P = Polish, Po = Portuguese, R = Russian, S = Swedish, Sp = Spanish, Sw = Swiss

Literary Companion

TABLE OF CONTENTS

English Verse

This section of the *Cyclopaedia* is concerned with English verse since the time of Chaucer, with its different metres and rhymes. The poet's subtle verse patterns of metre and rhyme are indeed one of his most potent means of expression, and by keeping an attentive ear to them we are helped to catch his meaning.

A glance at any good anthology of English poems written during the last five or six centuries will show what a rich variety of traditional verse patterns the contemporary poet now has at his disposal, whatever may be his mood or theme. Our poet laureate, Masefield, has made great use of these time-honoured forms. For his leisurely "Dauber," he employs the stately "rhyme-royal" stanza that was no longer new even to Chaucer. His sonnets are of Shakespearean design, and for his brisk "Reynard the Fox" he uses the octosyllabic couplet in which the Puritan poet, Marvell, once hymned the newly discovered "remote Bermudas."

Many poets, however, find the traditional forms are not sufficiently flexible for modern needs, and they may so drastically modify them as to make them, at first sight, unrecognisable.

One of the most indefatigable experimenters has been Dame Edith Sitwell. In the notes to the Penguin selection of her poetry she says:

> "At the time I began to write, a change in the direction, imagery, and rhythms in poetry had become necessary, owing to the rhythmical flaccidity, the verbal deadness, the dead and expected patterns, of some of the poetry immediately preceding us.
>
> "Rhythm is one of the principal translators between dream and reality. Rhythm might be described as, to the world of sound, what light is to the world of sight. It shapes and gives new meaning."

Placing so high a value on rhythm, Edith Sitwell sets herself, in her early "Façade," to tireless experiment in the effect on rhythm or metre of all kinds of subtle devices in the use of sound, until, as she says, her experiences led to the poem "Gold Coast Customs." This poem, written in 1929, is "about the state that led up to the second World War," and is prophetic in its vision of

"That sick thick smoke from London burning."

When we first read "Gold Coast Customs" we are shocked and and stunned by this portrayal of the ruthless and heartless savagery of our so-called civilisation. The shock is driven home by the metre, a savage staccato of stabbing lines, that echoes the fevered heart-beat of those indifferent to poverty and suffering, of the "rich man Judas, brother Cain." It also echoes "the beating of the drums that heralded the Customs, as they were called, in Ashantee, a hundred years ago, when, at the death of any rich or important person, slaves and poor persons were killed so that the bones of the dead might be washed by human blood."

Only when we recover from our shock and look carefully at the verse, do we realise that this blood-curdling metre, apparently entirely new, is written according to age-long principles, and uses for the most part an irregular tattoo of the iambs and anapæsts that are the ground beat of most of our finest verse.

As Day Lewis has said in the Preface to the Penguin selection of his poems:

> "We must never think of 'modern poetry' as something in a vacuum, or something that started in 1900 or 1917 or 1930. Every good poem has grown out of the compost of all the poetry ever written."

Of his own poems Day Lewis goes on to say, "Contrary to received opinion about modern verse, nearly all my poems 'rhyme and scan,'" and the same may be said of most of our highly original contemporary poetry, such as that of W. H. Auden or Dylan Thomas.

The poet's intensely individual music is played on the age-old instrument of metre and rhyme, and the better we understand the instrument, the keener will be our enjoyment of the poet's skill and genius.

Even verse that cannot be called poetry—verse that is mechanical, uninspired, lacking that intensity of insight and expression that we recognise as poetic—even this mediocre verse can teach us something of the poet's instrument. A homely nursery rhyme like "Humpty Dumpty" can help us to appreciate the metre of Ariel's unearthly song, "Where the bee sucks."

It is for this reason that the following guide to versification throws its net wide, gathering together for our consideration patterns as diverse as those of the mediæval ballad and the modern Frenchified triolet, of the flippant clerihew, and the grave blank verse of Wordsworth's "Prelude."

Reference

The following account of our verse is illustrated by quotations and by constant reference to the numbered poems in the new edition of "The Oxford Book of English Verse," 1939.

Thus "OBEV 16" means "Oxford Book of English Verse," New Edition, Poem No. 16.

I. INTRODUCTION. STRESS, METRE, AND RHYME.

If we listen carefully to spoken English, we shall observe that there is a natural tendency to stress some syllables more than others. In the following sentence, for example, the greater stress normally falls on the syllables whose vowels are marked with an acute accent, which is the usual way of indicating stress.

"The expréss léft Mánchester at séven."

It is obvious that in this sentence the stress falls in a quite haphazard way, and it is for this reason that we recognise the sentence as prose, for the essential difference between English prose and verse is that in prose the stress falls at random, while in verse the stressed syllables occur according to some regular pattern.

If we mark the stressed syllables in the following line from Wordsworth,

"And lóud hallóos and scréams and échoes lóud,"

it is immediately clear that the stress occurs regularly. The line is in fact, composed of a simple stress pattern of an unstressed syllable followed by a stressed (*e.g.*, and lóud) which is repeated throughout.

It is a regular pattern of stress, such as this, that in English verse constitutes what we call "metre." Metre in Greek means simply "measure," and it is always by stress that we measure our verse.

Another feature that distinguishes our verse from prose is the use of rhyme, although rhyme, unlike metre, is not essential to verse.

II. METRE.

Different Kinds of Feet.

In English verse the unit of stress pattern constitutes a foot, the foot of verse being comparable to the bar of music.

English verse uses several kinds of feet, some of two syllables, or disyllablic, some of three syllables or trisyllabic, and occasionally a foot of four syllables.

Disyllabic feet are of four kinds:

The Iamb, consisting of an unstressed syllable followed by a stressed, *e.g.* "retúrn."

The Trochee, consisting of a stressed syllable followed by an unstressed, *e.g.*, "river."

The Spondee, consisting of two stressed syllables, *e.g.*, "dóor mát."

The Pyrrhic, consisting of two unstressed syllables, *e.g.*, in the phrase "into tówn," "into" is a pyrrhic.

Trisyllabic feet are of four kinds:

The Anapæst, consisting of two unstressed syllables followed by a stressed, *e.g.*, "as you wish."

The Dactyl, consisting of a stressed syllable followed by two unstressed, *e.g.*, "árchery."

The Amphibrach, very rarely used, consisting of a stressed syllable between two unstressed, *e.g.*, "delíghted."

The Tribrach, still more rare, consisting of three unstressed syllables, *e.g.*, last three syllables of "incommúnicable."

A four-syllabled foot is very occasionally found:

The Choriambus, which may be thought of as a trochee followed by an iamb, *e.g.*, "Tóll for the bráve."

Different Kinds of Metrical Line.

Based on the different kinds of feet are the different kinds of English metre, which may be compared with the "time" in music.

Disyllabic metres may be either iambic or trochaic, for it is impossible to speak at any length using only pyrrhic or spondees, and the most common trisyllabic metres are anapæstic or dactyllic. Examples of different kinds of metrical line follow.

Iambic Line.

"I stróve with nóne for nóne was wórth my
strífe."
[OBEV 584]

Trochaic Line.

"Hóme art góne and tá'en thy wáges."
[OBEV 150]

Anapæstic Line.

"With a héy and a hó and a héy noninó."
[OBEV 147]

Dactylic Lines.

"Wít with his wántonness,
Tásteth death's bítterness."
[OBEV 177]

Amphibrach Lines.

"Most fríendship is féigning, most lóving mere
fólly
Then héigh ho, the hólly!
This life is most jólly."
[OBEV 146]

Choriambic Line.

"Kéntish Sir Býng stóod for his Kíng."

Variations in Metre.

Satisfying poetry is rarely entirely regular. Mechanical regularity is soon wearisome to the ear and is a characteristic of doggerel. The poet satisfies our love of rhythm in a more interesting and subtle way by introducing all kinds of variations and inversions, while at the same time maintaining the throb of the basic metre. An account of the chief variations follows.

Elision.

Elision is the suppression in pronunciation of a vowel or a syllable.

In the anapæstic line,

"The Assýrian came dówn like a wólf on the fóld"

the second foot appears to have four syllables, but in fact the "i" of "Assýrian" is elided or dropped before the "a" as shown by the little bracket. The elision of "i," which is pronounced "y" and known as "consonantal y," is especially common, and occurs in such words as "familiar," "opinion." Elision is often shown by the use of the apostrophe as in "heav'n." In "heav'n" we see one of the many conventional elisions of poetry, like "'tis," "'twas," "did'st," "o'er," "e'er," "'gainst," and many more.

Substitution.

Substitution is the use of a foot different from that of the metre in which the poem is written. In the following examples we can see the effect on iambic verse of some common substitutions.

Of a Trochee.

"Stíffen the sínews, súmmon úp the blóod."
Shakespeare, "Henry V."

Here the initial trochee gives force and emphasis.

Of a Spondee.

"Rócks cáves, lákes féns, bógs déns and shádes
of déath."

In this extraordinary line of Milton's the spondees slow down and weight the verse.

Of a Pyrrhic.

"They flý forgótten as a dréam"

Here the pyrrhic in the third foot gives lightness to the line.

Of a Dactyl.

"Cháttering his téeth for cóld that díd him chill."

When a dactyl replaces an iamb it is usually in the first foot as in this typical instance from Spenser, where the dactyl gives emphasis and variety to the line.

Of Anapæsts.

"And the cóming wind did róar more lóud
And the sáils did sígh like sédge."
[OBEV 562]

The initial anapæsts in these two lines from "The Ancient Mariner" give an effect of hurry and speed.

Additional Syllable.

An additional syllable may be added to either the beginning or end of a line.

Feminine Ending.

A feminine ending is an extra unstressed syllable that is added after the final stressed syllable of a line, giving a gentle falling inflexion. It is often used in blank verse and is a marked characteristic of Shakespeare's later plays, *e.g.*,

" Be not afear'd; the isle is full of noises,
Sounds and sweet airs that give delight and hurt not."

Anacrusis.

Anacrusis is the use of an extra syllable before the first regular foot of the line.

Dropped Syllable.

It sometimes appears that a line is a syllable, or syllables, short, until we realise that a suspense or pause occupies the time that would have been taken by the missing syllable. The dropped syllable can be indicated by the "caret" mark, thus ^. The following technical terms are used for lines that are short of syllables.

Catalectic Line.

This leaves off in the middle of the last foot, as in the trochaic line

" Ẽver lét the fáncy róam,"

or the dactylic line,

" Rings on her fíngers and bélls on her tóes."

The catalectic line is common in trochaic and dactylic verse, for it is in keeping with the tendency of English verse to end on a stressed syllable.

Acephalous Line.

This omits the first syllable of the line, as in the anapæstic line,

" That hóst with their bánners at súnset were séen."

The Cæsura.

The cæsura is a special kind of pause, quite different from that which indicates a dropped syllable. It is a pause about the middle of a line and is usually indicated by a pause in the sense, *e.g.*,

" Both hungered after death; both chose to win or die."

Two Ways of Describing Metre.

The Classical.

The actual names that we have been using for the different kinds of feet and metres are derived from Greek. It is most important, however, to realise that in the classical languages they had a different meaning, for Greek and Latin verse was written on a quite different principle from ours, and was scanned according to the "quantity" or length of the syllable, and not according to stress. Thus an iamb in Greek and Latin consisted of a short syllable followed by a long, marked thus, ⏑ –, and a trochee of a long syllable followed by a short, marked – ⏑.

In English verse the length of the syllable is totally irrelevant. For instance, the line,

" Pólly pút the kéttle ón and léts have téa "

begins with five trochees, all consisting of two *short* syllables.

The application of Greek words to English metres is confusing only if we forget that in English verse the criterion is stress.

The Modern.

Some writers, however, prefer new ways of describing our verse, and the most popular method is set out below:

A foot is called a period.
A disyllabic metre is called duple or double time.
A trisyllabic metre is called triple time.
A period with the stress on the first syllable is said to be falling.
A period with the stress on a second or third syllable is said to be rising.

III. RHYME.

Another thing that gives a formal pattern to English verse, and distinguishes it from prose, is rhyme. It is not essential to our verse, much of our verse being rhymeless.

Rhyme is a similarity in sound in words occurring normally at the ends of lines. In true rhyme the last stressed syllable and consonants following it are the same, while the sounds preceding the stressed vowel are different, *e.g.*, "cage/page," "pleasure/treasure."

The Types of Rhyme.

The most familiar division of rhyme is into masculine, feminine, and triple rhyme, but we also distinguish broken and Leonine rhyme.

Masculine, Male, or Single Rhyme.

The final syllable is stressed, *e.g.*, "cage/page," "joy/boy."

Feminine, Female, or Two-syllabled Rhyme.

The syllable before the last is stressed, and the final syllable unstressed, *e.g.*, "pleasure/treasure," "bending/lending."

Triple or Tumbling or Three-syllabled Rhyme.

The antepenultimate syllable is stressed. Triple rhyme is normally found in light or comic verse, like that of W. S. Gilbert or in this punning "Epitaph on a Dentist.":

" Stranger! Approach this spot with gravity!
John Brown is filling his last cavity."

In "The Bridge of Sighs" [OBEV 662] Hood dares to use it in a serious poem with such rhymes as "scrútiny/mútiny."

Broken Rhyme.

Broken rhyme, where more than one word is needed to complete the rhyme, is occasionally used, *e.g.*, "estate/their gate."

Leonine Rhyme.

Although rhyme normally occurs at the end of the line, we also find verse where the first half of the line rhymes with the second. This device, known as Leonine rhyme, is frequently used in Coleridge's "Ancient Mariner" [OBEV 562], *e.g.*,

" The ice did split, with a thunder-fit."

Poetic Licence in Rhyme.

The difficulty of rhyming in English is considerable, for many words have not a single rhyming word, some have only one, others very few. Certain licences are therefore allowed to the poet in the following ways:

Eye Rhyme or Printers' Rhyme.

Here words rhyme only to the eye, as "love/move." Keats in "Meg Merrilies" uses "rushes/bushes."

Identical Rhyme.

Here the same syllable or word is used twice so that the line rhymes with itself, *e.g.*, "part/impart" [OBEV 562], "universe/this verse" [OBEV 617]. The use of rhyming words spelt differently but pronounced identically is also a poetic licence, *e.g.*, "wright, write, right."

Cockney Rhyme.

Keats' use of Cockney rhymes has been much criticised, *e.g.*, "mourn/torn," "faces/vases," "briar/attire." There is still considerable difference between Northern and Southern pronunciation of English, and many eminent poets have availed themselves of a Southern pronunciation in rhyming "dawn/morn," although in the North of England the "r" of "morn" would be sounded.

Assonance.

Assonance is sometimes used instead of rhyme, and occurs frequently in early folk poetry and less formal verse. It consists in a similarity in the accented vowels and those which follow, but not in the consonants, *e.g.*, "feet/creep," "skin/swim."

Perversion of Rhyme.

Modern poets, following Wilfrid Owen, have sometimes used a deliberate perversion of rhyme, which should not be confused with assonance. Wilfrid Owen opens his bitter poem "A Terre" with the following stanza:

"Sit on the bed. I'm blind and three parts shell.
Be careful; can't shake hands now; never shall.
Both arms have mutinied against me,—brutes.
My fingers fidget like ten idle brats."

The deliberate falsity of rhymes like "shall/shell," and "brutes/brats" conveys Owen's horror at the disintegration and collapse of the First World War.

Recording of Rhyme Schemes.

The conventional way of noting rhyme schemes is to call the first series *a*, the second *b*, and so on. Normally each new series is indented, *e.g.*,

"Joyful, joyful!	*a*
When virginity	*b*
Seeks all coyful	*a*
Man's affinity.	*b*
Fate all flowery,	*c*
Bright and bowery	*c*
Is her dowery!	*c*
Joyful, joyful."	*a*

W. S. Gilbert, "Yeomen of the Guard."

IV. THE STANZA.

Some poems are divided into groups of lines, which strictly speaking are called "stanzas," though in popular language they are often known as "verses." Generally the stanzas of a poem are uniform, but sometimes they are varied as in Milton's "Lycidas" [OBEV 325].

V. ENGLISH VERSE FORMS.

English poetry uses an immense wealth of verse forms, distinguishable from each other by the predominating metre and also by the pattern of rhyme and the kind of stanza—or by the absence of rhyme and stanza. An account of these follows.

Iambic Metres.

The metre most natural to the English language is undoubtedly the iambic.

With Iambic Pentameter as Basis.

The iambic pentameter of five stresses and ten syllables, also called the iambic decasyllabic line, is more used than any other, and is the basis of the following forms.

Blank Verse. Blank verse, consisting of unrhymed iambic pentameters, is the metre of Shakespeare's plays, Milton's "Paradise Lost," Wordsworth's "Prelude," and Tennyson's "Idylls of the King." In the hands of such masters it is a most flexible instrument, especially when diversified with the eleven-syllabled line with a feminine ending. Shakespeare used the metre with increasing freedom, though it must be remembered that some apparent variations are due to the different pronunciation of Elizabethan times.

The following lines of blank verse occur in Wordsworth's "Prelude," Book III. He is describing his rooms in St. John's College, Cambridge.

"And from my pillow, looking forth by light
Of moon or favouring stars, I could behold
The antechapel where the statue stood
Of Newton with his prism and silent face,
The marble index of a mind for ever
Voyaging through strange seas of Thought, alone."

Heroic Couplet. The heroic couplet, consisting of iambic pentameters rhyming in pairs, was in Elizabethan times called "riding rhyme," possibly because it is the metre of The Prologue of Chaucer's "Canterbury Tales," and of many of the tales themselves. It became the most fashionable metre of the eighteenth century when it was used by Pope, Goldsmith, and Johnson. Keats later employed it in "Lamia."

The *Closed Couplet* was, in the heyday of the couplet's vogue, considered the most polished and correct. Here the sentence form exactly coincides with the couplet and the rhyme has a clinching effect, *e.g.*,

"True ease in writing comes from art, not chance,
As they move easiest who have learned to dance."

Pope was the supreme master of the closed couplet, and eschewed variations such as enjambement, or the Alexandrine.

Enjambement is a variation used by poets before Pope's time and revived by the Romantic poets. In enjambement the sentence flows over from one line or couplet to the next, and the click of the rhyme is submerged, *e.g.*, Keats' description of Lamia in her serpent form with skin of "dazzling hue."

"And full of silver moons, that, as she breathed,
Dissolv'd or brighter shone, or interwreathed
Their lustres with the gloomier tapestries."
Keats, "Lamia."

The Alexandrine, another variation, is a line of six iambic feet. Dryden made frequent use of the Alexandrine but Pope parodied it in the brilliant line that serves as a mnemonic.

"A needless Alexandrine ends the song,
That, like a wounded snake, drags its slow length along."

The triplet, another variation, consists of three lines rhyming together. The third line is frequently an Alexandrine.

Rhyme Royal. Rhyme royal has seven iambic pentameters, rhyming ABABBCC. Used by Chaucer in "Troilus and Cressida" [OBEV 14 and 15] and Shakespeare in "Lucrece," it was revived by Masefield in such poems as "Dauber."

Spenserian Stanza. The Spenserian stanza has eight iambic pentameters followed by an Alexandrine, rhyming ABABBCBCC. Invented by Spenser in "The Faerie Queene," it was used by Byron in "Childe Harold," Keats in "The Eve of St. Agnes," and Shelley in "Adonais."

Elegaic Stanza. The Elegaic stanza has four iambic pentameters, rhyming ABAB. It is also called the "heroic quatrain," quatrain meaning a four-lined stanza. This form is best known through Gray's "Elegy" [OBEV 465].

"Omar Khayyám" Stanza.

The "Omar Khayyám" stanza receives its name from its use by Fitzgerald in his translation of the "Rubaiyat." It has four iambic pentameters, rhyming AABA.

Ottava Rima. Ottava rima, also called the octave stanza, has eight iambic pentameters, rhyming ABABABCC. It was used by Byron in "Don Juan," and by Keats in "Isabella."

Terza Rima. Terza rima has stanzas of three iambic pentameters with a linking rhyme scheme: ABA, BCB, CDC, etc. The concluding stanza is rounded of with an extra line rhyming with its central line, *e.g.*, DEDE, constituting, in effect, a heroic quatrain. Used by Dante, the verse has been adapted by English poets. Shelley's "Ode to the West Wind" [OBEV 617] uses modified terza rima, the final rhymes being DEDEE.

The Sonnet. A sonnet has fourteen iambic pentameters. Perfected in Italy by Petrarch, who died in 1374, it was introduced into England in the sixteenth century. There are two chief types of sonnet.

The Petrarchan, or Italian, sonnet has an "octave" of eight lines, rhyming ABBAABBA, followed by a "sestet" of six lines, where some variety of rhyme schemes is found. The strictest Petrarchan sonnets have either two "tercets" of three lines each, with rhymes CDECDE, or else three pairs of lines rhyming CDCDCD.

An example of sestet rhyming CDECDE is Milton's "On His Blindness" [OBEV 327].

Examples of sestets CDCDCD are Wordsworth's "Upon Westminster Bridge" [OBEV 534] and Keats' "On First Looking into Chapman's Homer" [OBEV 641].

Not all of these examples observe the natural pause between octave and sestet which is characteristic of the strict Italian form, and many of our finest sonnets depart from the original rhyme scheme in both octave and sestet.

A lesser-known Petrarchan sonnet by Keats:

'To one, who has been long in city pent,
'Tis very sweet to look into the fair
And open face of heaven,—to breathe a prayer
Full in the smile of the blue firmament.
Who is more happy, when, with heart's content,
Fatigued he sinks into some pleasant lair
Of wavy grass, and reads a debonair
And gentle tale of love and languishment?
Returning home at evening with an ear
Catching the notes of Philomel,—an eye
Watching the sailing cloudlet's bright career,
He mourns that day so soon has glided by:
E'en like the passage of an angel's tear
That falls through the clear ether silently."

The *Elizabethan, or Shakespearean,* sonnet consists of three quatrains with the rhymes ABAB/CDCD/EFEF/ concluded by a couplet rhyming GG. The couplet often clinches the thought.

Examples are Shakespeare's sonnets [OBEV 155–174], and Keats' last sonnet [OBEV 644].

Other Iambic Metres.

Many of our iambic verse forms use a shorter or longer line than the pentameter.

The Octosyllabic Couplet. The octosyllabic couplet consists of lines of four stresses and eight syllables, and the lines rhyme in pairs. English poets like Marvell have used this metre effectively, *e.g.*, "A Garden" [OBEV 365, *see also* OBEV 367, 370]. It is the metre of Masefield's "Everlasting Mercy" and "Reynard the Fox."

The Ballad. There are two chief kinds of ballad metre.

(a) *Strict Ballad Form* consists of stanzas of four iambic lines, the first and fourth with four stresses, and the second and third with three, with the rhyme scheme ABCB. The fine old ballads "Sir Patrick Spens" [OBEV 381] and "The Wife of Usher's Well" [OBEV 388] are in this metre. Coleridge, in "The Ancient Mariner" [OBEV 562] shows how many varieties of stanza can be based on the simple ballad stanza.

"*Fourteeners*" is the name given to a form which is simply a re-arrangement of the ballad quatrain as a rhyming couplet of two iambic lines with seven stresses, as in Macaulay's "The Armada."

(b) *Less Strict Ballad Form, or Long Metre,* consists of stanzas of four iambic lines each with four stresses, the rhyme scheme being ABCB or ABAB. Many ancient ballads, such as "Thomas the Rhymer" [OBEV 379], are of this type.

"In Memoriam" Metre. This, the metre of Tennyson's "In Memoriam," is like the less strict ballad metre in having four iambic lines, each with four stresses, but its rhyme scheme is ABBA.

Short Metre. Short metre, rarely used, consists of iambic quatrains, each line having three stresses and the rhyme scheme being ABCB.

English Hymn Metres. Most English hymns are written in short iambic lines, and English hymnology names them according to the number of syllables. The most common are:

Common Metre, or 8686, with rhymes ABAB, *e.g.*, "O for a thousand tongues to sing" ["Songs of Praise" 595].
Long Metre, or 8888, with rhymes ABAB, *e.g.*, "When I survey the wondrous cross" ["Songs of Praise" 133].
Short Metre, or 6686, with rhymes ABCB, *e.g.*, "Blest are the pure in heart" ["Songs of Praise" 455].

Double Iambic Metre. When we are accustomed to hearing verse we come to realise that stresses are not always of equal weight. It is possible to distinguish in these "fourteeners" of Masefield a major stress, marked ˝ and a minor stress marked ´.

"Oh sőme are fónd of Spắnish wine, and sőme are fónd of Frĕnch,
And sőme'll swállow tắy and stúff fit ŏnly fór a wĕnch."

Masefield's "Captain Stratton's Fancy" [OBEV 939]

The lines have in fact four major stresses, and between the major stresses intervene three syllables, of which the middle has a minor stress. It is this alternation in the weight of the stress which gives its characteristic swing to such a poem as Chesterton's "The Rolling English Road" [OBEV 930].

Trochaic Metres.

Pure Trochaic Metre.

English poets seldom use a pure trochaic metre, partly because of the difficulty of rhyming, and partly because the continual feminine ending that it involves is not pleasing to the English ear. A few very short lyrics in this metre can be found, as Browne's Song "For her gait, if she be walking" [OBEV 251], but the only poem of any length is Longfellow's "Hiawatha," and the metre

of this *tour de force* tends to sound monotonous. It consists of unrhymed lines, each of four stresses, *e.g.*,

"Líke a yéllow léaf in áutumn
Líke a yéllow wáter-líly."

Modified Trochaic Metre.

Ever since the Middle Ages our poets have contrived to combine the advantages of a trochaic metre and of a masculine ending by the simple expedient of shortening the last foot of the line to a stressed monosyllable. This catalectic, or shortened, trochaic line is found both in couplets and in stanza forms. *The seven-syllabled trochaic couplet, also called the trochaic tetrameter*, consists of these catalectic, or shortened, lines rhyming in pairs, and is a gay, tripping measure, as in some passages of Milton's "L'Allegro" [OBEV 318].

"Háste thee nýmph and bring with thée
Jést and yóuthful Jóllity."

Keats uses the metre in "Bards of Passion," and "Fancy" [OBEV 637 and 638].

Lyrics in modified trochaic metre are often found. Herrick uses the seven-syllabled lines rhyming in pairs in "Cherry Ripe" and other lyrics [OBEV 264, 279, 280, 281]. Edmund Blunden, in "Forefathers" [OBEV 965], uses it in a stanza rhyming ABABCC. George Herbert in his lyric "Discipline" [OBEV 291] brilliantly combines five- and three-syllabled lines rhyming ABAB, *e.g.*,

"Thrów awáy Thy ród,
Thrów awáy Thy wráth;
Ó my Gód,
Táke the géntle páth."

Further Variations in Modified Trochaic Metre.

The modified trochaic line is especially subject to further variation.

(*a*) It is often combined with a pure trochaic line, *e.g.*, in Hunt's poem "Jenny Kiss'd Me" [OBEV 600] where the catalectic and the complete trochaic line alternate regularly.

(*b*) It often has an extra unstressed syllable preceding it (anacrusis), as in the second of these lines from Keats' poem "Fancy" [OBEV 638].

"Ín a dárk conspiracý
To | bánish Even fróm her ský."

The line that results might well be taken for iambic, and there are some passages in English poetry, such as lines in Milton's "L'Allegro" [OBEV 318], which can be described either as irregular trochaic or irregular iambic lines! It depends on what the hearer judges to be the *basic* stress.

Double Trochaic Metre.

Corresponding to double iambic metre there is a double trochaic metre. W. S. Gilbert effectively uses it in many of his patter songs, as in "Ferdinando and Elvira," *e.g.*,

"Thén we lĕt off páper crăckers, eách of which contáined a mŏtto,
Ánd she lĭstened while I rĕad them, till her mŏther tóld her nŏt to."

These lines, like those in double iambic metre, have four major stresses (marked ´), and between the major stresses three syllables, of which the middle carries a minor stress.

A modified double trochaic metre, where the last foot is shortened to a stressed monosyllable, can be recognised in Tennyson's "Locksley Hall," or in Lewis Carroll's verses in "Alice in Wonderland":

"'Wíll you wălk a little făster?' sáid a whĭting tó a snail."

Trisyllabic Metres Generally.

Because of the irregularities incident to verse in anapæsts, dactyls, and amphibrachs, it is not easy to distinguish one trisyllabic metre from another. Swinburne, the past master of trisyllabic metres, often passes with great freedom from anapæstic to dactylic lines within the same stanza.

Anapæstic Metres.

Pure Anapæstic.

Anapæstic metre is used only in short poems, and often conveys a sense of speed and urgency. The chief variation is the omission of one or two of the unstressed syllables at the beginning of a line. Some of the best-known examples of anapæstic verse are Byron's "Sennacherib," Flecker's "The War Song of the Saracens," and Lewis Carroll's parodies, "'Tis the voice of the lobster" and "You are old, Father William," from "Alice in Wonderland."

The Limerick.

The limerick may be defined as a single anapæstic stanza, having the first two lines of three feet, the next two lines of two feet and a concluding line of three feet, with the rhyme scheme AABBA.

The origin of the limerick is uncertain, but it became popular after the appearance in 1846 of Edward Lear's "Book of Nonsense." Lear's limericks differ from the contemporary type in that his final line is normally a repetition, adding nothing to the sense and repeating one of the previous rhyme words.

Most of our modern lyrics are passed on by word of mouth, but some that concisely express some intellectual attitudes have appeared in print, as the following, on "Determinism"—

"There wás a young mán who said 'Dámn!
It appéars to me nów that I ám
Just a béing that móves
In predéstinate gróoves,
Not a táxi or bús, but a trám.'"

Dactylic Metres.

Pure Dactylic.

Like pure trochaic metre, pure dactylic metre has a feminine ending to the line, which makes rhyming difficult and does not satisfy the English ear. Very few serious poems keep consistently to a pure dactylic verse, and Robert Graves' "In the Wilderness" is most unusual in this respect, *e.g.*,

"Chríst of His géntleness
Thírsting and húngering
Wálked in the wilderness."

Modified Dactylic Metre.

Normally dactylic metre is modified in that a catalectic line is frequently used, where the final foot is shortened to a trochee or a stressed monosyllable, as in Hood's "Bridge of Sighs" [OBEV 662], the most remarkable dactylic poem in the language, *e.g.*,

"Óne more unfórtunate
Wéary of bréath
Ráshly impórtunate
Góne to her déath."

Shakespeare also uses the catalectic line in the refrain to "Where the bee sucks" [OBEV 140]—

"Mérrily mérrily sháll I live nów
Únder the blóssom that hángs on the bóugh."

It is interesting to note how the catalectic dactylic line of the refrain is matched by the catalectic trochaic line of the verse.

Amphibrach Metres.

Pure Amphibrach Metre.

The amphibrach metre is extremely rare in English, although it occurs occasionally in a few lines, or a refrain, like that to "Blow, blow thou Winter Wind" [OBEV 146]. Laurence Binyon's

"Bablock Hythe" is one of the few poems to use amphibrachs continuously, *e.g.*,

> "Till súnset was rimming
> The Wést with pale flúshes;
> Behínd the black rúshes
> The lást light was dímming."

Modified Amphibrach Metre.

The pure amphibrach line can be used alternating with a catalectic line, shorn of its last syllable, as in Goldsmith's drinking song in "She Stoops to Conquer," Act I, Scene 2, *e.g.*,

> "Let schóol-masters púzzle their bráin
> With grámmar and nónsense and léarning."

Choriambic Metre.

There are few poems in pure choriambic metre. Ruskin's quatrain "Trust Thou thy Love" [OBEV 753] is one of the few examples, *e.g.*,

> "Trúst thou thy Lóve; if she be próud, is she not swéet?"

Choriambic effects are often obtained incidentally, especially in blank verse, when the first foot of a line is a trochee.

Lionel Johnson frequently achieves the same kind of effect in lyric verses by substituting a choriamb for two iambs, as in the poem "By the Statue of King Charles" [OBEV 909], *e.g.*,

> "Cómely and cálm, he rides
> Hárd by his ówn Whitehall."

Sprung Rhythm.

Sprung rhythm was practised by Gerard Manley Hopkins and his followers.

Its distinction lies in the fact that in a foot of verse the first syllable is always stressed, and this stressed syllable may be followed by any number of unstressed syllables from none to three, or even more, as the occasion demands. Hopkins has described sprung rhythm in the Preface to his "Poems."

Quantitative Classical Metres.

Since the Renaissance poets such as Spenser, Coleridge, and Tennyson have from time to time endeavoured to reproduce in English verse the complicated quantitative metres of Greek and Latin verse. The difficulty, if not impossibility, of putting the stress on the long vowel in English has for the most past rendered such experiments interesting only to the scholar.

It should always be remembered that the technical names, such as iamb and trochee, although borrowed from the classics, have in English verse a quite different meaning, referring never to quantity but always to stress.

Metrical Forms of French Origin.

It became fashionable during the last years of the nineteenth century for poets to imitate certain verse forms which had long been practised in France, some of them from the time of the troubadours.

Chaucer and Gower had in the fourteenth century used some of these forms, later English poets had occasionally experimented with some of them, and Swinburne, Austin Dobson, Edmund Gosse, and others did much to adapt and naturalise them, although their intricate rhyming patterns are very difficult to construct in a language so short of rhymes as English. The most popular were the triolet, villanelle, rondeau, ballade, and sestina.

Characteristic of the Anglicised versions are:

1. Freedom as regards metre and length of line.

2. Complicated and exacting rhyme schemes, which permit of no such poetic licence as identical rhyme.

3. A refrain line which recurs in certain stereotyped positions without any alteration of sound, although there may be significant alteration of meaning. Only the sestina is without a refrain.

Triolet.

A triolet is a single stanza of eight short lines. The first line is repeated as the fourth, and the first and second appear again as seventh and eighth. Only two rhymes are used, the scheme being: ABAAABAB.

The triolet was re-introduced into England by Bridges in 1873. Austin Dobson's "A Kiss" is a good example of the form.

> "Rose kissed me today.
> Will she kiss me tomorrow?
> Let it be as it may,
> Rose kissed me today,
> But the pleasure gives way
> To a savour of sorrow;—
> Rose kissed me today,—
> Will she kiss me tomorrow?"

See also Dobson's triolet "I intended an Ode" [OBEV 828].

Villanelle.

The villanelle has five stanzas, each of three lines, followed by one stanza of four lines. It has a refrain which consists of the first and third lines of the first stanza. These lines alternately form the last lines of the four middle stanzas, and reappear as a concluding couplet to the poem. Only two rhymes are employed throughout. Stanzas one to five rhyme ABA and stanza six ABAA.

Austin Dobson wrote several villanelles including the well-known "On a Nankin Plate." The following of Henley's is both a good example and description of the form.

Villanelle by W. E. Henley:

> A dainty thing's the Villanelle
> Shy, musical, a jewel in rhyme,
> It serves its purpose passing well.
>
> A double-clappered silver bell
> That must be made to clink in chime,
> A dainty thing's the Villanelle;
>
> And if you wish to flute a spell,
> Or ask a meeting 'neath the lime,
> It serves its purpose passing well.
>
> You must not ask of it the swell
> Of organs grandiose and sublime—
> A dainty thing's the Villanelle;
>
> And, filled with sweetness, as a shell
> Is filled with sound, and launched in time,
> It serves its purpose passing well.
>
> Still fair to see and good to smell
> As in the quaintness of its prime,
> A dainty thing's the Villanelle,
> It serves its purpose passing well.

Rondeau.

A rondeau is a short and compact verse form. It has thirteen lines, usually of eight syllables, which use only two rhymes, and in addition a refrain, usually of four syllables, which introduces a third rhyme. This refrain consists of the first half of the opening line and is twice repeated, thus giving the rondeau fifteen lines all told. The rondeau is divided into three stanzas with the following rhyme scheme: AABBA: AAB + refrain, C: AABBA + refrain C.

Austin Dobson wrote many rondeaus to this exacting plan, including the ingenious "You bid me try" and "In After Days" [OBEV 830].

A Rondeau by Austin Dobson:

You bid me try.

You bid me try, Blue-Eyes, to write
A Rondeau. What!—forthwith?—to-night?
Reflect. Some skill I have, 'tis true;—
But thirteen lines!—and rhymed on two!
"Refrain," as well. Ah, hapless plight!

Still, there are five lines,—ranged aright.
These Gallic bonds, I feared, would fright
My easy Muse. They did, till you—
You bid me try!

That makes them eight. The port's in sight:—
'Tis all because your eyes are bright!
Now just a pair to end in 'oo'—
When maids command, what can't we do.
Behold!—the RONDEAU, tasteful, light,
You bid me try!

1876

Roundel.

The roundel is a variation of the rondeau. Swinburne in his "Century of Roundels" wrote a hundred, and his pattern is usually followed. It consists of nine full lines, plus the refrain (consisting of the opening half of the first line), which is twice repeated, giving eleven lines all told. Only two rhymes are used throughout. The roundel is divided into three stanzas with the following rhyme scheme: ABA + refrain B; BAB; ABA + refrain B.

Swinburne's roundel called "The Roundel" is especially interesting.

Rondel.

The rondel is a form of verse similar to the rondeau. The modern English version consists of fourteen lines all told. Only two rhymes are used, and the initial two lines are repeated as lines 7 and 8 and again as lines 13 and 14. The rondel is frequently arranged in three stanzas with a rhyme scheme as follows: ABBA; ABAB; ABBAAB.

The rondel was revived in the nineteenth century by Bridges, Dobson, Gosse and Henley, and Dobson's "Love comes back to his vacant dwelling" is one of the best known.

Ballade.

There are several kinds of ballade, but the most popular modern form consists of three eight-lined stanzas followed by an envoy of four lines. Each of the stanzas and the envoy end with a refrain. The rhymes of the eight-lined stanzas are ABABBCBC, and of the envoy BCBC.

Austin Dobson wrote several ballades of this kind, the best known being, "This was the Pompadour's fan," and "And where are the galleons of Spain?"

Chaucer's "Balade," "Hyd, Absolon, thy gilte tresses clere," is of an earlier seven-lined type without an envoy.

A ballade by Austin Dobson:

The Ballad of the Thrush.

Across the noisy street
I hear him careless throw
One warning utterance sweet;
This faint at first, and low
The full notes closer grow;
Hark! What a torrent gush!
They pour, they overflow—
Sing on, sing on, O Thrush!

What trick, what dream's deceit
Has fooled his fancy so
To scorn of dust and heat?
I, prisoned here below,
Feel the fresh breezes blow;
And see, thro' flag and rush,
Cool water sliding slow—
Sing on, sing on, O Thrush!

Sing on. What though thou beat
On that dull bar, thy foe!
Somewhere the green boughs meet
Beyond the roofs a-row;
Somewhere the blue skies show,
Somewhere no black walls crush
Poor hearts with hopeless woe—
Sing on, sing on, O Thrush!

Envoy.

Bird, though they come, we know,
The empty cage, the hush;
Still, ere the brief day go,
Sing on, sing on, O Thrush!

1883

The Chant Royal.

The chant royal is a longer form of ballade. It has five stanzas of eleven lines and an envoy of five lines.

The rhyme scheme is ABABCCDDEDE, and the envoy has rhyme DDEDE.

The Sestina.

The sestina has six stanzas, each of six lines. The end words to the lines of the first stanza are repeated as end words in the other five stanzas, but in a different and stereotyped order. The poem concludes with an envoy.

The first sestina published in English was by Gosse in 1877. Swinburne wrote many, including "I saw my soul at rest upon a day."

The Clerihew.

The clerihew is an amusing quatrain, so called after its inventor Edmund Clerihew Bentley. It disdains regular metre and depends on the simple rhyme scheme AABB. The distinctive characteristic of the clerihew is that it is concerned with some eminent person, who is named in the first line and then described in a wilfully fanciful way, the matter being dictated by the exigencies of the rhyme, as in Bentley's clerihew on J.S. Mill.

"John Stuart Mill,
By a mighty effort of will,
Overcame his natural bonhomie
And wrote 'Principles of Political Economy.'"

We might invent a clerihew for Pears Cyclopædia, and say

"You will find *Pears Cyclopœdia*
A simpler and speedier
Aid in your search for verity
If you do not use it with levity."

Free Verse or Vers Libre.

It is hardly possible to define anything so vague as Free Verse. It is characterised by a greater intensity of feeling and a more elevated language than is usual in prose, and has a rhythm that is different from that of poetry in that it is irregular; it has rhythm but not metre.

Free Verse is arranged in lines, but these lines have an indefinite number of syllables. They have balance but no regularly recurring pattern of stress, and no rhyme.

The best-known writer of Free Verse is Walt Whitman, whose "Leaves of Grass" was published in 1855.

VI. CONCLUSION.

The foregoing account is no more than a description of our traditional verse forms. It in no way implies that verse is written according to rules.

We have only to look at Shakespeare's lyrics [OBEV 133–174] to realise how brilliantly free and inventive the poet can be in devising new and delightful patterns of verse—many of them so subtle as to be very difficult to define All that the students and critics can do is to follow in the poets' wake, endeavouring to understand and elucidate the forms that the maker has created.

Figures of Speech

We constantly use figurative language without realising it. When we say that we are "browned off," "fed up," "at the end of our tether," we do not expect to be taken literally. We are in fact employing metaphors.

An understanding of metaphors and other figurative expressions enables us to use our language with greater confidence and effectiveness. It also helps us to understand more fully what others have written. Especially is it valuable when we read a good novel, play, or poem, for to the creative writer figurative language is as natural as the air he breathes.

The following guide to our figures of speech is arranged alphabetically for ease of reference.

Alliteration. A kind of repetition. Two or more words in close succession begin with the same letter, or sound, usually a consonant. Up to the fourteenth century much English verse was written according to an alliterative principle, as in this modernised quotation from "Piers Plowman."

"I had *w*andered me *w*eary so *w*eary I rested me
On a *b*road *b*ank by a merry-sounding *b*urn."

A strong tendency to alliteration still survives in our poetry. Shakespeare ridicules it in the mechanical's play in "A Midsummer Night's Dream" (Act V, Scene 1) in such lines as—

"Whereat, with blade, with bloody blameful blade,
He bravely broach'd his boiling bloody breast."

Anti-climax. See Bathos.

Antithesis. A figure of speech where ideas are so set out that they are in sharp contrast to each other, *e.g.*,

"Better to reign in Hell than serve in Heav'n."
Milton.

"To err is human, to forgive divine."
Pope.

Apostrophe. A figure of speech where the speaker or writer suddenly breaks off and directly addresses some other person who may be present either in the flesh or only in the imagination. Often it is not a person but a thing, abstraction, or personification that is addressed, as in Milton's famous apostrophe, "Hail, holy light" in "Paradise Lost," Book III, line 1. Apostrophe can be used with comic effect, *e.g.*,

"She turns, O guardian angels stop her
From doing anything improper."

(This couplet is also, incidentally, an example of bathos.)

Assonance. (1) Assonance is correspondence of vowel sounds. For instance, in the opening lines of the "fairy song" in "A Midsummer Night's Dream" (Act II, Scene 3) there is a play on only three vowels, and this repetition helps towards the effect of a magic charm, *e.g.*,

"Philomel, with melody, Sing."

In Tennyson's poem "Break, break, break" the repetition of the "o" sound in the second line is like an outcry of grief, *e.g.*,

"On thy cold grey stones, *O* sea."

(2) Assonance is sometimes used instead of rhyme, especially in early folk poetry. Here there is correspondence of one word with another in the accented vowel and any vowels which follow, but not in the consonants, *e.g.*, in "King Estmere," "Spain" is rhymed with "same," and "barone" with "home."

Bathos or Anti-climax. A figure of speech that consists of a sudden and ludicrous descent from lofty to trivial things. In "The Rape of the Lock" Pope wittily used bathos to satirise the frivolity of the woman of fashion, who lacking all sense of proper feeling, casts the same "screams of horror," and "shrieks to pitying heav'n,"

"When *husbands* or when *lapdogs* breathe their last."

The careless writer may fall to bathos which is unintentionally comic in its effect. The word "bathos" in Greek means "depth."

Climax. A figure of speech where ideas are set out in such a way that each rises above its predecessor in fable. In Greek the word "climax" means a ladder. One of the finest examples is in Shakespeare's "The Tempest" (Act IV, Scene 1) when Prospero says,

"And like the baseless fabric of this vision
The cloud-capp'd towers, the gorgeous palaces,
The solemn temples, the great globe itself,
Yea, all which it inherit, shall dissolve."

Epigram. A concise and pointed saying, effective by its wit and ingenuity. It often uses antithesis. S. T. Coleridge's definition of this form is in itself an epigram, *e.g.*,

"What is an epigram? a dwarfish whole:
Its body brevity, and wit its soul."

Euphemism. A figure of speech where a harsh or distressing expression is replaced by one that is gentler, if less accurate. Thus we may call a lie a "flight of fancy," or a "terminological inexactitude." There is a striking instance of euphemism in "Macbeth" (Act I, Scene 5), when Lady Macbeth, planning the murder of her guest, Duncan, says, "He that's coming must be provided for."

Hypallage or "Transferred Epithet." A figure of speech where an adjective, or adverb, is separated from the word to which it belongs grammatically, and is transferred to some other word in the sentence, its unusual position giving it a kind of emphasis. The word "obsequious" is thus transferred in the sentence "A lacquey presented an obsequious cup of coffee."

Hyperbole. A figure of speech where there is a deliberate use of exaggeration for the sake of effect as in the phrase "tons of money." Lady Macbeth uses hyperbole when she says, "Here's the smell of blood still; all the perfumes of Arabia will not sweeten this little hand" (Act V, Scene 1).

Writers of film trailers frequently indulge in hyperbole.

Innuendo. A figure of speech where something is hinted at, or suggested, but not openly stated. Dickens uses innuendo to suggest Scrooge's stinginess by saying, "Darkness was cheap, and Scrooge liked it."

Irony. (1) A figure of speech where the speaker says one thing but intends the opposite to be understood. Shylock uses the word "courtesies" ironically when he says,

"Fair sir, you spit on me on Wednesday last,
You spurn'd me such a day; another time
You call'd me dog; and for these courtesies
I'll lend you thus much moneys."
"Merchant of Venice" (Act I, Scene 3).

The use of irony can clearly be seen in Shakespeare's "Julius Cæsar" in Antony's well-known speech to the citizens. They gradually realise

that when Antony repeats that Brutus and the rest are "honourable men," he is speaking ironically, and intends the opposite. When they fully perceive this they cry, "They were traitors . . . villains, murderers." ("Julius Cæsar," Act III, Scene 2.)

(2) *Dramatic irony* is the use of words which have a second inner significance that is not realised by some of the actors in a scene. For instance, in Sheridan's "School for Scandal," Act IV, Scene 3, Sir Peter admires Joseph Surface's useful screen, and Surface replies, "Oh yes, I find great use in that screen." He and the audience know, but Sir Peter does not, that at that very moment the screen is concealing Peter's own wife who had rashly visited Joseph.

It is helpful to remember that in Greek the word "irony" means "dissimulation."

Litotes. A figure of speech which is really a special kind of understatement (or Meiosis). Instead of making a positive statement (*e.g.*, "This is a difficult task") we might use Litotes, and say "This is no easy task," thus expressing a positive by the negative of its opposite.

Malapropism. An amusing inaccuracy in vocabulary. Words that have an accidental similarity in sound may become confused in the speaker's mind and the wrong word may come uppermost. Thus Mrs. Malaprop complains that the disobedience of her niece gives her, not "hysterics," but "hydrostatics." It is not surprising that Mrs. Malaprop, of Sheridan's "The Rivals," has given her name to this kind of verbal confusion, though many before her time, including humble folk in Shakespeare's plays, have uttered malapropism. Bottom, in "A Midsummer Night's Dream," says that in the wood they "may rehearse more obscenely" when he means "obscurely."

Meiosis. A figure of speech where a deliberate understatement is made for the sake of effect. English people are especially fond of Meiosis and often use it colloquially, in such an expression as "He made a very 'decent' contribution," meaning a very "generous" contribution. The full meaning of what we intend is often conveyed by the tone of voice, *e.g.*,

"This is *some* war."

Metaphor. It is helpful to think of the figure of speech, metaphor, as a condensed simile. In metaphor one thing is not merely *compared* to another, as in simile, but is boldly spoken of as if it actually *were* that other. Thus Bacon, in the following metaphor, does not say books are *like* food, but speaks of them as if they actually *were* food, *e.g.*, "Some books are to be tasted, others to be swallowed, and some few to be chewed and digested."

Metaphor is usually defined as the transfer of a name, or descriptive term, to some object to which it is not properly applicable, thus making an implicit comparison. Shakespeare uses nautical terms to describe our human situation when Brutus says,

"There is a tide in the affairs of men which, taken at the flood, leads on to fortune" ("Julius Cæsar," Act IV, Scene 2).

In *Mixed Metaphor* two or more inconsistent metaphors are used of the same object, as when, speaking of a suspicion, someone said, "I smell a rat; I see it in the air; but I will nip it in the bud."

Metonymy. A figure of speech where a person or thing is not named directly, but by some associated thing. Instead of saying, "The prisoner addressed the magistrate," we might use metonymy, and say, "The prisoner addressed the bench." Similarly, "a speech from the Lord Chancellor" is sometimes called "a speech from the Woolsack."

Onomatopœia. The use of words which imitate or echo the sounds they suggest, *e.g.*,

"Seas half-frozen slushed the deck with slime."
Masefield.

Oxymoron. A figure of speech where words that are usually contradictory are combined in one expression, *e.g.*, "bitter-sweet."

"I know this is a joyful trouble to you."
"Macbeth," Act II, Scene 1

Paradox. A figure of speech where a statement is made that at first sight seems contradictory, or absurd, *e.g.*,

"The rule of the road is a paradox quite:
If you keep to the left, you are sure to be right."

and

"The child is father of the man."
Wordsworth.

Pathetic Fallacy. A figure of speech where it is assumed that things of nature have feelings like those of human beings, *e.g.*,

"And daffadillies fill their cups with tears."
Milton.

In Greek "pathos" means "feeling."

Personification. A figure of speech where some abstraction, or some inanimate thing is represented as a person, *e.g.*,

"Rule, Britannia."

"But look the dawn in russet mantle clad
Walks o'er the dew of yon high eastern hill."
Hamlet, Act I, Scene 1.

Personification is really a special kind of metaphor.

Pun. The use of words so as to convey a double meaning, as in Belloc's couplet

"When I am dead, I hope it may be said
'His sins were scarlet, but his books were read.'"

In the three puns that follow there is a suggestion of a banking transaction! "The Egyptians received a check on the bank of the Red Sea which was crossed by Moses." Puns, which were popular in the nineteenth century, especially with Lamb and Hood, are now out of favour.

Simile. A figure of speech which makes a comparison pointing out a similarity between things otherwise unlike. It is usually introduced by "like" or "as," *e.g.*,

"Men fear death as children fear to go in the dark."
Bacon.

"His own thought drove him like a goad."
Tennyson.

Spoonerism. An accidental transposition of the sound of two words, so called after Rev. W. A. Spooner, warden of New College, Oxford, *e.g.*,

"You have hissed all my mystery lectures" for "You have missed all my history lectures."

Synecdoche. A figure of speech where the name of a part is used for the whole, or the whole for the part, *e.g.*,

"A fleet of a hundred sail",

meaning of a hundred ships.

Synecdoche is really a special kind of Metonymy.

Transferred Epithet. See Hypallage.

Literary Forms

Allegory. A description or story which has a second and deeper significance below the surface. The characters are really personifications, usually representing some vice or virtue. Allegory flourished in the Middle Ages, but the best-known allegory in the world is Bunyan's "Pilgrim's Progress" (1678), which has been translated into over a hundred different languages and dialects. (*See* **G49** (1)). On the surface "The Pilgrim's Progress" is the story of a journey in which the hero encounters many difficulties but at last reaches his destination. Its inner meaning is the progress of the Christian soul through life on earth. Spenser's "Faerie Queene" (1589 and 1596) is a more subtle and complex allegory, capable of several interpretations, religious, ethical, and political. Allegory has been described as extended metaphor. *See* **M10–11.**

Autobiography. The story of a man's (or woman's) own life, written by himself. The autobiography is becoming increasingly popular, recent excellent examples being Stephen Spender's *World within World*, Richard Church's *Over the Bridge* and Laurie Lee's *Cider with Rosie*.

Ballad. There are two chief types of ballad:

1. A light song, often sentimental, as was the Victorian ballad, or a popular song, often of a personal kind, praising or attacking some notability.

2. A traditional poem, passed on by word of mouth. Many of our traditional ballads date from the 15th century. They tell some stirring tale, as do the many ballads about Robin Hood. Sometimes they record an actual occurrence, like the ballad "The Battle of Otterbourne," which tells of a Border skirmish, fought in 1388. Such ballads are enlivened by lively dialogue, and they use a special kind of stanza, which is described on **M5.**

Ballade. A short highly stylised poem, with a strict verse form. *See* **M9.**

Biography. A narrative telling the life story of some actual person, usually a well known figure. The most famous biographer of classical times was Plutarch, who in the 1st century B.C. wrote his series of parallel "Lives" of twenty-three Greeks and twenty-three Romans. *See* **G78** (1). The English translation of this provided Shakespeare with some of the plots of his plays. Boswell's *Life of Samuel Johnson* (1791) is our best-known English biography.

Burlesque. The aim of burlesque is to make us laugh by ridiculing the work of some other writer. Sometimes it treats his serious subject in a mocking way. Sometimes it takes the form of an absurd imitation or caricature of his style. Some of our most successful burlesques are dramatic in form, like Sheridan's "The Critic," produced in 1779. This has a play within a play, called "A Tragedy Rehears'd," a brilliant burlesque of the sentimental, historical plays so popular in his time. Danny Kaye's film, "The King's Jester," is a burlesque of pseudo-historical films.

Chant Royal. A poem of a strictly formal kind, French in origin. *See* **M9.**

Clerihew. A single-stanza verse form, four lines long. *See* **M9.**

Comedy. A play which is happy and amusing in tone, but not necessarily light or superficial. A comedy always has a fortunate conclusion. Shakespeare's "Twelfth Night" and Oscar Wilde's "The Importance of being Earnest" are typical examples.

Drama. A play in verse or prose, where the story is unfolded and the characters represented through the actions and speeches of actors on a stage. It is essential to good drama that there should be some kind of dynamic action and some conflict between the characters. In comedy the conflict is usually open and external. "As You Like It," for instance, begins with a quarrel between Orlando and Oliver. But most of the world's finest tragedies reveal also an inner conflict in the soul of man. In "Hamlet" the hero is at odds with many people, including his mother, the king, Ophelia, Polonius, and Laertes, but all these struggles are of secondary significance, compared with the conflict in his own mind. Even a play like "Waiting for Godot," which reduces incident and conflict to a minimum, must make some concession to the demand of the audience for the dynamic. Drama cannot be static. Occasionally poets have written dramas which they knew were not practicable for the stage. Shelley's lyrical dramas, "Prometheus Unbound" and "Hellas," are of this kind.

Eclogue. In classical literature a brief poem, usually in the form of a dialogue between shepherds. It was a popular form in the time of the Renaissance; Spenser's "Shepheardes Calendar" (1579) consists of twelve eclogues, one for each month of the year.

Elegy. A lyric poem of lamentation for the dead. Gray's "Elegy in a Country Church-yard" (1750) is the best-known English elegy. It reflects in a general way on the "destiny obscure" of the humble folk who are buried in a quiet church-yard, probably that of Stoke Poges, but most elegies mourn the death of only one person. Such are Shelley's "Adonais" (1821), on the death of Keats, and Matthew Arnold's "Thyrsis" (1867), commemorating his friend Arthur Hugh Clough. Tennyson's "In Memoriam" (1850) is unusual, in that it is not a single elegy, but a series of elegiac poems, inspired by the poet's grief for the death in 1833 of his friend Arthur Hallam.

Epic. A very long narrative poem, usually consisting of several books. The epic tells of the splendid deeds of some hero of history or legend, and is frequently concerned with war. Some of the world's greatest epics are the Greek "Iliad" and "Odyssey," ascribed to Homer, the Latin "Aeneid" of Virgil, the Hindu "Mahabharata," and Milton's "Paradise Lost," whose hero is God himself. The epic is distinguished by its sustained dignity of style.

Epilogue. *See* **Prologue.**

Essay. The word essay, derived from the French, means literally an "attempt" or "endeavour," and as a literary term it applies to a short prose composition which attempts to present the author's reflections on any subject he chooses. As a literary form the essay derives from the French "Essais" of Montaigne, first translated into English by Florio in 1603. (*See* **G48** (1).) Our first English essayist was Francis Bacon, who published between 1597 and 1625 three volumes of his essays, brief, pithy, and objective in character. In course of time the essay has be-

come more subjective and personal, especially in the hands of Lamb, Hazlitt, and contemporary writers.

Extravaganza. A composition, musical or literary, which uses improbable and fantastic elements and incidents. A good example of narrative extravaganza is Thackeray's *Rose and the Ring* (1855), in which, for instance, Gruffanuff's husband, the footman, is, because of his rudeness, turned into a door-knocker. Extravaganzas are frequently dramatic in form, and most pantomimes may be regarded as such.

Fable. A very brief story designed to teach some lesson or moral. The characters of the story are often animals, birds, or insects, which converse like human beings. The most famous of all fables are those attributed to Aesop, and those of La Fontaine, the French writer of the 17th century.

Farce. A species of dramatic comedy whose whole aim is to excite laughter. It does not scruple to use improbable characters and incidents and absurd situations. "Charley's Aunt" is a typical farce.

Lampoon. A coarse satire (q.v.) attacking an individual. Lampoons are usually short. The word itself is derived from a French word meaning "drinking song."

Limerick. A single-stanza verse form, 5 lines long and with a formal metre and rhyme scheme. *See* **M7**.

Lyric. In ancient Greece a lyric was originally a poem meant to be sung to the accompaniment of the lyre, a stringed musical instrument rather like a small harp. Later the word was used for a poem with song-like qualities: short, usually divided into verses, and expressing the feelings of the poet. The lyric flourished in England in the Elizabethan age, as witnessed by the lovely lyrics scattered through Shakespeare's plays. Neglected in the 18th century, it became popular again with the Romantic poets of the 19th century. Odes, elegies, and sonnets are all species of lyrics.

Mask or **Masque.** A dramatic entertainment performed by amateurs and originating in the court masquerade. The action or plot of the masque is of the slightest and there is little concern with portrayal of character, for the masque gives pleasure by means of its verse, music, and dancing, and its elegant costume and scenery. It was very popular in the 16th and 17th centuries, and from 1605 Ben Jonson wrote many court masques, for which Inigo Jones designed original costumes and settings. Our best-known examples are Shakespeare's masque in Act IV of "The Tempest" and Milton's "Comus."

Melodrama. There are two meanings of the word melodrama.

1. In the early 19th century a melodrama meant a play, usually of a romantic and sensational kind, in which songs were inserted, and where an orchestra accompanied the action. The musical comedy of today might be regarded as its modern counterpart.

2. Today the word melodrama is used of an inferior kind of play, which deliberately excites the emotions by its sensational and violent happenings, but which has a happy ending. We should be careful to distinguish melodrama, which uses violence for its own sake, from serious plays, like "Hamlet" or "King Lear," where violent acts are only incidents necessary to a profound interpretation of human conduct.

Memoirs. The word is normally used of a record of events of which the author has some personal experience or special source of information.

Miracle Plays. Mediæval verse plays produced from the late 14th to 16th centuries by the town guilds and performed in the market-place, or other suitable open space. They consisted of a series of dramatised stories from the Bible or Lives of Saints. Each scene would be allotted to one of the guilds, which was then responsible for its production on a wheeled stage. As soon as the actors of one guild had completed their scene, their stage would be trundled off, sometimes to another rendezvous, and would itself be succeeded by another stage with its scene, until a whole cycle of episodes had been performed. Four great cycles of miracle plays are still extant called after the towns where they were probably performed, York, Coventry, Chester, and Wakefield. The Wakefield cycle is often called the Towneley cycle. The plays have not only a strong religious sense but also a lively comic spirit. The Towneley cycle has some especially racy comic scenes. One popular incident shows the noisy quarrel that results when Noah's wife refuses to go into the ark. *See* **G39** (**2**).

Mock Heroic. A species of parody (*q.v.*), caricaturing some play or poem written in a lofty and high-flown style. "The Rehearsal" (1672), by Villiers, is typical. It is an absurd imitation ridiculing the artificial and high falutin' heroic plays which were then in vogue.

Monody. In Greek literature an ode sung by a single voice, like our solo in music. In English literature it signifies a poem of mourning for someone's death. The elegies "Lycidas," by Milton, and "Thyrsis," by Matthew Arnold, were both called monodies by their authors.

Monologue. Originally a scene where one person of the drama spoke alone. Today it usually means a dramatic composition for a single actor, such as the well-known Lancashire monologues presented by Stanley Holloway. The word is also sometimes used as meaning soliloquy.

Moralities or **Morality Plays.** Mediæval verse plays of an allegorical kind, which attempted to teach lessons of virtue, the persons of the drama usually being not real people, but personifications. Most Moralities date from the 15th century, the best known being "Everyman," which is Dutch in origin. The hero, Everyman, is summoned by Death, and vainly appeals for help to his friends, Fellowship, Kindred, Goods, Knowledge, Beauty, and Strength, but all fail him. Only his own Good Deeds will consent to accompany him on his last journey. *See* **G39** (**2**).

Mysteries or **Mystery Plays.** Some modern writers use the term "Mystery play" instead of "Miracle play" (*q.v.*). It is really an alternative title. One critic tried to distinguish between "Mystery plays," as concerned with stories from the Gospels, and "Miracle plays," as concerned with the lives and deeds of Saints, but this distinction is not usually followed.

Novel. A lengthy prose fiction in narrative form, telling a realistic story of people and their doings. Its chief interest is in character and incident. The first English novelist was Samuel Richardson, whose novels, especially *Pamela* (1740–41) and *Clarissa Harlowe* (1747–48), had a European reputation. In the present century writers like James Joyce, and Virginia Woolf have written what have been called novels of the "stream of consciousness," where the interest lies not so much in the incidents as in the mind's response to events, and reflections.

Ode. In classical literature an ode was a poem to be sung. In English literature it signifies a

lyric poem, usually in rhyme, and is seldom longer than 150 lines. It is usually in the form of an address, and lofty in its feeling and style. The ode was popular with the romantic poets. Some of our best known are Shelley's "Ode to the West Wind," and Keats' "Ode to a Nightingale," "Ode on a Grecian Urn," and "To Autumn," all of them published in 1820.

Parable. A brief story serving as an example of some general principle, usually ethical, which gives the story its significance. Such is Christ's parable of the Good Samaritan. Most parables are miniature allegories. The parables of the Sower and the Good Shepherd are both allegorical in form.

Parody. A literary caricature, which mimics the themes and style of some other author in such a way as to make his faults seem absurd and laughable. J. C. Squire's *Tricks of the Trade* is an amusing collection of his skilful parodies of such writers as Byron, Wordsworth, and Masefield.

Pastoral. A pastoral poem, romance, or play is one in which the life of shepherds or of simple rustic folk is portrayed in an idealised way. Originating in Greek literature, the pastoral was revived at the time of the Renaissance. Spenser's "Shepheardes Calendar" consists of twelve pastoral eclogues. Shakespeare's "As You Like It" is a pastoral play, Milton's "Lycidas" is a pastoral elegy and his "Comus" a pastoral masque. There is usually in the pastoral a deeper meaning below the surface. A critic has said, "The shepherd's cloak was the acknowledged disguise of the lover, the poet, the courtier, the pastor of souls, the critic of contemporary life." In the pastoral form the charm of a simple setting and deeper significance are combined.

Prologue and Epilogue. Generally speaking, a prologue means a foreword, or preface, and an epilogue an appendix to a literary work, but the terms are often used more specifically when referring to a play. Here the prologue is a short speech in verse or prose spoken to the audience by one of the actors before the play begins, the epilogue a similar speech after its conclusion. The prologue endeavours to put the audience into a receptive state of mind, the epilogue to ask for a kind reception to the play. Shakespeare's "Romeo and Juliet" has a prologue, his "As You Like It" an epilogue, spoken by Rosalind, who says, "Good plays prove the better by the help of a good epilogue." In the 18th century it was customary for a leading actor to speak the prologue and for a leading actress to make a plea for the play in the epilogue.

Romance. The romance of the early Middle Ages was a fictitious tale in verse, telling the adventures of some hero of chivalry, the interest being in the incidents, sometimes of a supernatural kind, rather than in character. The most famous of these early romances is the French "Chanson de Roland" of the early 12th century. (*See* **G38** (2).) In the later Middle Ages a romance might be written in prose. In the 16th and 17th centuries a romance meant a tale in either prose or verse in which the scenes and incidents were remote from those of real life. Sir Philip Sidney's "Arcadia" (1590), written to entertain his sister, is of this type. Today the word romance is rather vaguely used of a tale of somewhat improbable events. Sir Henry Rider Haggard wrote several such romances, including *King Solomon's Mines* (1886), and *She* (1887).

Rondeau. A poem of a strictly formal kind, French in origin. *See* **M8**.

Rondel. A poem similar in form to the rondeau. *See* **M9**.

Roundel. A variation of the Rondeau. *See* **M9**.

Saga. The word saga, which is of Norse origin, and means story, is applied to the mediæval prose narratives of Iceland and Norway, especially those concerned with the traditions of Icelandic families and Norwegian kings. William Morris, in his "Earthly Paradise," gives in "The Lovers of Gudrun" a version of the Icelandic Laxdæla Saga. *See also* **G38** (2).

Satire. A work in either verse or prose attacking folly and vice. Pope's "Dunciad," in verse, published between 1728 and 1743, ridicules contemporary authors and literary follies in a massive attack on dulness and literary hacks. Swift's *Gulliver's Travels* (1726), which on the surface is a series of prose tales of travel to imaginary countries, is actually a comprehensive satire. It begins, in the first book on "Lilliput," with incisive ridicule of the squabbles between English political parties and religious sects, and culminates, in the final book on the Houyhnhnms, in a devastating attack on all that is bestial in human nature. Samuel Butler's *Erehwon* (an anagram of Nowhere), published in 1872, also uses a prose travel tale in his satirical exposure of Victorian convention and hypocrisy. Although not precisely satires, many of Shaw's plays are satirical in spirit. "Arms and the Man" may be considered in one of its aspects as a satire on war.

Sestina. A poem of a strictly formal kind, French in origin. *See* **M9**.

Skit. A light satire, often in the form of parody.

Soliloquy. In a soliloquy a man talks to himself, or utters his thoughts aloud regardless of the presence of others who may hear him. The word is usually applied to such utterances by a character in a play. The most famous soliloquies in literature are those of Hamlet.

Sonnet. A lyric poem of fourteen lines, with an intricate rhyme scheme. *See* **M6**.

Squib. A brief, sharp satire (*q.v.*) attacking an individual.

Threnody. A term from the Greek, seldom used today. It means a song of mourning, especially a lament for the dead.

Tragedy. A play, or other literary work, which is preoccupied with the serious and unhappy aspects of life. It is sombre in tone and ends with misfortune. Shakespeare's "Macbeth" and Ibsen's "Ghosts" are typical tragedies.

Tragi-Comedy. The word is used in two different ways:

(*a*) It may denote a play (or very occasionally a story) which combines both tragic and comic elements. Chekhov's "The Cherry Orchard" is a tragi-comedy of this type.

(*b*) It may also mean a play which is for the most part sombre in theme and tone, but which has a happy conclusion, like Shakespeare's "The Winter's Tale."

Trilogy. In Greek literature a series of three tragedies, like Aeschylus' trilogy, the "Oresteia," written when he was nearly seventy, in the 5th century B.C. (*See* **G21** (1).) In modern times the word trilogy is applied to any sequence of three literary works which are related to each other in subject and theme.

Triolet. A single-stanza verse form, eight lines long, and with a very formal pattern, French in origin. *See* **M8**.

Villanelle. A poem of a strictly formal kind, French in origin. *See* **M8**.

How to Enjoy a Poem

Many people who enjoy listening to music, and seeing paintings, find it difficult to appreciate poetry, and a few suggestions as to how we may approach a poem may be useful. A very good practice is to read the poem aloud. Poetry uses the musical sounds and rhythms of words, and although the printed words on the page may seem flat, like a score of music, the actual sound and rhythm of the spoken words help the lines to come alive. It is best when reading or hearing a poem for the first time to keep an open mind, ready to receive whatever impression it may make and trying to suspend judgment. Someone was once looking at a piece of modern statuary that he could not understand and was foolishly condemning, when a friend who was an art critic said, "Just walk round it." In the same way we can, as it were, walk round the poem until its significance begins to dawn on us. We must remember first and foremost that a poet normally uses words not literally, but with a figurative meaning. He loves to speak of one thing as if it were another. When Keats describes the pleasure he has had in his wide reading he speaks of books as if they were countries and he himself a traveller.

"Much have I travell'd in the realms of gold,
And many goodly states and kingdoms seen."
OBEV 641.

Making out the Meaning. Remembering always that the poet normally speaks in images, we need to pay close attention to the words he uses if we are to enjoy their full meaning. I. A. Richards describes in his book *Practical Criticism*, 1929, how he gave a group of people, undergraduates and others, unfamiliar poems to read and then asked for their written interpretations. In the light of these, he formulated certain principles which aid one in "making out the meaning," which as he rightly says is the fundamental problem. He distinguished four kinds of "meaning": the plain "sense" of the poem, the "feeling," the "tone," and the "intention," and many readers of poetry now find it enlightening to consider a poem from these four aspects. The plain "sense" is arrived at simply by deciphering the words, and incidentally the punctuation, in an attempt to find out what the poet actually says. Readers do not always take the trouble to do this. Another aspect of meaning is the poet's "feeling" for his subject. Does he, for instance, express awe, tenderness, anger, amusement? Then there is his "tone" towards the reader. Is it confidential, or appealing, or didactic? Finally Richards speaks of the "intention" of the poem, the whole aim that the writer is trying to pursue.

Distinguishing Subject and Theme. Another illuminating way of looking at a poem is to distinguish between its subject and its theme, for they are seldom identical. A poet loves to transpose his experience into another setting, and below his surface narrative or description, we usually find a secondary meaning, the theme, which is the core of the poem. Often there are many such themes, subtly woven together. Keats chose for the subject of one of his odes a Grecian urn (OBEV 632), but the themes of the ode are manifold, one being the magic of art which captures for ever the fleeting moment. Similarly, Shelley addressed an ode to the West Wind, and here one of the main themes is a plea for poetic inspiration (OBEV 617).

The Formal Aspects of the Poem. Other pointers to its meaning are the formal pattern of the poem—the literary form in which it is cast, the versification (*see* **M2–9**), the kind of imagery, or figures of speech (*see* **M10–11**). The great poet suits the form to the meaning, as the glove fits a hand, and although the form, like the glove, is something external, it can give a clear indication of what is within.

Study of Shakespeare's Sonnet 73 (OBEV 162).

"That time of year thou may'st in me behold,
When yellow leaves, or none, or few do hang
Upon those boughs which shake against the cold—
Bare ruin'd choirs where late the sweet birds sang.
In me thou see'st the twilight of such day,
As after Sunset fadeth in the West,
Which by and by black night doth take away,
Death's second self that seals up all in rest.
In me thou see'st the glowing of such fire,
That on the ashes of his youth doth lie,
As the death-bed, whereon it must expire,
Consum'd with that which it was nourish'd by.
This thou perceiv'st, which makes thy love more strong,
To love that well, which thou must leave ere long."

Kinds of Meaning. Searching for the plain "sense," we find here three clearly defined images, the first of very late autumn,

"When yellow leaves, or none, or few do hang
Upon those boughs which shake against the cold——"

Then follows an image of twilight, the brief phase after the sunset has faded and before the fall of night. The third image is of a dying fire, glowing amid its ashes. All these, says Shakespeare, "thou may'st in me behold." All three, then, suggest that phase in man's life that follows the prime, the decline towards death. The "feeling" of these first twelve lines is sombre and foreboding, and in its "tone" the poem speaks to one alone—"thou may'st behold," "thou see'st." Then when we reach the concluding couplet we perceive the "intention" of the poem. It is a love poem,

"This thou perceiv'st, which makes thy love more strong,
To love that well, which thou must leave ere long."

The sober reflections on decline and death are set against a statement of steadfast love.

Subject and Theme. We can also approach the poem trying to distinguish "subject and theme." Then we perceive more clearly the theme of the imminence of death, which gradually develops and gathers momentum. For instance, the trees are called "bare ruin'd choirs" where the birds no longer sing, and this suggests a ruined empty abode from which the voice has flown, the spirit departed. Then the "black night" which succeeds twilight is "Death's second self," and the fire lies on the ashes "As the death-bed, whereon it must expire."

The very colours of the poem are suggestive. A picture is painted in sombre greys and black, lit up by a dull glow soon to be engulfed in darkness, the yellow leaves on the bough, the sunset fading into twilight, the fire dying on the ashes. It is like the chiaroscuro of a Rembrandt painting.

Formal Pattern. If we now attend to the formal patterns of the poem we find how exquisitely they match the sense. The poem is a sonnet (*see* **M6**), that is a brief lyric poem of only fourteen lines, expressing feeling in a taut and concentrated way. There is no room for digression; every word counts.

As we expect from a Shakespearean sonnet we find the rhyme scheme ABAB CDCD EFEF GG. This indicates that the poem will naturally take the design of three quatrains and a concluding couplet. Then how exquisitely and precisely each image is contained within the brief compass of its quatrain, and how apt are the metaphors in which the images are expressed.

Even so we have no longer exhausted the significance of this short poem. Much is left to discover, and light is shed by the sonnets that precede and follow it in Shakespeare's sequence.

FAMILIAR FOREIGN PHRASES AND CLASSICAL QUOTATIONS

Fr., French. Gr., Greek. Ger., German. It., Italian. L., Latin. Sp., Spanish.

à bas (Fr.), down, down with.
ab extra (L.), from without.
ab incunabilis (L.), from the cradle.
ab initio (L.), from the beginning.
ab intra (L.), from within.
à bon chat, bon rat (Fr.), to a good cat, a good rat; well attacked and defended; tit for tat; a Rowland for an Oliver.
à bon marché (Fr.), cheap, a good bargain.
à bras ouverts (Fr.), with open arms.
absente reo (L.), the accused being absent.
absit invidia (L.), let there be no ill-will; envy apart.
ab uno disce omnes (L.), from one specimen judge of all the rest; from a single instance infer the whole.
ab urbe conditâ (L.), from the building of the city; i.e., Rome.
a capite ad calcem (L.), from head to heel.
à chaque saint sa chandelle (Fr.), to each saint his candle; honour where honour is due.
à cheval (Fr.), on horseback.
à compte (Fr.), on account; in part payment.
à corps perdu (Fr.), with might and main.
à couvert (Fr.), under cover; protected; sheltered.
ad astra (L.), to the stars.
ad calendas Græcas (L.), at the Greek calends; *i.e.*, never, as the Greeks had no calends in their mode of reckoning.
à demi (Fr.), by halves; half-way.
a Deo et rege (L.), from God and the king.
ad hoc (L.), arranged for this purpose; special.
ad hominem (L.), to the man; to an individual's interests or passions; personal.
adhuc sub judice lis est (L.), the case has not yet been decided.
a die (L.), from that day.
ad infinitum (L.), to infinity
ad interim (L.), in the meantime.
ad libitum (L.), at pleasure.
ad modum (L.), after the manner of.
ad nauseam (L.), to disgust or satiety.
ad referendum (L.), for further consideration.
ad rem (L.), to the purpose; to the point.
ad valorem (L.), according to the value.
affaire d'amour (Fr.), a love affair.
affaire d'honneur (Fr.), an affair of honour; a duel.
affaire de cœur (Fr.), an affair of the heart.
a fortiori (L.), with stronger reason.
à gauche (Fr.), to the left.
à genoux (Fr.), on the knees.
à haute voix (Fr.), aloud.
à huis clos (Fr.), with closed doors; secretly.
à la belle étoile (Fr.), under the stars; in the open air.
à la bonne heure (Fr.), well timed; all right; very well; as you please.
à l'abri (Fr.), under shelter.
à la mode (Fr.), according to the custom or fashion.
à la Tartufe (Fr.), like Tartuffe, the hero of a celebrated comedy by Molière; hypocritically.
al fresco (It.), in the open air; out-of-doors.
al più (It.), at most.
alter ego (L.), another self.
à merveille (Fr.), to a wonder; marvellously.
amor patriæ (L.), love of country.
amour-propre (Fr.), self-love; vanity.
ancien régime (Fr.), the ancient or former order of things.
anguis in herba (L.), a snake in the grass.
anno Christi (L.), in the year of Christ.
anno Domini (L.), in the year of our Lord.
anno mundi (L.), in the year of the world.
annus mirabilis (L.), year of wonders; wonderful year.
ante bellum (L.), before the war.
ante lucem (L.), before light.
ante meridiem (L.), before noon.
à outrance (Fr.), to the utmost; to extremities; without sparing.
à pied (Fr.), on foot.
à point (Fr.), to a point, just in time, exactly right.
a posse ad esse (L.), from possibility to reality.
ariston metron (Gr.), the middle course is the best; the golden mean.
arrière-pensée (Fr.), hidden thought; mental reservation.
au courant (Fr.), fully acquainted with.
audi alteram partem (L.), hear the other side.
au fait (Fr.), well acquainted with; expert.
au fond (Fr.), at bottom.
auf Wiedersehen! (Ger.), till we meet again.
au pis aller (Fr.), at the worst.
au revoir (Fr.), adieu till we meet again.
aut vincere aut mori (L.), either to conquer or to die; death or victory.
a verbis ad verbera (L.), from words to blows.
a vinculo matrimonii (L.), from the bond of matrimony.
à volonté (Fr.), at pleasure.
a vostra salute (It.), *à votre santé* (Fr.), *a vuestra salud* (Sp.), to your health.
bas bleu (Fr.), a blue-stocking; a literary woman.
beau monde (Fr.), the world of fashion.
beaux esprits (Fr.), men of wit; gay spirits.
beaux yeux (Fr.), fine eyes; good looks.
ben trovato (It.), well or cleverly invented.
bête noire (Fr.), a black beast; a bugbear.
bon gré mal gré (Fr.), with good or ill grace; willing or unwilling.
bonhomie (Fr.), good-nature; artlessness.
bonne bouche (Fr.), a delicate or tasty morsel.
bon vivant (Fr.), a good liver; a gourmand.
brutum fulmen (L.), a harmless thunderbolt.
canaille (Fr.), rabble.
candida Pax (L.), white-robed Peace.
casus belli (L.), that which causes or justifies war.
causa sine qua non (L.), an indispensable cause or condition.
caveat emptor (L.), let the buyer beware (or look after his own interest).
cela va sans dire (Fr.), that goes without saying; needless to say.
ceteris paribus (L.), other things being equal.
chacun son goût (Fr.), every one to his taste.
cogito, ergo sum (L.), I think, therefore I exist.
comme il faut (Fr.), as it should be.
compos mentis (L.), sound of mind; quite sane.
compte rendu (Fr.), an account rendered; a report or statement drawn up.
conditio sine qua non (L.), a necessary condition.
conseil de famille (Fr.), a family consultation.
consensus facit legem (L.), consent makes the law.
consilio et animis (L.), by wisdom and courage.
consilio et prudentia (L.), by wisdom and prudence.
constantia et virtute (L.), by constancy and virtue.
contra bonos mores (L.), against good manners.
contretemps (Fr.), an unlucky accident; a hitch.
cordon bleu (Fr.), blue ribbon; a cook of the highest class.
cordon sanitaire (Fr.), a line of guards to prevent the spreading of contagion or pestilence.
corpus delicti (L.), the body or substance of a crime or offence.
corrigenda (L.), things to be corrected.
coup de grâce (Fr.), a finishing stroke.
coup d'état (Fr.), a sudden decisive blow in politics; a stroke of policy.
coup de soleil (Fr.), sunstroke.
credat Judæus Apella (L.), let Apella, the superstitious Jew, believe it (I won't); tell that to the marines.
cucullus non facit monachum (L.), the cowl does not make the friar.
cui bono? (L.), For whose advantage is it? to what end?
culpam pœna premit comes (L.), punishment follows hard upon crime.
cum grano salis (L.), with a grain of salt; with some allowance.
cum privilegio (L.), with privilege.
currente calamo (L.), with a fluent pen.
da locum melioribus (L.), give place to your betters.
damnant quod non intelligunt (L.), they condemn what they do not comprehend.
data et accepta (L.), expenditures and receipts.
de bon augure (Fr.), of good augury or omen.
de bonne grâce (Fr.), with good grace; willingly.

de die in diem (L.), from day to day.
de facto (L.), in point of fact; actual or actually.
dei gratia (L.), by God's grace.
de jure (L.), from the law; by right.
de mal en pis (Fr.), from bad to worse.
de novo (L.), anew.
deo volente (L.), God willing; by God's will.
de profundis (L.), out of the depths.
dernier ressort (Fr.), a last resource.
deus ex machina (L.), one who puts matters right at a critical moment; providential intervention.
dies non (L.), a day on which judges do not sit.
distingué (Fr.), distinguished; of genteel or elegant appearance.
dolce far niente (It.), sweet doing-nothing; sweet idleness.
double entente (Fr.), a double meaning; a play on words.
dramatis personæ (L.), characters of the drama or play.
dum spiro, spero (L.), while I breathe, I hope.
ecce homo! (L.), behold the man!
eheu! fugaces labuntur anni (L.), alas! the fleeting years glide by.
einmal ist keinmal (Ger.), just once doesn't count.
en avant (Fr.), forward.
en badinant (Fr.), in sport; in jest.
en déshabillé (Fr.), in undress.
en famille (Fr.), with one's family; in a domestic state.
enfant terrible (Fr.), a terrible child, or one that makes disconcerting remarks.
enfin (Fr.), in short; at last; finally.
en passant (Fr.), in passing; by the way.
en plein jour (Fr.), in broad day.
en rapport (Fr.), in harmony; in agreement; in relation.
en règle (Fr.), according to rules; in order.
entente cordiale (Fr.), cordial understanding, especially between two states.
entre nous (Fr.), between ourselves.
en vérité (Fr.), in truth; verily.
e pluribus unum (L.), one out of many; one composed of many.
esprit de corps (Fr.), the animating spirit of a collective body, as a regiment, learned profession or the like.
et sequentes, et sequentia (L.), and those that follow.
et tu, Brute! (L.), and thou also, Brutus!
ex animo (L.), heartily; sincerely.
ex capite (L.), from the head; from memory.
ex cathedra (L.), from the chair or seat of authority, with high authority.
exceptio probat regulam (L.), the exception proves the rule.
ex curia (L.), out of court.
ex dono (L.), by the gift.
exeunt omnes (L.), all go out or retire.
exit (L.), he goes out.
ex mero motu (L.), from his own impulse, from his own free will.
ex nihilo nihil fit (L.), out of nothing, nothing comes; nothing produces nothing.
ex officio (L.), in virtue of his office.
ex post facto (L.), after the deed is done; retrospective.
face à face (Fr.), face to face.
façon de parler (Fr.), manner of speaking.
faire bonne mine (Fr.), to put a good face upon the matter.
fait accompli (Fr.), a thing already done.
fama clamosa (L.), a current scandal; a prevailing report.
faute de mieux (Fr.), for want of better.
faux pas (Fr.), a false step; a slip in behaviour.
festina lente (L.), hasten slowly.
fiat justitia, ruat cœlum (L.), let justice be done though the heavens should fall.
fiat lux (L.), let there be light.
fide et amore (L.), by faith and love.
fide et fiduciâ (L.), by fidelity and confidence.
fide et fortitudine (L.), with faith and fortitude.
fidei defensor (L.), defender of the faith.
fide non armis (L.), by faith, not by arms.
fide, sed cui vide (L.), trust, but see whom.
fides et justitia (L.), fidelity and justice.
fides Punica (L.), Punic faith; treachery.
filius nullius (L.), a son of nobody; a bastard.
finis coronat opus (L.), the end crowns the work.
flagrante bello (L.), during hostilities.
flagrante delicto (L.), in the commission of the crime.
floreat (L.), let it flourish.
fons et origo (L.), the source and origin.
force majeure (Fr.), irresistible compulsion; war, strike, Act of God, etc.
forensis strepitus (L.), the clamour of the forum.
fortuna favet fortibus (L.), fortune favours the bold.
functus officio (L.), having performed one's office or duty; hence, out of office.
gaudeamus igitur (L.), so let us be joyful!
genius loci (L.), the genius or guardian spirit of a place.
gradu diverso, via una (L.), the same road by different steps.
grande parure / *grande toilette* (Fr.), full dress.
guerra al cuchillo (Sp.), war to the knife.
Hannibal ante portas (L.), Hannibal before the gates; the enemy close at hand.
hiatus valde deflendus (L.), a chasm or deficiency much to be regretted.
hic et nunc (L.), here and now.
hic et ubique (L.), here and everywhere.
hic jacet (L.), here lies.
hic labor, hoc opus est (L.), this is a labour, this is a toil.
hic sepultus (L.), here buried.
hoc genus omne (L.), all of this sort or class.
hoi polloi (Gr.), the many; the vulgar; the rabble.
hominis est errare (L.), to err is human.
homme de robe (Fr.), a man in civil office.
homme d'affaires (Fr.), a man of business.
homme d'esprit (Fr.), a man of wit or genius.
honi soit qui mal y pense (O. Fr.), evil to him who evil thinks.
honores mutant mores (L.), honours change men's manners or characters.
hors de combat (Fr.), out of condition to fight.
hors de propos (Fr.), not to the point or purpose.
hors-d'œuvre (Fr.), out of course; out of order.
ich dien (Ger.), I serve.
idée fixe (Fr.), a fixed idea.
id est (L.), that is.
il a le diable au corps (Fr.), the devil is in him.
Ilias malorum (L.), an Iliad of ills; a host of evils.
il penseroso (It.), the pensive man.
il sent le fagot (Fr.), he smells of the faggot; he is suspected of heresy.
imperium in imperio (L.), a state within a state; a government within another.
in actu (L.), in act or reality.
in articulo mortis (L.), at the point of death; in the last struggle.
in capite (L.), in chief.
in curia (L.), in court.
index expurgatorius / *index prohibitorius* (L.), a list of books prohibited to Roman Catholics.
in esse (L.), in being; in actuality.
in extenso (L.), at full length.
in extremis (L.), at the point of death.
in memoriam (L.), to the memory of; in memory.
in nubibus (L.), in the clouds.
in petto (It.), in (my) breast; to one's self.
in re (L.), in the matter of.
in sano sensu (L.), in a proper sense.
in situ (L.), in its original situation.
in vino veritas (L.), there is truth in wine; truth is told under the influence of intoxicants.
ipse dixit (L.), he himself said it; a dogmatic saying or assertion.
ipsissima verba (L.), the very words.
ipso facto (L.), in the fact itself.
ipso jure (L.), by the law itself.
jacta est alea (L.), the die is cast.
je ne sais quoi (Fr.), I know not what.
joci causa (L.), for the sake of a joke.
labor omnia vincit (L.), labour conquers everything.
l'allegro (It.), the merry man.
lapsus linguæ (L.), a slip of the tongue.
lares et penates (L.), household gods.
laus Deo (L.), praise to God.
le beau monde (Fr.), the fashionable world.
lector benevole (L.), kind or gentle reader.
le jeu n'en vaut pas la chandelle (Fr.), the game is not worth the candle; the object is not worth the trouble.
le mot de l'énigme (Fr.), the key to the mystery.
le point du jour (Fr.), daybreak.
lèse-majesté (Fr.), high-treason.
lettre de cachet (Fr.), a sealed letter containing private orders; a royal warrant.
lex loci (L.), the law or custom of the place.
lex non scripta (L.), unwritten law; common law.
lex scripta (L.), written law; statute law.
locum tenens (L.), a deputy.

lucri causa (L.), for the sake of gain.
magnum opus (L.), a great work.
mala fide (L.), with bad faith; treacherously.
mal à propos (Fr.), ill-timed; out of place.
malgré nous (Fr.), in spite of us.
malheur ne vient jamais seul (Fr.), misfortunes never come singly.
malum in se (L.), evil or an evil in itself.
mardi gras (Fr.), Shrove-Tuesday.
mariage de convenance (Fr.), marriage from motives of interest rather than of love.
mauvaise honte (Fr.), false modesty.
mauvais goût (Fr.), bad taste.
mea culpa (L.), my fault; by my fault.
me judice (L.), I being judge; in my opinion.
mens agitat molem (L.), mind moves matter.
mens legis (L.), the spirit of the law.
mens sana in corpore sano (L.), a sound mind in a sound body.
meo periculo (L.), at my own risk.
meo voto (L.), according to my wish.
mise en scène (Fr.), the getting up for the stage, or the putting on the stage.
modus operandi (L.), manner of working.
more suo (L.), in his own way.
motu proprio (L.), of his own accord.
multum in parvo (L.), much in little.
mutatis mutandis (L.), with suitable or necessary alteration.
nervus probandi (L.), the sinews of the argument.
nihil ad rem (L.), irrelevant.
nil desperandum (L.), there is no reason to despair.
noblesse oblige (Fr.), rank imposes obligations; much is expected from one in good position.
nolens volens (L.), willing or unwilling.
nom de guerre (Fr.), a false or assumed name.
non compos mentis (L.), not of sound mind.
non sequitur (L.), it does not follow.
nosce te ipsum (L.), know thyself.
nota bene (L.), mark well.
nudis verbis (L.), in plain words.
obiter dictum (L.), a thing said by the way.
omnia vincit amor (L.), love conquers all things.
ora pro nobis (L.), pray for us.
O tempora! O mores! (L.), O the times! O the manners (or morals)!
ouï-dire (Fr.), hearsay.
padrone (It.), a master; a landlord.
par excellence (Fr.), by way of eminence.
pari passu (L.), at an equal pace or rate of progress.
particeps criminis (L.), an accomplice in a crime.
pas de quoi (Fr. abbrev. Il n'y a pas de quoi), don't mention it.
passim (L.), everywhere; in all parts of the book, chapter, etc.
pâté de foie gras (Fr.), goose-liver pie.
pater patriæ (L.), father of his country.
patres conscripti (L.), the conscript fathers; Roman senators.
pax vobiscum (L.), peace be with you.
per ardua ad astra (L.), through rough ways to the stars; through suffering to renown.
per capita (L.), by the head or poll.
per contra (It.), contrariwise.
per diem (L.), by the day; daily.
per se (L.), by itself; considered apart.
pied-à-terre (Fr.), a resting-place; a temporary lodging.
pis aller (Fr.), the worst or last shift.
plebs (L.), the common people.
poco a poco (It.), little by little. [called for.
poste restante (Fr.), to remain in the post-office till
prima facie (L.), at first view or consideration.
primus inter pares (L.), first among equals.
pro forma (L.), for the sake of form.
pro patria (L.), for our country.
pro tanto (L.), for so much; for as far as it goes.
pro tempore (L.), for the time being.
quid pro quo (L.), one thing for another; tit for tat; an equivalent.
qui m'aime, aime mon chien (Fr.), love me, love my dog. [sent.
qui tacet consentit (L.), he who is silent gives con-
quod erat demonstrandum (L.), which was to be proved or demonstrated.
quod erat faciendum (L.), which was to be done.
quod vide (L.), which see; refer to the word just mentioned.
quo jure? (L.), by what right? [tence.
raison d'être (Fr.), the reason for a thing's exis-
re (L.), in the matter or affair of.
reculer pour mieux sauter (Fr.), to draw back in order to make a better spring.
reductio ad adsurdum (L.), the reducing of a position to a logical absurdity.
requiescat in pace (L.), may he (or she) rest in peace.
respice finem (L.), look to the end.
respublica (L.), the commonwealth.
revenons à nos moutons (Fr.), let us return to our sheep; let us return to our subject.
re vera (L.), in truth.
sans peur et sans reproche (Fr.), without fear and without reproach.
sans rime ni raison (Fr.), without rhyme or reason.
sans souci (Fr.), without care.
sartor resartus (L.), the botcher repatched; the tailor patched or mended.
sauve qui peut (Fr.), let him save himself who can.
savoir-faire (Fr.), the knowing how to act; tact.
savoir-vivre (Fr.), good-breeding; refined manners.
semper idem (L.), always the same.
seriatim (L.), in a series; one by one.
sic passim (L.), so here and there throughout; so everywhere.
sicut ante (L.), as before.
sine die (L.), without a day being appointed.
sine mora (L.), without delay.
sine qua non (L.), without which, not; indispensable condition.
sotto voce (It.), in an undertone.
spirituel (Fr.), intellectual; witty.
stet (L.), let it stand; do not delete.
sub judice (L.), under consideration.
sub pœna (L.), under a penalty
sub rosa (L.), under the rose; privately.
sub voce (L.), under such or such a word.
sui generis (L.), of its own or of a peculiar kind.
summum bonum (L.), the chief good.
tableau vivant (Fr.), a living picture; the representation of some scene by a group of persons.
tant mieux (Fr.), so much the better.
tant pis (Fr.), so much the worse.
tempora mutantur, nos et mutamur in illis (L.), the times are changing and we with them.
tempus fugit (L.), time flies.
tête-à-tête (Fr.), together in private.
tiers état (Fr.), the third estate; the commons.
to kalon (Gr.), the beautiful; the chief good.
to prepon (Gr.), the becoming or proper.
tour de force (Fr.), a feat of strength or skill.
tout à fait (Fr.), wholly; entirely.
tout à l'heure (Fr.), instantly.
tout de suite (Fr.), immediately.
tu quoque (L.), thou also.
ubique (L.), everywhere.
ubi supra (L.), where above mentioned.
ultra licitum (L.), beyond what is allowable.
ultra vires (L.), beyond powers or rights conferred by law.
urbi et orbi (L.), to the city (Rome) and the world.
utile dulci (L.), the useful with the pleasant.
ut infra (L.), as below.
ut supra (L.), as above stated.
vade in pace (L.), go in peace.
variæ lectiones (L.), various readings.
variorum notæ (L.), the notes of various commentators.
vede et crede (L.), see and believe.
veni, vidi, vici (L.), I came, I saw, I conquered.
verbatim et literatim (L.), word for word and letter for letter.
verbum sat sapienti (L.), a word is enough for a wise man.
ver non semper viret (L.), spring is not always green.
vexata quæstio (L.), a disputed question.
via media (L.), a middle course.
via trita, via tuta (L.), the beaten path is the safe path.
vice versâ (L.), the terms of the case being reversed.
videlicet (L.), that is to say; namely.
vi et armis (L.), by force of arms; by main force; by violence.
vigilate et orate (L.), watch and pray.
vita brevis, ars longa (L.), life is short; art is long.
vivat regina! (L.), long live the queen!
vivat rex! (L.), long live the king!
viva voce (L.), by the living voice; orally.
voilà (Fr.), behold; there is; there are.
voilà tout (Fr.), that's all.
volo, non valeo (L.), I am willing, but unable.
vox populi, vox Dei (L.), the voice of the people is the voice of God.

General Compendium

A collection of useful tables and data on a variety of unrelated subjects, including

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General Compendium

ENGLISH MONARCHS
(A.D. 827–1603)

Monarch	Accession	Died	Age	Reigned
I.—BEFORE THE CONQUEST.				
SAXONS AND DANES				
Egbert	827	839	—	12
Ethelwulf	839	858	—	19
Ethelbald	858	860	—	2
Ethelbert	858	865	—	7
Ethelred	865	871	—	6
Alfred the Great	871	899	50	28
Edward the Elder	899	924	54	25
Athelstan	924	939	45	15
Edmund	939	946	25	7
Edred	947	955	32	8
Edwy	955	959	18	3
Edgar	959	975	32	17
Edward the Martyr	975	979	17	4
Edmund Ironside	1016	1016	27	0
Canute the Dane	1017	1035	40	18
Harold I	1035	1040	—	5
Hardicanute	1040	1042	24	2
Edward the Confessor	1042	1066	62	24
Harold II	1066	1066	44	0
II.—FROM THE CONQUEST TO THE PRESENT DAY.				
NORMANS				
William I	1066	1087	60	21
William II	1087	1100	43	13
Henry I	1100	1135	67	35
Stephen, Count of Blois	1135	1154	50	19
PLANTAGENETS				
Henry II	1154	1189	56	35
Richard I	1189	1199	42	10
John	1199	1216	50	17
Henry III	1216	1272	65	56
Edward I	1272	1307	68	35
Edward II	1307	1327	43	20
Edward III	1327	1377	65	50
Richard II	1377	dep. 1399	34	22
Henry IV	1399	1413	47	13
Henry V — Lancaster	1413	1422	34	9
Henry VI	1422	dep. 1461	49	39
Edward IV	1461	1483	41	22
Edward V — York	1483	1483	13	0
Richard III	1483	1485	35	2
TUDORS				
Henry VII	1485	1509	53	24
Henry VIII	1509	1547	56	38
Edward VI	1547	1553	16	6
Jane	1553	1554	17	9 days
Mary I	1553	1558	43	5
Elizabeth I	1558	1603	69	44

BRITISH MONARCHS

(1603 to the present day)

Monarch	Accession	Died	Age	Reigned
		STUARTS		
James I (VI of Scotland)	1603	1625	59	22
Charles I	1625	beh. 1649	48	24
		COMMONWEALTH DECLARED, MAY 19, 1649		
Oliver Cromwell, Lord Protector	1653–8	—	—	—
Richard Cromwell, Lord Protector	1658–9	—	—	—
		STUARTS (RESTORATION)		
Charles II	1660	1685	55	25
James II (VII of Scotland)	1685	dep. 1688	68	3
		Interregnum Dec. 11, 1688 to Feb. 13, 1689		
William III and Mary II	1689	1702 1694	51 33	13 6
Anne	1702	1714	49	12
		HOUSE OF HANOVER		
George I	1714	1727	67	13
George II	1727	1760	77	33
George III	1760	1820	81	59
George IV	1820	1830	67	10
William IV	1830	1837	71	7
Victoria	1837	1901	81	63
		HOUSE OF SAXE-COBURG		
Edward VII	1901	1910	68	9
		HOUSE OF WINDSOR		
George V	1910	1936	70	25
Edward VIII	1936	Abd. 1936	—	325 days
George VI	1936	1952	56	15
Elizabeth II	1952			

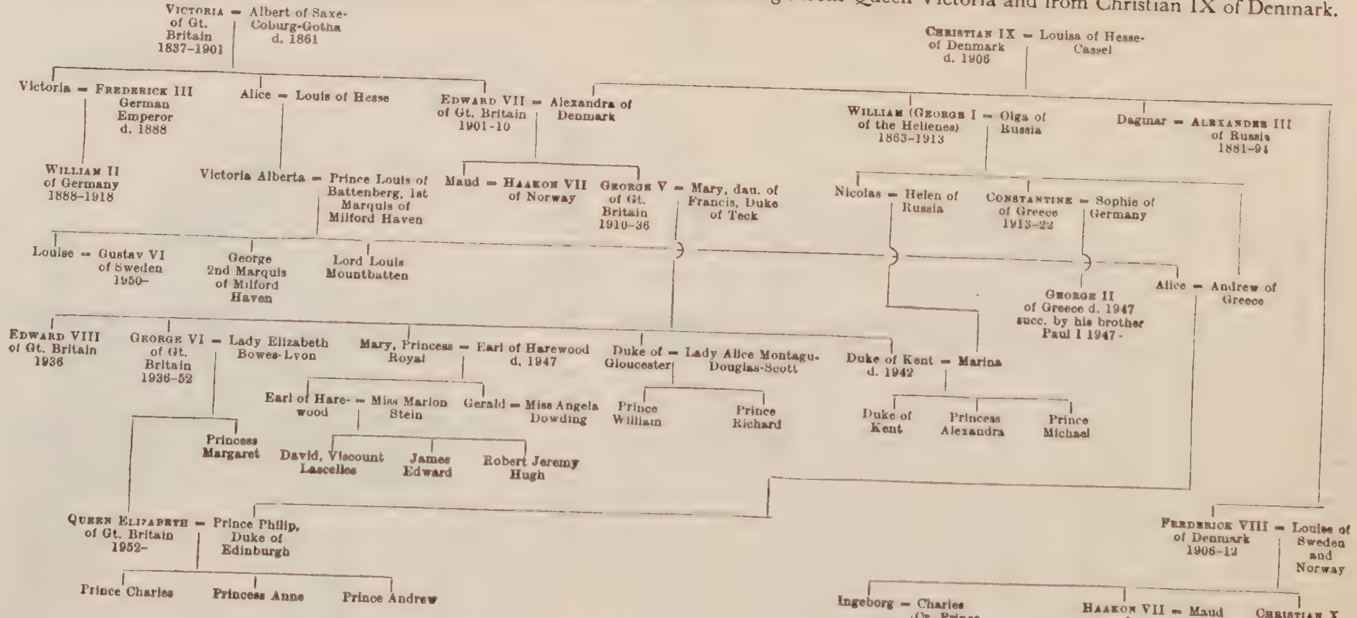
SCOTTISH MONARCHS

(1057–1603)

Monarch		Accession	Died
Malcolm III (Canmore)	Son of Duncan I (murdered by Macbeth)	1057	1093
Donald Bàn	Brother of Malcolm Canmore	1093	—
Duncan II	Son of Malcolm Canmore, by first marriage	1094	1094
Donald Bàn	Restored	1094	1097
Edgar	Son of Malcolm Canmore, by second marriage	1097	1107
Alexander I	Son of Malcolm Canmore	1107	1124
David I	Son of Malcolm Canmore	1124	1153
Malcolm IV (the Maiden)	Son of Henry, eldest son of David I	1153	1165
William I (the Lion)	Brother of Malcolm the Maiden	1165	1214
Alexander II	Son of William the Lion	1214	1249
Alexander III	Son of Alexander II, by second marriage	1249	1286
Margaret, Maid of Norway	Daughter of Eric II of Norway, granddaughter of Alexander III	1286	1290
John Baliol	Grandson of eldest daughter of David, Earl of Huntingdon, brother of William the Lion	1292	1296
Robert I (Bruce)	Great-grandson of 2nd daughter of David, Earl of Huntingdon, brother of William the Lion	1306	1329
David II	Son of Robert I, by second marriage	1329	1371
Robert II (Stewart)	Son of Marjorie, daughter of Robert I by first marriage, and Walter the Steward	1371	1390
Robert III	(John, Earl of Carrick) son of Robert II	1390	1406
James I	Son of Robert III	1406	1437
James II	Son of James I	1437	1460
James III	Eldest son of James II	1460	1488
James IV	Eldest son of James III	1488	1513
James V	Son of James IV	1513	1542
Mary	Daughter of James V, by second marriage	1542	1587
James VI (ascended the Throne of England 1603)	Son of Mary, by second marriage	1567	1625

THE ROYAL FAMILY

Showing the common descent of Queen Elizabeth and The Duke of Edinburgh from Queen Victoria and from Christian IX of Denmark.



THE SUCCESSION

The order of succession to the Throne is as follows:

1. Prince Charles.
2. Prince Andrew.
3. Princess Anne.
4. Princess Margaret.
5. [illegible]
6. Prince William of Gloucester.
7. Prince Richard of Gloucester.
8. Duke of Kent.
9. Prince Michael of Kent.
10. [illegible]
11. The Princess Royal.
12. Earl of Harewood.
13. Viscount Lascelles.
14. Hon. J. E. Lascelles.
15. [illegible]

PRECEDENCE IN ENGLAND

The Sovereign.

The Duke of Edinburgh.

The Prince of Wales.

Younger son of the Sovereign.

The Duke of Gloucester.

The Duke of Windsor.

Archbishop of Canterbury

Lord High Chancellor.

Archbishop of York.

Prime Minister.

Lord President of the Council.

Speaker of the House of Commons.

Lord Privy Seal.

High Commissioners of Commonwealth Countries and Ambassadors of Foreign States.

Ambassadors and High Commissioners.

The five Great Officers of State :

1. Lord Great Chamberlain
2. Earl Marshal
3. Lord Steward
4. Lord Chamberlain
5. Master of the Horse

} Above all of their degree.

Dukes, according to their creation :

1. Of England.
2. Of Scotland.
3. Of Great Britain.
4. Of Ireland.
5. Since the Union.

Ministers and Envoys.

Eldest sons of Dukes of Blood Royal.

Marquesses, in same order as Dukes.

Dukes' eldest sons.

Earls, in same order as Dukes.

Younger sons of Royal Dukes.

Marquesses' eldest sons.

Dukes' younger sons.

Viscounts, in same order as Dukes.

Earls' eldest sons.

Marquesses' younger sons.

Bishops of London, Durham, and Winchester.

All other English bishops, according to seniority of consecration.

Secretaries of State, if Barons.

Barons, in same order as Dukes.

Treasurer of H.M. Household.

Comptroller of H.M. Household.

Vice-Chamberlain of H.M. Household.

Secretaries of State under degree of Baron.

Viscounts' eldest sons.

Earls' younger sons.

Barons' eldest sons.

Knights of the Garter, if commoners.

Privy Councillors, if of no higher rank.

Chancellor of the Exchequer.

Chancellor of the Duchy of Lancaster.

Lord Chief Justice of England.

Master of the Rolls.

President of the Probate Court.

Lords Justices of Appeal.

Judges of the High Court of Justice.

Vice-Chancellor of County Palatine of Lancaster.

Viscounts' younger sons.

Barons' younger sons.

Sons of Life Peers.

Baronets according to date of patent.

Knights of the Thistle.

Knights of St. Patrick.

Knights Grand Cross of the Bath.

Members of the Order of Merit.

Knights Grand Commanders of the Star of India.

Knights Grand Cross of St. Michael and St. George.

Knights Grand Commanders of the Indian Empire.

Knights Grand Cross of the Royal Victorian Order.

Knights Grand Cross of Order of the British Empire.

Companions of Honour.

Knights Commanders of the above Orders.

Knights Bachelors.

Official Referees of Supreme Court of Judicature.

Judges of County Courts and of Mayor's and City of London Court.

Serjeants at Law.

Masters in Lunacy.

Companions and Commanders, *e.g.*, C.B.; C.S.I.; C.M.G.; C.I.E.; C.V.O.; C.B.E.; D.S.O.; M.V.O. (4th); O.B.E.; I.S.O.

Eldest sons of younger sons of Peers.

Baronets' eldest sons.

Eldest sons of Knights in order of their fathers.

M.V.O. (5th); M.B.E.

Younger sons of the younger sons of Peers.

Baronets' younger sons.

Younger sons of Knights in order of their fathers.

Naval, Military, Air, and other Esquires by Office.

Women take the same rank as their husbands or as their eldest brothers; but the daughter of a Peer marrying a Commoner retains her title as Lady or Honourable. Daughters of Peers rank next immediately after the wives of their elder brothers, and before their younger brothers' wives. Daughters of Peers marrying Peers of lower degree take the same order of precedency as that of their husbands; thus the daughter of a Duke marrying a Baron becomes of the rank of Baroness only, while her sisters married to commoners retain their rank and take precedence of the Baroness. Merely official rank on the husband's part does not give any similar precedence to the wife. Dames Grand Cross (G.C.V.O. or G.B.E.) rank after wives of Baronets and before wives of Knights Grand Cross. Dames Commanders (D.C.V.O. or D.B.E.) rank after wives of Knights Grand Cross and before wives of Knights Commanders.

Precedence is formed by statute, patent, or usage, but the chief regulations regarding the order of precedence were settled by Parliament in the reign of Henry VIII.

Precedence locally, in county or city, has not been promulgated by written code, but in Counties the Lord Lieutenant stands first, and secondly the Sheriff, and therefore in Cities and Boroughs the Lord Lieutenant has social precedence over the Mayor; but at City or Borough functions the Lord Mayor or Mayor will preside. At Oxford and Cambridge the High Sheriff takes precedence of the Vice-Chancellor.

PRECEDENCE IN SCOTLAND

The Sovereign.

The Duke of Edinburgh.

The Duke of Rothesay (eldest son of the Sovereign).

Younger son of the Sovereign.

The Lord High Commissioner during sitting of General Assembly.

The Duke of Gloucester, the Duke of Windsor, uncles of the Sovereign.

Lord Lieutenants of counties, Lord Provosts of cities being ex-officio Lord Lieutenants of counties of cities, and Sheriffs Principal, when within their localities, in the order named.

Lord Chancellor of Great Britain.

Moderator of the Assembly of the Church of Scotland.

The Prime Minister.

Keeper of the Great Seal of Scotland (Secretary for Scotland), if a peer.

Keeper of the Privy Seal of Scotland, if a peer.

Hereditary Lord High Constable of Scotland.

Hereditary Master of the Household in Scotland.

Dukes, as in English precedence.

Eldest sons of Dukes of Blood Royal.

Marquesses, as in England.

Eldest sons of Dukes.

Earls as in England.

Younger sons of Royal Dukes.

Eldest sons of Marquesses.

Younger sons of Dukes.

Keeper of the Great Seal of Scotland (Secretary for Scotland), if not a peer.

Keeper of the Privy Purse, if not a peer.

Lord Justice-General.

Lord Clerk-register.

Lord Advocate.

Lord Justice Clerk.

Viscounts, as in England.

Eldest sons of Earls.

Younger sons of Marquesses.

Barons, as in England.

Eldest sons of Viscounts.

Younger sons of Earls.

Eldest sons of Barons.

Knights of the Garter.

Privy Councillors not included in above ranks.

Lords of Session (by date of appointment).

Younger sons of Viscounts.

Younger sons of Barons.

Sons of Life Peers.

Baronets.

Knights of the Thistle.

Knights of St. Patrick.

Knights of other Orders as in England.

Solicitor-general for Scotland.

Lord Lyon King of Arms.

Sheriffs Principal (except as shown above).

Knights Bachelor.

Sheriffs Substitute.

Companions of Orders as in England.

Commanders of Royal Victorian Order.

Commanders of the British Empire Order.

Eldest sons of younger sons of Peers.

Companions of Distinguished Service Order.

Member of Fourth Class of Royal Victorian Order.

Officers of British Empire Order.

Eldest sons of Baronets.

Eldest sons of Knights of the Garter, of the Thistle, and of St. Patrick.

Eldest sons of Knights.

Members of Fifth Class of Royal Victorian Order.

Members of British Empire Order.

Younger sons of Baronets.

Younger sons of Knights.

Queen's Counsel.

Barons-feudal.

Esquires.

Gentlemen.

MODES OF ADDRESS TO PERSONS OF RANK

ROYALTY.

QUEEN.

Begin: Madam, *or* May it please Your Majesty, *or* Lord —— presents his duty to Your Majesty.
Address: The Queen's Most Excellent Majesty.
Speak to as: Your Majesty.

PRINCES AND PRINCESSES, DUKES AND DUCHESSES OF THE BLOOD ROYAL.

Begin: Sir (*or* Madam).
Address: His (*or* Her) Royal Highness the Prince (*or* Princess) ——.
His (*or* Her) Royal Highness the Duke (*or* Duchess) of ——.
Speak to as: Your Royal Highness.

NOBILITY.

DUKES AND DUCHESSES.

Begin: My Lord Duke.
Address: His Grace the Duke of ——, K.G., etc.
Speak to as: Your Grace.

Begin: Madam.
Address: Her Grace the Duchess of ——.
Speak to as: Your Grace.

MARQUESSES AND MARCHIONESSES.

Begin: My Lord Marquess, *or* My Lord.
Address: The Most Hon. the Marquess of ——.
Speak to as: Your Lordship.

Begin: Madam.
Address: The Most Hon. the Marchioness of ——.
Speak to as: Your Ladyship.

EARLS AND COUNTESSES.

Begin: My Lord.
Address: The Right Hon. the Earl of ——, *or* The Earl ——.
Speak to as: Your Lordship.

Begin: Madam.
Address: The Right Hon. the Countess of ——, or The Countess ——.
Speak to as: Your Ladyship.

VISCOUNTS AND VISCOUNTESSES.

Begin: My Lord.
Address: The Right Hon. Viscount, *or* Viscount ——.
Speak to as: Your Lordship.

Begin: Madam.
Address: The Right Hon. the Viscountess ——.
Speak to as: Your Ladyship.

BARONS AND BARONESSES.

Begin: My Lord.
Address: The Right Hon. Lord ——.
Speak to as: Your Lordship.

Begin: My Lady.
Address: The Right Hon. Lady ——.
Speak to as: Your Ladyship.

BARONETS.

Begin: Sir.
Address: Sir (Christian name and surname), Bt.

KNIGHTS BACHELOR.

As Baronet, except that the word Bt. is omitted.

THE CHURCH.

ARCHBISHOPS.

Begin: My Lord Archbishop, *or* Your Grace.
Address: His Grace the Lord Archbishop of ——.
Speak to as: Your Grace.

A retired archbishop is addressed as The Most Rev. Archbishop ——.

BISHOPS.

All Bishops, whether Diocesan or Suffragan, are addressed by the spiritual title "Lord."

Begin: My Lord Bishop.
Address: The Right Rev. the Lord Bishop of ——.
Speak to as: Your Lordship.

It is usual to accord to Colonial Bishops the courtesy title of "Lord Bishop," and they are addressed in the same manner as English Bishops. Assistant and retired Bishops are not addressed as "Lord Bishop" but as The Right Rev. Bishop ——, *or* The Right Rev. (surname), D.D.

Begin: Right Rev. Sir.

DEANS.

Begin: Very Reverend Sir.
Address: The Very Rev. the Dean of ——.

ARCHDEACONS.

Begin: Venerable Sir.
Address: The Venerable the Archdeacon of ——.

CANONS.

Begin: Reverend Sir.
Address: The Reverend Canon ——.
Speak to as: Canon ——.

THE LAW.

LORD CHANCELLOR.

Begin: According to rank.
Address: The Right Hon. the Lord High Chancellor.
Speak to: According to rank.

LORD CHIEF JUSTICE.

Begin: According to rank, if a peer, otherwise as a Judge.
Address: The Right Hon. the Lord Chief Justice of England.

LORD JUSTICE OF APPEAL.

Begin: Sir.
Address: The Right Hon. the Lord Justice ——.
Speak to as: Your Lordship (addressed on the Bench as "My Lord").

LORD OF APPEAL IN ORDINARY AND HIS WIFE.

As Baron and Baroness.

MASTER OF THE ROLLS.

Begin: Sir.
Address: The Right Hon. the Master of the Rolls (addressed on the Bench as "Your Lordship" or "My Lord").

JUDGES.

Begin: Sir.
Address: The Hon. Mr. Justice —— *or* The Hon. Sir —— (if a Knight).
Speak to as: Your Lordship (addressed on the Bench as "My Lord").

JUDGES OF COUNTY COURT.

Begin: Dear Judge ——.
Address: His Honour Judge —— (addressed on the Bench as "Your Honour").

JUSTICES OF THE PEACE.

Address: The Right Worshipful ——, J.P. (addressed on the Bench as "Your Worship").

LORD MAYOR.

Begin: My Lord.
Address: The Right Hon. the Lord Mayor of —— (London, York, Belfast, etc.).
Speak to as: Your Lordship.

LORD MAYOR'S WIFE.

Begin: Madam.
Address: The Right Hon. the Lady Mayoress of ——.
Speak to as: Your Ladyship.

LORD PROVOST.

Begin: My Lord Provost, *or* My Lord.
Address: The Right Hon. the Lord Provost of Edinburgh (or Glasgow).
Speak to as: Your Lordship.
(The Lord Provost's wife is called Lady Provost.)

MAYORS.

Begin: Sir.
Address: If of a city—The Right Worshipful the Mayor of ——. If of a borough—His Worship the Mayor of ——.
Speak to as: Your Worship.

DIPLOMATIC SERVICE.

AMBASSADORS.

Begin: Sir, My Lord, etc., according to rank.
Address: His Excellency (in other respects according to rank) H.B.M. Embassy.
Speak to as: Your Excellency.

CONSULS.

Begin: Sir.
Address: (Christian name and surname), Esq., H.B.M. Agent and Consul-General, *or* H.B.M. Consul-General, *or* H.B.M. Consul, *or* H.B.M. Vice-Consul.

GOVERNORS-GENERAL.

Begin: According to rank.
Address: His Excellency (ordinary designation), Governor of——.
Speak to as: Your Excellency.

PRIVY COUNCILLORS.

The courtesy title of "Right Honourable" is accorded all Privy Councillors (all members of the Cabinet are privy councillors, and the office is conferred for life). In the case of peers below the rank of Marquess, who already have a right to it in virtue of their peerage, the rank of Privy Councillor is indicated by the letters "P.C." after the name. Wives do not share the title.

Address: The Right Hon. ——.
Admiral the Right Hon. Sir ——.
Colonel the Right Hon. ——.
Air Vice-Marshal the Right Hon. Sir ——.
The Right Rev. the Right Hon. the Lord Bishop of ——.
The Most Hon. the Marquess of ——, P.C.

BUSINESS LETTERS.

Business letters to persons of rank can either be written in the third person (grammatical pitfalls must be guarded against), in which case they are not signed, or in the first person plural.

3rd person.
Messrs. —— present their compliments to the Right Hon. the Earl of —— and have pleasure in ——.

1st person plural.
Begin: Your Lordship.

ORDERS OF CHIVALRY

Garter
K.G.

The Most Noble Order of the Garter (1348). *Ribbon:* Garter blue, not worn in undress uniform. *Motto:* Honi soit qui mal y pense (*Evil to him who evil thinks*).

Thistle
K.T.

The Most Noble and Most Ancient Order of the Thistle (1687). *Ribbon:* Green, not worn in undress uniform. *Motto:* Nemo me impune lacessit (*No one provokes me with impunity*).

Saint Patrick
K.P.

The Most Illustrious Order of St. Patrick (1783). *Ribbon:* Sky blue, not worn in undress uniform. *Motto:* Quis separabit? (*Who shall separate?*).

Bath
G.C.B. (Knight Grand Cross), (Mil.& Civ).
K.C.B. (Knight Commander), (Mil. & Civ).
C.B. (Companion), (Mil.).

The Most Honourable Order of the Bath (1399). *Ribbon:* Crimson. *Motto:* Tria juncta in uno (*Three joined in one*). (Remodelled 1725 and 1815, and enlarged 13 times since.)

Order of Merit
O.M. (Mil. & Civ.)

The Order of Merit (1902). *Ribbon:* Blue and crimson. Ranks after G.C.B. before K.C.B.

Star of India
G.C.S.I. (Knight Grand Commander).
K.C.S.I. (Knight Commander).
C.S.I. (Companion).

The Most Exalted Order of the Star of India (1861). (Since enlarged 8 times.) *Ribbon:* Light blue, with white edges. *Motto:* Heaven's Light our Guide.

Saint Michael and Saint George
G.C.M.G. (Knight Grand Cross).
K.C.M.G. (Knight Commander).
C.M.G. (Companion).

The Most Distinguished Order of St. Michael and St. George (1818). *Ribbon:* Saxon blue, with scarlet centre. *Motto:* Auspicium melioris aevi (*Token of a better age*).

Indian Empire
G.C.I.E. (Knight Grand Commander).
K.C.I.E. (Knight Commander).
C.I.E. (Companion).

The Most Eminent Order of the Indian Empire (1877). (Since enlarged 8 times.) *Ribbon:* Imperial purple. *Motto:* Imperatricis auspiciis (*Under the auspices of the Empress*).

Victorian Order
G.C.V.O. (Knight or Dame Grand Cross).
K.C.V.O. (Knight Commander).
D.C.V.O. (Dame Commander).
C.V.O. (Commander).
M.V.O. (Member).

The Royal Victorian Order (1896). *Ribbon:* Blue, with red and white edges. *Motto:* Victoria.

British Empire
G.B.E. (Knight or Dame Grand Cross
K.B.E. (Knight Commander).
D.B.E. (Dame Commander).
C.B.E. (Commander).
O.B.E. (Officer).
M.B.E. (Member).

The Most Excellent Order of the British Empire (1917). *Ribbon:* Rose pink edged with pearl grey with vertical pearl stripe in centre (Mil. Div.); without vertical stripe (Civ. Div.). *Motto:* For God and the Empire.

Companions of Honour
C.H.

Order of the Companions of Honour (1917). *Ribbon:* Carmine, with gold edges. Ranks after G.B.E. and before K.B.E.

Victoria and Albert
V.A.

The Royal Order of Victoria and Albert (for Ladies) (1862). (Since enlarged 3 times.)

Crown of India
C.I.

The Imperial Order of the Crown of India (for Ladies) (1878). *Ribbon:* Light blue watered edged white, worn as bow on left shoulder.

UNITED KINGDOM COINAGE

The Royal Mint is authorised to issue coins of the following denominations and specifications :—

Denomination.	Standard Weight.
	Grains.
Gold:	
Five Pound Piece	616·37239
Two Pound Piece	246·54895
Sovereign	123·27447
Half Sovereign	61·63723
Cupro-Nickel:	
Crown	436·36363
Half-Crown	218·18181
Florin	174·54545
Shilling	87·27272
Sixpence	43·63636
Silver:	
Maundy Fourpence	29·09090
Maundy Threepence	21·81818
Maundy Twopence	14·54545
Maundy Penny	7·27272
Nickel Brass:	
Threepence	105·00000
Bronze:	
Penny	145·83333
Halfpenny	87·50000
Farthing	43·75000

Gold Coinage in Britain consists of eleven-twelfths of fine metal and one-twelfth of alloy: fineness, 916·66. Two hundred and forty troy ounces of standard gold are coined into 934 sovereigns and one half-sovereign; one troy ounce is, therefore, worth £3 17*s.* 10½*d.*, and one ounce of pure gold is nominally worth £4 4*s.* 11½*d.* The minimum weight at which a sovereign is allowed to remain current unchallenged is 122¼ grains; that of half-a-sovereign 61⅛ grains. Any person to whom it is tendered may break, cut, or deface any gold coin below the least current weight, but light gold coin which has not been illegally dealt with is received by the Bank of England on behalf of the Mint at its full face value.

Cupro-Nickel. The first change in the silver standard since the reign of Queen Elizabeth was made in 1920, when the degree of fineness was reduced to 500 parts in a thousand as against 925. 1946 marked the end of the silver coinage. To provide silver bullion for industry and for a fund towards the redemption of our silver debt to America the silver coins are to be withdrawn from circulation and gradually replaced by ones made of cupro-nickel, composed of 75% copper and 25% nickel. Maundy Money will, however, be raised to the original silver standard of 925 parts per 1000.

Bronze as employed in minting United Kingdom coins is an alloy of copper 95½ parts, tin 3 parts, and zinc 1½ parts.

Nickel Brass. The twelve-sided threepenny piece is composed of copper 79%, zinc 20%, and nickel 1%.

No person is permitted to coin any token to pass for, or as representing, any British piece of money under a penalty of £20.

New Coinage. A proclamation approving new designs for coinage was signed by H.M. the Queen in Council on November 25th, 1952. These coins became legal tender on January 1st, 1953, and include coin in gold as well as in silver, cupro-nickel, mixed metal, and bronze.

The principal design is that of the uncrowned head of Elizabeth II, which is the work of Mrs. Mary Gillick, C.B.E. This is used on the coinage of the United Kingdom, Canada, Australia, New Zealand, South Africa, Ceylon, and Southern Rhodesia, though the inscriptions vary in each country. The Queen is shown wearing a laurel wreath tied at the back with a flowing ribbon above two rows of curls at the nape of the neck. The inscription on the obverses of the cupro-nickel coins issued after the 1st January, 1954, reads "ELIZABETH · II · DEI · GRATIA · REGINA" and on the obverses of the gold, silver, nickel-brass and bronze coins "ELIZABETH · II · DEI · GRATIA · REGINA · F : D :".

The reverse sides of the coins are as follows:—

Half-crown, shield of the Royal Arms surmounted by the Crown; prepared by Mr. E. G. Fuller and modelled by Mr. Cecil Thomas, F.R.B.S.

Florin, circular pattern of thistles, shamrock, and leeks about a double rose. This is the first time a Welsh emblem has decorated the United Kingdom coinage as an integral part of the design; prepared by Mr. E. G. Fuller and modelled by Mr. Cecil Thomas, F.R.B.S.

Shilling, shield of the English quartering of the Royal Arms surmounted by the Crown; design prepared and modelled by Mr. W. M. Gardner. The Scottish shilling shows a shield of the Scottish quartering of the Royal Arms surmounted by the Crown; also designed and modelled by Mr. W. M. Gardner.

Sixpence, garland of interlaced rose, thistle, shamrock, and leek, designed by Mr. E. G. Fuller and modelled by Mr. Cecil Thomas, F.R.B.S.

Threepenny piece, chained portcullis surmounted by a coronet, designed and modelled by Mr. W. M. Gardner.

There is no change on the reverse of the bronze coinage (coppers), which will continue to bear, on the *penny*, the figure of Britannia, familiar since Charles II; on the *half-penny*, a sailing-ship inspired by the *Golden Hind*, designed by Mr. T. H. Paget, O.B.E., and on the *farthing* the wren of Mr. Wilson Parker.

The coins of Colonial territories, in accordance with tradition, bear the crowned head of the Sovereign, designed for the present Reign by Mr. Cecil Thomas, F.R.B.S.

The *five-shilling pieces* issued to commemorate the Coronation bore on the obverses an equestrian effigy of Her Majesty by Mr. Gilbert Ledward, R.A., and on the reverses a design by Mr. E. G. Fuller modelled by Mr. Cecil Thomas, F.R.B.S. of the four quarterings of the Royal Arms each contained in a shield and arranged in saltire with, in the intervening spaces, a rose, a thistle, a sprig of shamrock and a leek. Upon the edges of the coins was the inscription, "FAITH AND TRUTH I WILL BEAR UNTO YOU".

The designs specified for *crown pieces* issued after the 1st January, 1954 are Mrs. Gillick's uncrowned effigy for the obverses and the same design as shown on the reverses of the Coronation crown pieces for the reverses.

LEGAL TENDER

Bank of England Notes are issued for sums of 10*s.* £1, and £5. 10*s.* and £1 bank-notes are legal tender in Great Britain and Northern Ireland, and £5 bank-notes (if dated September 2nd, 1944, or after) in England and Wales only. £5 notes dated prior to September 2nd, 1944, and all notes of higher denominations have ceased to be legal tender; they are, however, still exchangeable at the Bank.

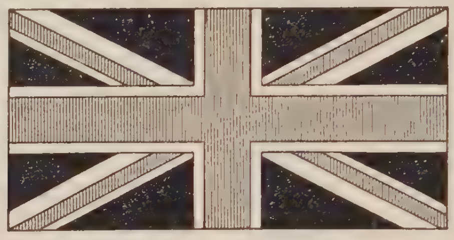
Gold Coins if not below the minimum current weight, are legal tender; but, unless otherwise authorised by or on behalf of the Treasury, persons resident in the United Kingdom holding sovereigns or other gold coin must, under the Exchange Control Act, 1947, offer that coin for sale to an Authorised Dealer.

Silver and/or Cupro-Nickel Coins are legal tender for sums not exceeding £2, nickel-brass threepenny pieces for sums not exceeding 2*s.*, and bronze coins, including farthings, for sums not exceeding 1*s.* No one can demand "change".

Treasury Notes of the value of 10*s.* and £1, which were first issued during the First World War, ceased to be issued in November 1928; though no longer legal tender, they remain exchangeable at the Bank of England.

THE UNION JACK

The present Union Jack is composed of three heraldic crosses, viz., the cross of St. Andrew, forming the blue and white basis; upon which lies the red and white cross of St. Patrick; and upon the whole rests the red and white cross of St. George, dividing the flag vertically and horizontally. The original Union Jack combined only the St. George and St. Andrew crosses and was adopted in 1606 by order of James I. who as James VI. of Scotland succeeded to the throne of England in 1603. No further alteration was made in the flag until January 1st, 1801, when the Irish Parliament was dissolved and the Act of Union came into force.



It is flown on the following days on Government and Public buildings (from 8 a.m. to sunset) :—

Feb.	6 (1952)	H.M. the Queen's Accession.
,,	19 (1960)	Prince Andrew's Birthday.
Mar.	31 (1900)	Duke of Gloucester's Birthday.
Apr.	21 (1926)	Birthday of H.M. the Queen.
,,	25 (1897)	Princess Royal's Birthday.
May	24	Empire Day.
June	2 (1953)	Coronation Day.
June	10 (1921)	Duke of Edinburgh's Birthday.
Aug.	4 (1900)	Birthday of H.M. Queen Elizabeth the Queen Mother.
,,	15 (1950)	Princess Anne's Birthday.
,,	21 (1930)	Princess Margaret's Birthday.
Nov.	14 (1948)	Prince Charles' Birthday.
,,	20 (1947)	The Royal Wedding Day.

and on the occasion of the "official" Queen's birthday, Remembrance Day and the opening and closing of Parliament by the Queen.

The *Royal Standard* is hoisted on buildings in which Her Majesty the Queen is actually present.

THE BEAUFORT SCALE OF WIND FORCE

Beaufort number	*Wind*	*Effect on land*	*Speed*	
			M.p.h.	*Knots*
0	Calm	Smoke rises vertically	Less than 1	Less than 1
1	Light air	Direction shown by smoke but not by wind vanes	1–3	1–3
2	Light breeze	Wind felt on face; leaves rustle; wind vanes move	4–7	4–6
3	Gentle breeze	Leaves and twigs in motion; wind extends light flag	8–12	7–10
4	Moderate breeze	Raises dust, loose paper and moves small branches	13–18	11–16
5	Fresh breeze	Small trees in leaf begin to sway	19–24	17–21
6	Strong breeze	Large branches in motion; whistling in telegraph wires; difficulty with umbrellas	25–31	22–27
7	Moderate gale	Whole trees in motion; difficult to walk against wind	32–38	28–33
8	Fresh gale	Twigs break off trees; progress impeded	39–46	34–40
9	Strong gale	Slight structural damage occurs; chimney pots and slates blown off	47–54	41–47
10	Whole gale	Trees uprooted and considerable structural damage	55–63	48–56
11	Storm	Widespread damage, seldom experienced in England	64–75	57–65
12	Hurricane	Winds of this force only encountered in tropical revolving storms	Above 75	Above 65

WEIGHTS AND MEASURES.

I. WEIGHTS AND MEASURES LEGALLY PERMITTED UNDER THE WEIGHTS AND MEASURES ACTS.

I. IMPERIAL WEIGHTS AND MEASURES.

AVOIRDUPOIS.

1 dram (dr.)	27·34375 grains (gr.)
16 drams	1 ounce (oz.) = 437·5 gr.
16 ounces	1 pound (lb.) = 7000 gr.
14 pounds	1 stone
28 pounds	1 quarter
4 quarters	1 hundredweight (cwt.) = 112 lb.
20 hundredweight	1 ton = (2240 lb.)

TROY WEIGHT.

1 pennyweight (dwt.)	24 grains
480 grains	1 ounce

The only unit of troy weight which is now legal for use in trade in this country is the ounce Troy, and weighings of precious metals are made in multiples and decimals of this unit.

The term *carat* is not a unit of weight for precious metals, but is used to denote the quality of gold plate, etc., and is a figure indicating the number of 24ths of pure gold in the alloy, *e.g.*, a 9 carat gold ring consists of nine parts of pure gold and fifteen parts of base metals.

CAPACITY MEASURE.

4 gills	1 pint
2 pints	1 quart
4 quarts	1 gallon
2 gallons	1 peck
4 pecks	1 bushel
8 bushels	1 quarter
36 bushels	1 chaldron

There is no legal equivalent of the gallon in terms of cubic inches, but the most up-to-date scientific determination gives the figure 1 gallon = 277·420 cubic inches.

APOTHECARIES' WEIGHT.

20 grains	1 scruple
3 scruples	1 drachm
8 drachms	1 ounce

While the apothecaries' ounce is the same as the troy ounce, there is no such thing as an apothecaries' or troy pound of 12 ounces. The troy pound has been obsolete for many years.

The Avoirdupois system is normally used for retailing chemicals in quantities of a ¼ ounce and over, whilst the metric system is used for the newer drugs. The metric system (with apothecaries' equivalents) is also used for formulæ and prescriptions in the *British Pharmacopœia.*

APOTHECARIES' FLUID MEASURE.

60 minims (min.)	1 fluid drachm
8 fluid drachms	1 fluid ounce
20 fluid ounces	1 pint

There are 437½ grains weight of distilled water at 62° F. in 1 fluid ounce.

LINEAR MEASURE.

1 nail	1/16 yard
1 link	7·92 inches
12 inches	1 foot
3 feet	1 yard
5½ yards	1 rod, pole, or perch
4 rods, etc.	1 chain or 100 links (22 yd.)
220 yards	1 furlong
8 furlongs	1 mile = 1760 yards

SQUARE MEASURE.

144 sq. inches	1 sq. foot
9 sq. feet	1 sq. yard = 1296 sq. inches
30¼ sq. yards	1 sq. rod, pole, or perch
40 sq. rods	1 rood
4 roods	1 acre = 4840 sq. yards
640 acres	1 sq. mile

(To convert decimal parts of an acre into roods and perches, multiply by 4 to give roods and decimals of a rood, and multiply this decimal by 40, to give perches and decimals of a perch.)

CUBIC OR SOLID MEASURE.

1728 cu. inches	1 cu. foot
27 cu. feet	1 cu. yard

The relationship between the yard and the bushel is not legally defined. A relationship (based on that of the gallon in "Capacity Measure" above) would be 1 cu. yard = 21·022 bushels.

The *Reputed Quart* (6 per Imperial Gallon) and the *Reputed Pint* (12 per Imperial Gallon) are the sizes of most of the "bottles" and "half-bottles" in which wines and spirits are usually sold.

2. METRIC WEIGHTS AND MEASURES.

LINEAR MEASURE.

10 millimetres (mm.)	1 centimetre (cm.)
10 centimetres	1 decimetre (dm.)
10 decimetres	1 METRE (m.)
10 metres	1 dekametre (dam.)
10 dekametres	1 hectometre (hm.)
10 hectometres	1 kilometre (km.)

SURFACE OR SQUARE MEASURE.

100 centiares	1 are = 100 sq. metres
100 ares	1 hectare = 10,000 sq. metres

CAPACITY.

10 millilitres (ml.)	1 centilitre (cl.) = 10 c.c.
10 centilitres	1 decilitre (dl.) = 100 c.c.

CAPACITY (*cont.*).

10 decilitres	1 LITRE (lit.) = 1000 c.c.
10 litres	1 dekalitre (dal.)
10 dekalitres	1 hectolitre (hl.)
10 hectolitres	1 kilolitre (kl.) = 1 cu. metre

WEIGHT.

1000 micrograms	1 milligram (mg.)
10 milligrams	1 centigram (cg.)
10 centigrams	1 decigram (dg.)
10 decigrams	1 GRAM (gm.)
10 grams	1 dekagram (dag.)
10 dekagrams	1 hectogram (hg.)
10 hectograms	1 kilogram (kg.)
The metric carat	0·2 gram

3. IMPERIAL AND METRIC EQUIVALENTS.

LINEAR MEASURE.

IMPERIAL TO METRIC.

1 inch	2·54 centimetres
1 foot	30·48 centimetres
1 yard	0·914399 metre
1 pole (5½ yards)	5·0292 metres
1 chain (22 yards)	20·1168 metres
1 furlong (220 yards)	201·168 metres
1 mile (8 furlongs)	1·6093 kilometres

METRIC TO IMPERIAL.

1 millimetre	0·03937 inch
1 centimetre	0·3937 inch
1 decimetre	3·937 inches
1 metre	39·370113 inches.
1 metre	3·280843 feet
1 metre	1·0936143 yards
1 dekametre	10·936 yards
1 hectometre	109·36 yards
1 kilometre	0·62137 mile

SQUARE MEASURE.

Imperial to Metric.		Metric to Imperial.	
1 sq. inch	6·4516 sq. cm.	1 sq. cm.	0·15500 sq. inch
1 sq. foot	9·2903 sq. decimetres	1 sq. metre	10·7639 sq. feet
1 sq. yard	0·836126 sq. metre	1 sq. metre	1·1960 sq. yards
1 sq. rod (30¼ sq. yd.)	25·293 sq. metres	1 are (100 sq. metres)	119·60 sq. yards
1 rood (40 sq. rods)	10·117 ares	1 hectare (100 ares or 10,000 sq. metres)	2·4711 acres
1 acre (4,840 sq. yd.)	0·40468 hectare		
1 sq. mile (640 acres)	259·00 hectares		

CUBIC MEASURE.

Imperial to Metric.		Metric to Imperial.	
1 cu. inch	16·387 cu. cm.	1 cu. centimetre	0·0610 cu. inch
1 cu. foot (1728 cu. in.)	0·028317 cu. metre	1 cu. decimetre (1000 cu. cm.)	61·024 cu. inches
1 cu. yard (27 cu. ft.)	0·764553 cu. metre	1 cu. metre	35·3148 cu. feet
		1 cu. metre	1·307954 cu. yards

CAPACITY MEASURE.

Imperial to Metric.		Metric to Imperial.	
1 gill	1·42 decilitres	1 centilitre	0·070 gill
1 pint	0·568 litre	1 decilitre	0·176 pint
1 quart	1·136 litres	1 litre	1·75980 pints
1 gallon	4·5459631 litres	1 dekalitre	2·200 gallons
1 peck (2 gallons)	9·092 litres	1 hectolitre	2·75 bushels
1 bushel (8 gallons)	3·637 dekalitres		
1 quarter (8 bushels)	2·909 hectolitres		

Note: One litre = 1000·027 c.c.; one millilitre = 1 c.c.

APOTHECARIES' MEASURE.

Imperial to Metric.		Imperial to Metric.	
1 minim	0·059 millilitre	1 pint	0·568 litre
1 fluid scruple	1·184 millilitres	1 gallon (8 pints or 160 fluid ounces)	4·5459631 litres
1 fluid drachm (60 minims)	3·552 millilitres		
1 fluid ounce (8 drachms)	2·84123 centilitres		

AVOIRDUPOIS WEIGHT.

Imperial to Metric.		Metric to Imperial.	
1 grain	0·0648 gram	1 milligram	0·015 grain
1 dram	1·772 grams	1 centigram	0·154 grain
1 ounce (16 drams)	28·350 grams	1 decigram	1·543 grains
1 pound (16 ounces or 7000 grains)	0·45359243 kilogram	1 gram	15·432 grains
1 stone (14 lb.)	6·350 kilograms	1 dekagram	5·644 drams
1 quarter (28 lb.)	12·70 kilograms	1 hectogram	3·527 ounces
1 cwt. (112 lb.)	50·80 kilograms = 0·5080 quintal	1 kilogram (1000 gm.)	2·2046223 lb. or 15,432·3564 grains
1 ton (20 cwt.)	1·0160 tonnes or 1016 kilograms	1 myriagram (10 kg.)	22·046 lb.
		1 quintal (100 kg.)	1·968 cwt.
		1 tonne (1000 kg.)	0·9842 ton

TROY WEIGHT.

Imperial to Metric.		Metric to Imperial.	
1 grain	0·0648 gram	1 gram	0·03215 ounce troy
1 pennyweight (24 grains)	1·5552 grams	1 gram	15·432 grains
1 troy ounce (20 pennyweights)	31·1035 grams		

APOTHECARIES' WEIGHT.

Imperial to Metric.		Metric to Imperial.	
1 grain	0·0648 gram	1 gram	0·2572 drachm
1 scruple (20 grains)	1·296 grams	1 gram	0·7716 scruple
1 drachm (3 scruples)	3·888 grams	1 gram	15·432 grains
1 ounce (8 drachms)	31·1035 grams		

II. ELECTRICAL UNITS.

Until 31st December, 1947, the electrical units in general use were the so-called International Units, having been defined by the International Conference on Electrical Units held in London in 1908. These units were based upon specifications for a column of mercury and a silver voltameter which defined the International Ohm and International Ampere respectively, as units which for practical purposes could be accepted as equivalent to the fundamental theoretical units derived by multiplying the corresponding centimetre, gram, second (C.G.S.) electromagnetic unit by an integral power of ten. The International Units were not exactly equal to the fundamental units, and as the accuracy of all measurements increased, the discrepancy became increasingly troublesome.

The International Committee of Weights and Measures, which had succeeded the 1908 Conference, met in Paris in 1946 and decided to abolish the International Units, and as from 1st January, 1948, to use throughout the world the fundamental units themselves, which are known as Absolute Units. The decision meant that the units in common use at that time changed by various amounts up to 5 parts in 10,000.

The International Units and corresponding Absolute Unit values are as follows:—

Ohm. The International Ohm is the resistance offered to an unvarying current by a column of mercury of height 106·3 cm., 1 sq. mm. cross-section and weight 14·4521 grams at the temperature of melting ice (0° C.).

1 International Ohm = 1·00049 Absolute Ohm.

1 Absolute Ohm = 10^9 C.G.S. electromagnetic units.

1,000,000 Ohms = 1 Megohm.

Ampere. The International Ampere is that steady current which in flowing through a specified solution of silver nitrate, deposits silver on the cathode at the rate of 0·001118 gram per second.

1 International Ampere = 0·99985 Absolute Ampere.
1 Absolute Ampere = 0·1 C.G.S. electromagnetic unit.

Volt. The International Volt is that steady electromotive force which applied to the ends of a conductor, whose resistance is 1 International Ohm, causes a current of 1 International Ampere to flow.

1 International Volt = 1·00034 Absolute Volt.
1 Absolute Volt = 10^8 C.G.S. electromagnetic units.
1000 volts = 1 Kilovolt.

Watt. Energy is supplied to a circuit at the rate of 1 International Watt if the current in it is 1 International Ampere and the pressure across it is 1 International Volt.

1 International Watt = 1·00019 Absolute Watt.
1000 watts = 1 Kilowatt.
1 Kilowatt-hour = 1000 watts supplied for a period of 1 hour = Board of Trade Unit.

Coulomb. The unit of quantity, and is the quantity passing in 1 second when the mean current is 1 ampere.

1 Coulomb = 0·1 electromagnetic unit.

Henry. The unit of inductance, defined as the inductance of a circuit in which the induced electromotive force is 1 volt when the inducing current changes at the rate of 1 ampere per second.

1 International Henry = 1·00049 Absolute Henry.
1 Absolute Henry = 10^9 C.G.S. electromagnetic units.

Farad. The unit of capacity, and is that capacity which is charged to a difference of pressure of 1 volt by 1 coulomb.

1,000,000 microfarads = 1 farad.
1 International Farad = 0·99951 Absolute Farad.
1 Absolute Farad = 10^9 C.G.S. electromagnetic unit.

STANDARD SIZES OF BRITISH BOOKS

Size	Abbreviation	Inches
Foolscap octavo	F8	6¾ × 4¼
Crown octavo	C8	7½ × 5
Large crown octavo	lC8*	8 × 5¼
Demy octavo	D8	8¾ × 5⅝
Medium octavo	M8	9½ × 6
Royal octavo	R8	10 × 6¼
Imperial octavo	Imp8	11 × 7½
Foolscap quarto	F4	8½ × 6¾
Crown quarto	C4	10 × 7½
Demy quarto	D4	11¼ × 8¾
Medium quarto	M4	12 × 9½
Royal quarto	R4	12½ × 10
Imperial quarto	Imp4	15 × 11
Foolscap folio	F fol	13½ × 8½
Crown folio	Cfol	15 × 10
Royal folio	Rfol	20 × 12½
Imperial folio	Impfol	22 × 15½

* l = large, s = small may precede some abbreviations.

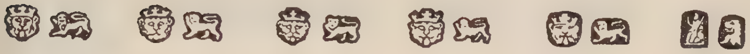
LONDON POSTAL DISTRICTS

Abbey Wood	S.E.2
Acton	W.3
Anerley	S.E.20
Balham	S.W.12
Barnes	S.W.13
Battersea	S.W.11
Bethnal Green	E.2
Blackheath	S.E.3
Bow	E.3
Brixton	S.W.2
Brockley	S.E.4
Camberwell	S.E.5
Catford	S.E.6
Charlton	S.E.7
Chelsea	S.W.3
Chingford	E.4
Chiswick	W.4
Clapham	S.W.4
Clapton	E.5
Cricklewood	N.W.2
Deptford	S.E.8
Dulwich	S.E.21
Ealing	W.5
Earl's Court	S.W.5
East Dulwich	S.E.22
Eastern Central (Head) District	E.C.1–4
Eastern (Head) District	E.1
East Finchley	N.2
East Ham	E.6
Eltham	S.E.9
Finchley, Church End	N.3
Finsbury Park	N.4
Forest Gate	E.7
Forest Hill	S.E.23
Fulham	S.W.6
Golders Green	N.W.11
Greenwich	S.E.10
Hackney	E.8
Hammersmith	W.6
Hampstead	N.W.3
Hanwell	W.7
Hendon	N.W.4
Herne Hill	S.E.24
Highbury	N.5
Highgate	N.6
Holloway	N.7
Homerton	E.9
Hornsey	N.8
Kennington	S.E.11
Kensington	W.8
Kentish Town	N.W.5
Kilburn	N.W.6
Lee	S.E.12
Lewisham	S.E.13
Leyton	E.10
Leytonstone	E.11
Lower Edmonton	N.9
Maida Hill	W.9
Manor Park	E.12
Mill Hill	N.W.7
Mortlake	S.W.14
Muswell Hill	N.10
New Cross	S.E.14
New Southgate	N.11
Northern (Head) District	N.1
North Finchley	N.12
North Kensington	W.10
North Western (Head) District	N.W.1
Norwood	S.E.19
Notting Hill	W.11
Paddington (Head) District	W.2
Palmer's Green	N.13
Peckham	S.E.15
Plaistow	E.13
Poplar	E.14
Putney	S.W.15
Rotherhithe	S.E.16
St. John's Wood	N.W.8
Shepherd's Bush	W.12
South Eastern (Head) District	S.E.1
Southgate	N.14
South Kensington	S.W.7
South Lambeth	S.W.8
South Norwood	S.E.25
South Tottenham	N.15
South Western (Head) District	S.W.1
Stockwell	S.W.9
Stoke Newington	N.16
Stratford	E.15
Streatham	S.W.16
Sydenham	S.E.26
The Hyde	N.W.9
Tooting	S.W.17
Tottenham	N.17
Upper Edmonton	N.18
Upper Holloway	N.19
Victoria Docks & North Woolwich	E.16
Walthamstow	E.17
Walworth	S.E.17
Wandsworth	S.W.18
West Brompton	S.W.10
West Ealing	W.13
Western Central (Head) District	W.C.1–2
Western (Head) District	W.1
West Kensington	W.14
West Norwood	S.E.27
West Wimbledon	S.W.20
Whetstone	N.20
Willesden	N.W.10
Wimbledon	S.W.19
Winchmore Hill	N.21
Woodford & South Woodford	E.18
Wood Green	N.22
Woolwich	S.E.18

HOW TO CORRECT PRINTERS' PROOFS

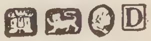
Marginal mark	Meaning	Corresponding mark in text
δ/	Delete (take out)	Cross through
δ	Delete and close-up	Above and below letters to be taken out
stet	Leave as printed (when words have been crossed out by mistake)	. . . . Under letters or words to remain
caps	Change to capital letters	Under letters or words to be altered
s.c.	Change to small capitals	Under letters or words to be altered
caps & s.c.	Use capital letters for initial letters and small capitals for rest of words	Under initial letters and under the rest of the words
l.c.	Change from capitals to lower case	Encircle letters to be altered
bold	Change to bold type	Under letters or words to be altered
ital.	Change to italics	Under letters or words to be altered
rom.	Change to roman type	Encircle words to be altered
w.f.	(Wrong fount.) Replace by letter of correct fount	Encircle letter to be altered
	Invert type	Encircle letter to be altered
X	Replace by similar but undamaged character	Encircle letter to be altered
	Insert (or substitute) superior figure or sign	⋏ (Or encircle letters or signs to be altered)
	Insert (or substitute) inferior figure or sign	⋏ (Or encircle letters or signs to be altered)
	Close-up—delete space between letters	Linking words or letters
#	Insert space	⋏
eq.#	Make spacing equal	Between words
less#	Reduce space	Between words
trs.	Transpose	Between letters or words, numbered when necessary
centre	Place in centre of line	Indicate position with
	Move to the left	
	Move to the right	
n.p.	Begin a new paragraph	Before first word of new paragraph
run on	No fresh paragraph here	Between paragraphs
spell out	The abbreviation or figure to be spelt out in full	Encircle words or figures to be altered
⋏	(Caret mark.) Insert matter indicated in margin	⋏
' '	Insert single quotation marks	⋏ ⋏
" "	Insert double quotation marks	⋏ ⋏

THE LONDON SILVER MARKS



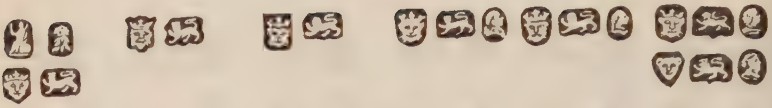
A	1598	a	1618	a	1638	A	1658	a	1678	a	1697
B	9	b	19	b	39	B	59	b	79	b	97
C	1600	c	20	c	40	C	Chas. II. 60	c	80	c	98
D	1	d	21	d	41	D	61	d	81	d	99
E	2	e	22	e	42	E	62	e	82	e	1700
F	Jas. I. 3	f	23	f	43	F	63	f	83	f	1
G	4	g	24	g	44	G	64	g	84	g	Anne. 2
H	5	h	Chas. I. 25	h	45	H	65	h	Jas. II. 85	h	3
I	6	i	26	i	46	I	66	i	86	i	4
K	7	k	27	k	47	K	67	k	87	k	5
L	8	l	28	l	48	L	68	l	88	l	6
M	9	m	29	m	Cmwth. 49	M	69	m	W. & M. 89	m	7
N	10	n	30	n	50	N	70	n	90	n	8
O	11	o	31	o	51	O	71	o	91	o	9
P	12	p	32	p	52	P	72	p	92	p	10
Q	13	q	33	q	53	Q	73	q	93	q	11
R	14	r	34	r	54	R	74	r	94	r	12
S	15	s	35	s	55	S	75	s	Wm III. 95	s	13
T	16	t	36	t	56	T	76	t	96	t	Geo. I. 14
V	17	v	37	v	57	V	77			v	15

PROVINCIAL SILVER MARKS

BIRMINGHAM . .	1800		1900	
CHESTER . .	1701		1800	
EXETER . .	1701		1800	

See also Hall-mark, Gen. Information.

THE LONDON



A	Geo. I. 1716	a	1736	A	1756	a	1776	A	1796	a	1816
B	17	b	37	B	57	b	77	B	97	b	17
C	18	c	38	C	58	c	78	C	98	c	18
D	19	d d	39	D	59	d	79	D	99	d	19
E	20	e	40	E	Geo. III. 60	e	80	E	1800	e	Geo. IV. 20
F	21	f	41	F	61	f	81	F	1	f	21
G	22	g	42	G	62	g	82	G	2	g	22
H	23	h	43	H	63	h	83	H	3	h	23
I	24	i	44	I	64	i	84	I	4	i	24
K	25	k	45	K	65	k	85	K	5	k	25
L	26	l	46	L	66	l	86	L	6	l	26
M	Geo. II 27	m	47	M	67	m	87	M	7	m	27
N	28	n	48	N	68	n	88	N	8	n	28
O	29	o	49	O	69	o	89	O	9	o	29
P	30	p	50	P	70	p	90	P	10	p	Will. IV. 30
Q	31	q	51	Q	71	q	91	Q	11	q	31
R	32	r	52	R	72	r	92	R	12	r	32
S	33	ſ	53	S	73	s	93	S	13	s	33
T	34	t	54	T	74	t	94	T	14	t	34
V	35	u	55	U	75	u	95	U	15	u	35

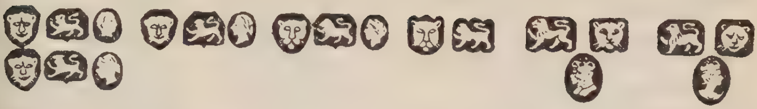
PROVINCIAL SILVER MARKS

NEWCASTLE . . 1702  1800 

SHEFFIELD . . 1800  1900 

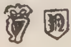
YORK . . 1700  . 1800 

SILVER MARKS



A	1836	a	1856	A	1876	a	1896	a	1916	A	Ed. VIII. 1936
B	Vic. 37	b	57	B	77	b	97	b	17	B	Geo. VI. 37
C	38	c	58	C	78	c	98	c	18	C	38
D	39	d	59	D	79	d	99	d	19	D	39
E	40	e	60	E	80	e	1900	e	20	E	40
F	41	f	61	F	81	f	Ed. VII. 1	f	21	F	41
G	42	g	62	G	82	g	2	g	22	G	42
H	43	h	63	H	83	h	3	h	23	H	43
I	44	i	64	I	84	i	4	i	24	I	44
K	45	k	65	K	85	k	5	k	25	K	45
L	46	l	66	L	86	l	6	l	26	L	46
M	47	m	67	M	87	m	7	m	27	M	47
N	48	n	68	N	88	n	8	n	28	N	48
O	49	o	69	O	89	o	9	o	29	O	49
P	50	p	70	P	90	p	Geo. V. 10	p	30	P	50
Q	51	q	71	Q	91	q	11	q	31	Q	51
R	52	r	72	R	92	r	12	r	32	R	Eliz. II. 52
S	53	s	73	S	93	s	13	s	33	S	53
T	54	t	74	T	94	t	14	t	34	T	54
U	55	v	75	U	95	u	15	u	35	U	55.

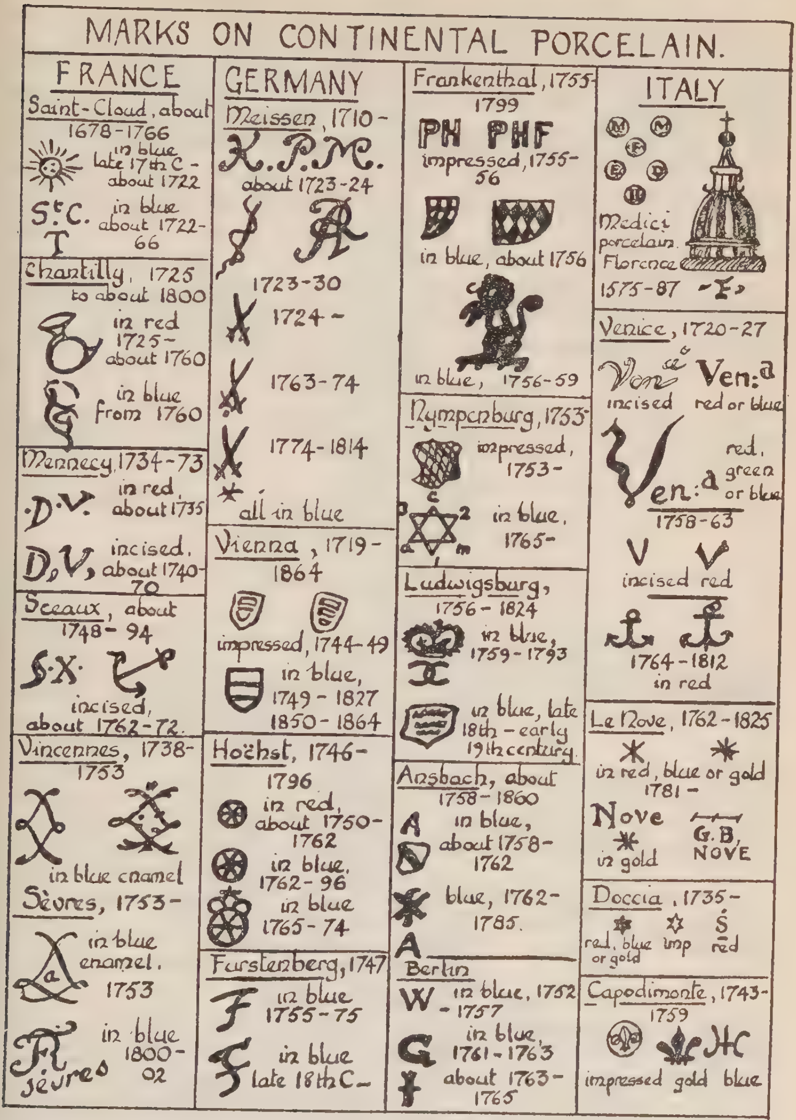
SCOTTISH AND IRISH SILVER MARKS

EDINBURGH . .	1700		1800	
GLASGOW . .	1700		1800	
DUBLIN . .	1700		1800	

The earliest fully-developed factory-mark is that of late-16th-century Italian porcelain made at Florence, but it was not until 1724, when the Meissen factory adopted the crossed swords from the arms of Saxony, that the practice was generally taken up by most pottery factories worthy of note.

In 1766 French manufacturers were compelled by law to mark their products with a mark previously registered with the police, but elsewhere marks similar to those of the reputable factories were adopted. Many factories used marks designed to look like the crossed swords of Meissen, whilst the English factories of Bow, Lowestoft, Derby, and Worcester made no attempt to disguise their occasional use of the device.

Many initials and numerals often found on porcelain are no aid to the identification of its place of manufacture and are merely the mark of a workman for factory or record purposes, pattern or mould numbers. The safest mark to accept as genuine is that which has been incised or



Drawn by J. P. Cushion, Victoria and Albert Museum.

stamped in the paste before firing and subsequently glazed.

The most widely used method of marking wares during the 18th century was by painting or printing in underglaze-blue which is generally accepted as authentic, but all painted, printed, or stencilled marks applied over the glaze could be added to a piece with the intention of deceiving. Any refiring of old wares is generally revealed by black specks in the glaze.

German porcelain of the eighteenth century particularly lends itself to forgery due to the hard-paste material then used still being available, and reproductions were made throughout the 19th century, but all tend to have an over-clean finish not in keeping with the original. Chelsea wares were also widely copied but owing to the soft-paste used for their manufacture are far easier to detect when produced in the harder material. *See also* **Porcelain, Gen. Information.**

BANK AND PUBLIC HOLIDAYS

In *England, Wales, N. Ireland* and *The Channel Islands* it is ordained that the Bank Holidays shall be: Easter Monday, Whit Monday, first Monday in August, Boxing Day (first weekday after Christmas). The Channel Islands have in addition special Bank Holidays on New Year's Day and Liberation Day.

N. Ireland and the *Irish Republic* have a special Bank Holiday on St. Patrick's Day, March 17th.

The Stock Exchange is closed on Bank Holidays Good Friday, January 1st and on Saturdays throughout the year.

The Queen's birthday (when decreed) is observed in the Customs and certain other Government establishments as a holiday.

	1960.	1961.
Easter Monday	Apr. 18	Apr. 3
Whit Monday	June 6	May 22

In *Scotland* it is enacted that the Bank Holidays observed shall be: New Year's Day, first Monday in May, first Monday in August. There are also special Spring and Autumn holidays in Edinburgh and Glasgow.

	1960.	1961.
1st Monday in Aug.	Aug. 1	Aug. 7
Boxing Day	Mon. Dec. 26	Tues. Dec. 26

THE SEASONS

1960.

Vernal Equinox—Spring begins Mar. 20, 3 p.m.
Summer Solstice—Summer begins June 21, 10 a.m.
Autumnal Equinox—Autumn begins Sept. 23, 1 a.m.
Winter Solstice—Winter begins Dec. 21, 8 p.m.

1961.

Vernal Equinox—Spring begins Mar. 20, 8 p.m.
Summer Solstice—Summer begins June 21, 4 p.m.
Autumnal Equinox—Autumn begins Sept. 23, 7 a.m.
Winter Solstice—Winter begins Dec. 22, 2 a.m.

(These times are G.M.T.)

QUARTER DAYS

ENGLAND, WALES, AND N. IRELAND.

Lady Day	March 25	Michaelmas	September 29
Midsummer	June 24	Christmas	December 25

SCOTLAND.

Candlemas	February 2	Lammas	August 1
Whitsun	May 15	Martinmas	November 11

HALF QUARTER DAYS

ENGLAND

February 8. | May 9. | August 11. | November 11.

GAME

Game is defined under the game laws as including hares, pheasants, partridges, grouse, heath or moor game, black game, deer, rabbits and (in Scotland) ptarmigan. The close times for game are as follows (the dates given are inclusive).

Black (or Heath) Game	Dec. 11 to Aug. 19 (Aug. 31 in Somerset, Devon, and New Forest).
Grouse (or Moor Game) and (in Scotland) Ptarmigan	Dec. 11 to Aug. 11.
Partridge	Feb. 2 to Aug. 31.
Pheasant	Feb. 2 to Sept. 30.

Deer, hares and rabbits are also protected to a limited extent.

CLOSE TIMES FOR SPORTING BIRDS

Birds for which the close season is Feb. 1 to Aug. 31 (inclusive):—

Godwit, bar-tailed; Plover, grey; Coot; Redshank, common; Curlew (other than Stone Curlew); Moorhen; Whimbrel; Plover, golden

Birds for which the close season is Feb. 1 to Aug. 31 (inclusive) (except below high water mark when it is Feb. 21 to Aug. 31 (inclusive):

Wild duck of the following species:—

Common pochard	Long-tailed duck	Teal
Common Scoter	Mallard	Tufted Duck
Gadwall	Pintail	Velvet Scoter
Garganey Teal	Scaup-duck	
Goldeneye	Shoveler	Wigeon

Wild geese of the following species:—

Bean-goose	Grey Lag Goose	White-fronted Goose
Canada Goose	Pink-footed Goose	

Birds for which the close season is Feb. 1 to Sept. 30 (inclusive):—

Capercaillie; Woodcock (in Scotland Feb. 1 to Aug. 31).

Birds for which the close season is Feb. 1 to Aug. 11 (inclusive):—

Snipe, common; Snipe, jack.

THE COUNTRY CODE

GUARD AGAINST THE RISK OF FIRE. Great damage is done every year to crops, plantations, woodlands, and heaths. A match or cigarette thrown away or a pipe carelessly knocked out, picnic fires not properly put out or lighted near dry crops, can quickly start a blaze.

FASTEN ALL GATES. If animals get out of a field they stray. As a result they may do serious damage to crops, suffer injury on the roads, or eat food that is harmful.

KEEP DOGS UNDER CONTROL. Animals are easily frightened, even by small, playful dogs. Stillbirths may be the result.

KEEP TO THE PATHS ACROSS FARM LAND. Crops are damaged by treading; flattened crops are difficult to harvest. Grass is a valuable crop.

AVOID DAMAGING FENCES, HEDGES, AND WALLS. If these are damaged, gaps will be caused. Where a man goes, an animal may follow.

LEAVE NO LITTER. Litter is not just unsightly, but often a danger as well. Broken glass and tins may injure animals and harm machinery.

SAFEGUARD WATER SUPPLIES. Countrymen often depend on wells and streams for water for themselves and for their animals.

PROTECT WILD LIFE, PLANTS, AND TREES. Wild animals should not be disturbed, plants uprooted, or trees treated roughly.

GO CAREFULLY ON COUNTRY ROADS. If there is no footpath, walkers are generally safer on the right, facing on-coming traffic. Care and patience are needed by motorists when passing farm animals.

RESPECT THE LIFE OF THE COUNTRYSIDE. Many of the machines and much of the business stock on which the farmer depends for his livelihood have to be kept in the open. Take care not to damage them.

SUNRISE AND SUNSET TABLE, 1960–61

(These times are given in G.M.T. throughout.)

1960.

Date		Sunrise a.m.	Sunset p.m.
July	3	3.49	8.19
	10	3.55	8.15
	17	4.02	8.09
	24	4.12	8.00
	31	4.22	7.50
August	7	4.33	7.37
	14	4.44	7.24
	21	4.55	7.10
	28	5.06	6.55
September	4	5.17	6.39
	11	5.29	6.23
	18	5.39	6.08
	25	5.51	5.51
October	2	6.02	5.35
	9	6.13	5.20
	16	6.25	5.05
	23	6.38	4.50
	30	6.50	4.36
November	6	7.02	4.25
	13	7.15	4.14
	20	7.27	4.04
	27	7.38	3.57
December	4	7.47	3.53
	11	7.55	3.51
	18	8.01	3.52
	25	8.04	3.56

Sundays, 1961.

Date		Sunrise a.m.	Sunset p.m.
January	1	8.05	4.01
	8	8.04	4.09
	15	7.59	4.19
	22	7.52	4.31
	29	7.43	4.44
February	5	7.32	4.56
	12	7.21	5.09
	19	7.07	5.22
	26	6.52	5.34
March	5	6.37	5.47
	12	6.22	5.59
	19	6.06	6.11
	26	5.50	6.23
April	2	5.35	6.34
	9	5.19	6.46
	16	5.03	6.58
	23	4.48	7.10
	30	4.35	7.20
May	7	4.22	7.32
	14	4.10	7.43
	21	4.00	7.54
	28	3.53	8.02
June	4	3.47	8.10
	11	3.43	8.16
	18	3.42	8.20
	25	3.44	8.21

Date		Sunrise a.m.	Sunset p.m.
July	2	3.48	8.20
	9	3.54	8.16
	16	4.01	8.10
	23	4.10	8.02
	30	4.20	7.52
August	6	4.31	7.40
	13	4.42	7.27
	20	4.52	7.14
	27	5.04	6.58
September	3	5.15	6.43
	10	5.26	6.27
	17	5.37	6.11
	24	5.48	5.55
October	1	6.00	5.39
	8	6.11	5.24
	15	6.23	5.08
	22	6.35	4.53
	29	6.48	4.39
November	5	6.59	4.27
	12	7.12	4.16
	19	7.24	4.06
	26	7.35	3.59
December	3	7.46	3.54
	10	7.54	3.51
	17	8.00	3.52
	24	8.04	3.55
December	31	8.06	4.00

MOON'S PHASES, 1960–61

(These times are given in G.M.T. throughout.)

1960.

First Quarter	July	2	3.48 a.m.
Full Moon		8	7.36 p.m.
Last Quarter		15	3.42 p.m.
New Moon		23	6.30 p.m.
First Quarter		31	12.38 p.m.
Full Moon	August	7	2.41 a.m.
Last Quarter		14	5.36 a.m.
New Moon		22	9.15 a.m.
First Quarter		29	7.22 p.m.
Full Moon	September	5	11.18 a.m.
Last Quarter		12	10.19 p.m.
New Moon		20	11.12 p.m.
First Quarter		28	1.13 a.m.
Full Moon	October	4	10.16 p.m.
Last Quarter		12	5.25 p.m.
New Moon		20	12.02 p.m.
First Quarter		27	7.33 a.m.
Full Moon.	November	3	11.57 a.m.
Last Quarter		11	1.47 p.m.
New Moon		18	11.46 p.m.
First Quarter		25	3.41 p.m.
Full Moon	December	3	4.24 a.m.
Last Quarter		11	9.38 a.m.
New Moon		18	10.46 a.m.
First Quarter		25	2.29 a.m.

1961.

Full Moon	January	1	11.06 p.m.
Last Quarter		10	3.02 a.m.
New Moon		16	9.30 p.m.
First Quarter		23	4.13 p.m.
Full Moon		31	6.46 p.m.
Last Quarter	February	8	4.49 p.m.
New Moon		15	8.10 a.m.
First Quarter		22	8.34 a.m.
Full Moon	March	2	1.34 p.m.
Last Quarter		10	2.57 a.m.
New Moon	March	16	6.50 p.m.
First Quarter		24	2.48 a.m.
Full Moon	April	1	5.47 a.m.
Last Quarter		8	10.16 a.m.
New Moon		15	5.37 a.m.
First Quarter		22	9.49 p.m.
Full Moon		30	6.40 p.m.
Last Quarter	May	7	3.57 p.m.
New Moon		14	4.54 p.m.
First Quarter		22	4.18 p.m.
Full Moon		30	4.37 a.m.
Last Quarter	June	5	9.18 p.m.
New Moon		13	5.16 a.m.
First Quarter		21	9.01 a.m.
Full Moon		28	12.37 p.m.
Last Quarter	July	5	3.32 a.m.
New Moon		12	7.11 p.m.
First Quarter		20	11.13 p.m.
Full Moon		27	7.50 p.m.
Last Quarter	August	3	11.47 a.m.
New Moon		11	10.36 a.m.
First Quarter		19	10.51 a.m.
Full Moon		26	3.13 a.m.
Last Quarter	September	1	11.05 p.m.
New Moon		10	2.49 a.m.
First Quarter		17	8.23 p.m.
Full Moon		24	11.33 a.m.
Last Quarter	October	1	2.10 p.m.
New Moon		9	6.52 p.m.
First Quarter		17	4.34 a.m.
Full Moon		23	9.30 p.m.
Last Quarter		31	8.58 a.m.
New Moon	November	8	9.58 a.m.
First Quarter		15	12.12 p.m.
Full Moon		22	9.43 a.m.
Last Quarter		30	6.18 a.m.
New Moon	December	7	11.51 p.m.
First Quarter		14	8.05 p.m.
Full Moon		22	12.42 a.m.
Last Quarter		30	3.57 a.m.

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ONE HOUR must be ADDED to the above times when SUMMER TIME is in operation.

LIGHTING-UP TIME is from 1 hour after local sunset to 1 hour before local sunrise during SUMMER TIME and from ½ hour after local sunset to ½ hour before local sunrise during the remainder of the year.

THERMOMETER COMPARISONS

Centigrade, 100°	Fahrenheit, 212°	Centigrade, 100°	Fahrenheit 212°
95	203	20	68
90	194	15·5	60
85	185	12·8	55
78·9	174	10	50
75	167	7·2	45
70	158	5	41
65	149	1·7	35
60	140	0	32
55	131	− 1·1	30
52·8	127	− 5	23
50	122	− 6·7	20
45	113	− 10	14
42·2	108	− 12·2	10
40	104	− 15	5
36·7	98	− 17·8	0
35	95	− 20	− 4
32·2	90	− 25	− 13
30	86	− 30	− 22
26·7	80	− 35	− 31
25	77	− 40	− 40

To reduce Fahrenheit to Centigrade, subtract 32 degrees and multiply by 5/9; to reduce Centigrade to Fahrenheit, multiply by 9/5 and add 32 degrees.

ROMAN NUMERALS

I	1	LXX	70
II	2	LXXX	80
III	3	LXXXVIII	88
IV	4	XC	90
V	5	IC	99
VI	6	C	100
VII	7	CX	110
VIII	8	CXI	111
IX	9	CXC	190
X	10	CC	200
XI	11	CCXX	220
XII	12	CCC	300
XIII	13	CCCXX	320
XIV	14	CD	400
XV	15	D	500
XVI	16	DC	600
XVII	17	DCC	700
XVIII	18	DCCC	800
XIX	19	CM	900
XX	20	XM	990
XXX	30	M	1000
XL	40	MD	1500
L	50	MDCCC	1800
LV	55	MCMLXI	1961
LX	60	MM	2000

RUSSIAN ALPHABET

А а	a	Р р	r
Б б	b	С с	s
В в	v	Т т	t
Г г	g	У у	u
Д д	d	Ф ф	f ph
Е е	e	Х х	kh [1]
Ж ж	zh	Ц ц	ts
З з	z	Ч ч	ch [2]
И и й	i	Ш ш	sh
К к	k	Щ щ	shch [3]
Л л	l	Ы ы	y [4]
М м	m	Э э	e [5]
Н н	n	Ю ю	yu [6]
О о	o	Я я	ya
П п	p	Ѳ ѳ	f

[1] as in "loch". [2] as in "church". [3] as in "Ashchurch". [4] as in "bit". [5] as in "epic". [6] as in "you".

RATES OF EXCHANGE IN RELATION TO STERLING

Country.	Currency.	Par value of Sterling at 15.1.60.[1]	Approximate rate at 23.2.60 or latest date available.
Argentine	Peso	50·40	231·50 [4]
Australia	Pound	1·25	1·25
Austria	Schilling	72·80	72·875
Belgium/Luxembourg	Franc	140·00	139·80
Belgian Congo	Franc	140·00	139·80
Bolivia	Boliviano		33,121·00 [4]
Brazil	Cruzeiro	51·80	511·00 [4]
Br. Honduras	Dollar	4·00	4·00
Br. West Indies	..	4·80	4·80
Burma	Kyat	13·333	13·333
Canada	Dollar		2·667
Ceylon	Rupee	13·333	13·31
Chile	Escudo		2·945 [4]
China	P.B. Dollar		6·843
Colombia	Peso	5·46	19·13 [4]
Costa Rica	Colon	15·72	19·25 [4]
Cuba	Peso	2·80	2·804
Czechoslovakia	Koruna		20·16 [3]
Denmark	Krone	19·34	19·35
Dominican Republic	Peso	2·80	2·804
Ecuador	Sucre	42·00	47·895 [4]
Egypt	Pound	0·975	0·975
El Salvador	Colon	7·00	7·04 [4]
Ethiopia	Dollar	6·957	7·00
Finland	Markka	896·00	896·75
France	New Fr.	13·824	13·763
French Equat. Africa	C.F.A. Franc	691·188	688·15
French West Africa	C.F.A. Franc	691·188	688·15
Germany (Fed. Rep. of)	Deutsche Mark	11·76	11·691
Greece	Drachma		84·00
Guatemala	Quetzal	2·80	2·8175 [4]
Haiti	Gourde	14·00	14·00
Honduras Rep.	Lempira	5·60	5·628
Hongkong	Dollar	16·00	16·00
Iceland	Krona	106·40	106·70
India	Rupee	13·333	13·333
Indonesia	Rupiah		126·00 [3]
Iran	Rial	212·10	212·10 [2]
Iraq	Dinar	1·00	1·00
Israel	Pound	5·04	5·04
Italy	Lire		1,741·125
Japan	Yen	1,008·00	1,010·40
Jordan	Dinar	1·00	1·00
Lebanon	Pound	6·136	8·92 [4]
Malaya	Dollar	8·57	8·562
Morocco	Dirham	14·169	14·142
Mexico	Peso	35·00	35·00
Netherlands	Guilder	10·64	10·571
Netherlands West Indies	..	5·28	5·275
New Zealand	Pound		1·007
Nicaragua	Cordoba	19·60	19·80 [3]
Norway	Kroner	20·00	20·036
Pakistan	Rupee	13·333	13·333
Panama	Balboa	2·80	2·804
Paraguay	Guarani	168·00	342·00 [4]
Peru	Sol		77·75 [4]
Philippines	Peso	5·60	5·63
Poland	Zloty		11·20
Portugal	Escudo		80·25
Spain	Peseta	168·00	168·00 [4]
Sweden	Kronor	14·485	14·511
Switzerland	Franc		12·161
Syria	Pound	6·136	10·30 [4]
Thailand	Baht		59·05
Tunisia	Tn. Dinar		1·172
Turkey	Lira	7·84	25·20 [3]
Union of South Africa	Pound	1·00	1·00
U.S.A.	Dollar	2·80	2·804
Uruguay	Peso		31·90 [4]
Venezuela	Bolivar	9·38	9·36 [4]
Yugoslavia	Dinar	840·00	840·00 [3]

[1] Established under agreement with the International Monetary Fund. [2] Rate which in general is applicable to financial transactions. [3] Official rate. [4] Free market rate.

UNIVERSITY DEGREES—COLOURS OF HOODS

Aberdeen

M.A.	Black corded silk lined with white silk and edged round cape and cowl.
D.Litt.	Scarlet superfine cloth lined with white silk.
B.D.	Black corded silk lined with purple silk.
D.D.	Scarlet superfine cloth lined with purple silk.
B.L.	Black corded silk edged with light blue silk.
LL.B.	Black corded silk lined with light blue silk.
LL.D.	Scarlet superfine cloth lined with light blue silk.
M.B., Ch.B.	Black corded silk lined with crimson silk.
Ch.M.	White corded silk lined with crimson silk.
M.D.	Scarlet superfine cloth lined with crimson silk.
B.Sc.	Black corded silk lined with green silk.
D.Sc.	Scarlet superfine cloth lined with green silk.
B.Sc.(Agric.)	Black corded silk edged with green silk.
B.Sc.(Eng.)	Black corded silk with green and white silk.
B.Sc.(For.)	Black corded silk with waved green silk edging.
B.Com.	Black corded silk edged with lilac silk.
Ph.D.	Scarlet superfine cloth lined with black ribbed silk.

Note:—All the hoods of this university are of the full type, with rounded capes, but have no liripipe to the cowl or hood portion proper.

Belfast, The Queen's University

B.A.	Black ribbed silk edged with white fur and the neck edged with watered blue silk.
M.A.	Black ribbed silk lined and edged with watered blue silk.
D.Litt.	Scarlet superfine cloth lined with white silk and edged with watered blue silk.
B.D.	Black ribbed silk lined with white silk and edged with watered blue silk.
D.D.	Scarlet superfine cloth lined with black silk and edged with watered blue silk.
LL.B.	Black ribbed silk lined with pink silk and edged with watered blue silk.
LL.D.	Scarlet superfine cloth lined with pink silk and edged with watered blue silk.
M.B., B.Ch., B.A.O.	Black ribbed silk lined with scarlet silk and edged with watered blue silk.
M.Ch.	Ribbed red silk lined with white silk and edged with watered blue silk.
M.D.	Scarlet superfine cloth lined with scarlet silk and edged with watered blue silk.
M.A.O.	Black ribbed silk lined with purple silk and edged with watered blue silk.
B.Mus.	Blue silk lined with white silk and edged with watered blue silk.
D.Mus.	Scarlet superfine cloth lined with blue silk and edged with watered blue silk.
Ph.D.	Scarlet superfine cloth lined with violet silk and edged with watered blue silk.
B.Sc.	Black ribbed silk lined with green silk and edged with watered blue silk.
M.Sc.	Ribbed red silk lined with green silk and edged with watered blue silk.
D.Sc.	Scarlet superfine cloth lined with green silk and edged with watered blue silk.
B.Sc.(Econ.)	Black ribbed silk lined with rose pink silk and edged with watered blue silk.
M.Sc.(Econ.)	Rose pink silk lined with white silk and edged with watered blue silk.
B.D.S.	Black ribbed silk lined with grey silk and edged with watered blue silk.
B.Agric.	Black ribbed silk lined with yellow silk and edged with watered blue silk.
M.Agric.	Red ribbed silk lined with yellow silk and edged with watered blue silk.

Note:—Bachelors' and Masters' hoods are of the simple shape and Doctors' of the full shape. All the hoods have the neck portion at least edged with the pale blue watered silk peculiar to this University.

Birmingham

B.A.	Black ribbed silk lined for 3″ with watered electric blue.
M.A.	Black ribbed silk fully lined with watered electric blue.
B.D.	Black ribbed silk lined with watered cobalt blue.
D.D.	Scarlet superfine cloth lined with watered cobalt blue.
LL.B.	Black ribbed silk lined for 3″ with watered bronze green silk.
LL.M.	Black ribbed silk fully lined with watered bronze green silk.
LL.D.	Scarlet superfine cloth lined with watered bronze green silk.
M.B., Ch.B.	Black ribbed silk lined for 3″ with watered cardinal silk.
Ch.M.	Black ribbed silk fully lined with watered cardinal silk.
M.D.	Scarlet superfine cloth lined with watered cardinal silk.
B.Mus.	Black ribbed silk lined for 3″ with watered orange silk.
D.Mus.	Scarlet superfine cloth lined with watered orange silk.
Ph.D.	Crimson cloth, lined with the watered silk of the Faculty.
B.Sc.	Black ribbed silk lined for 3″ with watered grey silk.
M.Sc.	Black ribbed silk fully lined with watered grey silk.
D.Sc.	Scarlet superfine cloth lined with watered grey silk.
D.Litt.	Scarlet superfine cloth lined with watered electric blue silk.
B.D.S.	Black ribbed silk lined for 3″ with watered dark red silk.
M.D.S.	Black ribbed silk fully lined with watered dark red silk.
B.Com.	Black ribbed silk lined for 3″ with watered terra-cotta silk.
M.Com.	Black ribbed silk fully lined with watered terra-cotta silk.
B.Soc.Sc., M.Soc.Sc.	Follow the scheme for Bachelors and Masters above with 3″ of the watered silk of the Faculty.

Note:—All hoods are of the full shape, similar to London, all the capes having well-rounded corners.

Bristol

B.A., M.A., LL.B., LL.M., LL.D., M.B., Ch.B., Ch.M., M.D., B.Mus., D.Mus., Ph.D., B.Sc., M.Sc., D.Sc., D.Litt., B.D.S., M.D.S., B.Sc.(Dom.Sc.), B.V.Sc., B.A.(Econ.)

All hoods are of the full shape, similar to Cambridge. Hoods are made of the University's special red stuff or silk. Bachelor's hoods are partly lined with a silk of a somewhat lighter shade of University red. Masters' hoods are fully lined with white silk, and Doctors' are fully lined with salmon-coloured silk. The M.B., Ch.B. hood is fully lined with light red silk and edged inside the hood proper with ¾″ of white silk. The LL.B. hood is fully lined with the lighter shade of University red and edged with ¾″ violet silk. The B.Mus. hood is fully lined with lavender silk and edged with ¾″ lavender silk. The Ph.D. hood is of red silk fully lined with dark violet silk. [This is an unconventional system.]

Cambridge

B.A.	Black corded ottoman silk lined with white fur.
M.A.	Black corded ottoman silk lined with fine ribbed white silk.
B.D.	Black corded ottoman silk lined with fine ribbed black silk.
D.D.	Scarlet superfine cloth lined with shot silk lilac shade.
LL.B.	Light cerise silk lined with white fur.
LL.M.	Black corded ottoman silk lined with light cerise silk.
LL.D.	Scarlet superfine cloth lined with light cerise silk.
M.B., B.Ch.	Mid-cerise silk lined with white fur.
M.Ch.	Black corded ottoman silk lined with mid-cerise silk.
M.D.	Scarlet superfine cloth lined with mid-cerise silk.
Mus.B.	Deep cherry coloured satin lined with white fur.
Mus.M.	Black corded ottoman silk lined with deep cherry coloured satin.
Mus.D.	Cream figured damask silk lined with deep cherry coloured satin.
M.Sc.	Black cloth lined with shot silk (pink with blue).
Sc.D.	Scarlet superfine cloth lined with shot silk (pink with blue).
M.Litt.	Black cloth lined with deep cerise silk (scarlet).
Litt.D.	Scarlet superfine cloth lined with deep cerise silk (scarlet).
Ph.D.	Black corded ottoman silk lined with scarlet superfine cloth.

Note:—All hoods are of the full shape. Edging is forbidden. Cambridge Law degrees are in LAW (not LAWS).

The University of Dublin (Trinity College)

B.A.	Black, White Fur, White.
M.A.	Black, Dark Blue.
B.D.	Black and Black Silk.
D.D.	Scarlet and Black Silk.
LL.B.	Black and White.
LL.D.	Scarlet, Pink.
M.B., B.Ch. B.A.O.	Black, Crimson.
M.Ch.	Crimson, White, Blue.
M.A.O.	Black, Purple.
M.D.	Scarlet, Crimson.
Mus.B.	Pale Blue, White Fur.
Mus.D.	White, Rose.
Ph.D.	Scarlet, Yellow.
M.Litt.	White lined with Blue.
Litt.D.	Scarlet and Mid-Blue.
B.Sc.	Dark Green, Black.
M.Sc.	White, Myrtle Green.
Sc.D.	Scarlet, Myrtle Green.
B.Dent.Sc.	Myrtle Green, Black, Crimson.
M.Dent.Sc.	Myrtle Green, Pale Blue, Crimson.
M.V.B.	Black, Maroon, Olive Green.
M.V.M.	White lined with Maroon.
B.A.I.	Black, Green.
M.A.I.	White, Green.
B.Comm.	Black, Gold.
M.Comm.	White, Gold.
B.A.I. (Elec. et Mech.)	Black, Green, Orange.
Sc.B.(Tech.)	Dark Green lined with Black edged with Orange.
Agr.B.	Black lined with Brown.
Agr.M.	White lined with Brown.
Agr.(Forest.)B.	Black lined with Brown edged with Green.
Agr.(Forest.)M.	White lined with Brown edged with Green.

Note:—All hoods are made in the full shape, similar to London; the capes should be rounded. Bachelors' and Masters' hoods are generally of black corded silk lined with fur or silk mentioned above, whereas Doctors' hoods are of scarlet superfine cloth lined with the silk specified above. Exceptions are, for example :—

B.Dent.Sc.	Myrtle green silk lined with black watered silk and edged with crimson silk.
M.Dent.Sc.	Myrtle green silk lined with pale blue silk and edged with crimson silk.
Mus.B.	Pale blue silk partly lined and edged with white fur.
Mus.D.	Cream figured damask silk lined with rose-coloured satin.

Durham

B.A.	Black and White Fur lining.
M.A.	Black and Palatinate.
B.D.	Black and Black.
D.D.	Scarlet and Palatinate.
B.C.L.	Purple and White Fur.
D.C.L.	Scarlet and White.
LL.M.	Maroon and Purple.
M.B., B.S.	Scarlet, Palatinate and White Fur edging.
M.S.	Rose and Purple.
D.Ch.	Scarlet, Rose and Purple.
M.D.	Scarlet, Scarlet and Palatinate.
B.Mus.	Palatinate and Brocaded Satin.
D.Mus.	Brocaded Satin and Palatinate.
Ph.D.	Scarlet, Scarlet and Palatinate Purple Silk edging 1".
B.Sc.	Palatinate, Fur and Scarlet Silk edging ¼".
M.Sc.	Black, Purple and Scarlet Silk edging ¼".
D.Sc.	Palatinate and Scarlet.
D.Litt.	Scarlet and Gold.
B.Hy.	Black, Purple, Scarlet and White Fur.
D.Hy.	Scarlet, Purple and White.
B.D.S.	Rose, Ivory and White Fur edging.
M.D.S.	Rose and Ivory.
B.Com.	Black and Cerise and White Fur edging.
M.Com.	Black and Cerise Silk lining.
B.Arch.	Black, Blue and White Fur edging.

and 2 Diplomas (*not* Degrees) :—

L.Th.
L.D.S.

Note:—Bachelors' and Masters' Hoods are generally intended to be of the Oxford M.A. type, but Doctors' hoods are of the Oxford Doctors' type with well-rounded capes.

Palatinate purple silk, cloth, or cassimere is peculiar to this University ; it is in fact a soft lilac shade.

Edinburgh

M.A.	Black and White.
B.D.	Black, Purple and Fur.
D.D.	Black and Purple.
B.L.	Black, Blue and Fur.
LL.B.	Black, Blue and Fur.
LL.D.	Black and Blue.
M.B., Ch.B.	Black, Crimson and Fur.
Ch.M.	Black and Gold.
M.D.	Black and Crimson.
B.Mus.	Scarlet, White and Fur.
D.Mus.	Scarlet and White.
Ph.D.	Black, Brown and Blue Shot.
B.Sc.	Black, Green and White Fur.
D.Sc.	Black and Green.
D.Litt.	Black, Blue and Yellow.
B.D.S.	Black, Crimson bordered with Ivory Fur.
M.D.S.	Black, Crimson bordered with Ivory Fur.
B.Com.	Black, Primrose Yellow, Fur.
B.Ed.	Black, Blue and Fur.

Note:—All hoods are of the simple shape and are worn back to front; all are lined with silk of the Faculty colour, Bachelors' being edged with white fur as well. Some of the Doctors' hoods (e.g. M.D.) have a sewn on cape of crimson silk as well.

Exeter

B.A.	Dove grey cloth edged with Faculty colour art. silk.
M.A.	Dove grey cloth lined with Faculty colour art. silk.
D.Litt.	Scarlet superfine cloth lined with dove grey cloth.
LL.B.	Dove grey cloth edged with Faculty colour art. silk.
LL.M.	Dove grey cloth lined with Faculty colour art. silk.
LL.D.	Scarlet superfine cloth lined with dove grey cloth.
B.Sc.	Dove grey cloth edged with Faculty colour art. silk.
M.Sc.	Dove grey cloth lined with Faculty colour art. silk.
D.Sc.	Scarlet superfine cloth lined with dove grey cloth.
B.A. (Social Studies).	Dove grey cloth edged with Faculty colour art silk.
M.A. (Social Studies).	Dove grey cloth lined with Faculty colour art. silk.
Ph.D. (all Faculties).	Dove grey cloth lined with scarlet cloth.

The Faculty colours are :—

Arts	Kingfisher blue.
Law	Purple.
Science	Turquoise blue.
Social Studies	Dark blue.

Note:—All bachelors have theological college style hoods, unlined, all the seams show, and the hood proper is merely edged with the Faculty colour 2" both inside and outside the cowl portion. All Doctors' hoods (incl. Ph.D.) are very heavy, being made of cloth and fully lined with cloth—no silk. All hoods are of the full shape similar to Cambridge. The Ph.D. hood is the Higher Doctors' hood inside out.

Glasgow

M.A.	Black and Purple.
B.D.	Black, Cherry, and Scarlet cloth border.
D.D.	Scarlet and White.
B.L.	Black and Red (Venetian red silk).
LL.B.	Black, Red, and Scarlet cloth border.
LL.D.	Scarlet and Red (Venetian red silk).
M.B., Ch.B.	Black and Scarlet silk lined with Scarlet cloth.
Ch.M.	Black silk lined with Scarlet silk.
M.D.	Scarlet cloth lined and faced with Scarlet silk.
B.Mus.	Black, Blue and Scarlet cloth border.
D.Mus.	Scarlet and Blue.
Ph.D.	Black and Crimson.
B.Sc.	Black, Gold and Scarlet cloth border.
D.Sc.	Scarlet and Gold.
B.Litt.	Black, White and Scarlet cloth border.
D.Litt.	Scarlet and Purple.
B.D.S.	Black, Green and Scarlet cloth border.
M.D.S.	Black and Green
B.V.M.S.	Black, Terra-cotta and Scarlet cloth border.
M.V.S.	Black and Terra-cotta.
D.V.M.	Scarlet and Terra-cotta.
Ed.B.	Black, Blue and Scarlet cloth border.

Note:—All hoods are of the full shape with well-rounded capes.

Hull

B.A. M.A. D.Litt. B.D. D.D. LL.B. LL.M. LL.D. B.Mus. D.Mus. B.Sc. M.Sc. D.Sc. Ph.D. (in all Faculties)	*All* hoods are lined throughout with the University silk, a turquoise blue taffeta. All Bachelors' hoods (other than B.D. and B.Mus.) are of black ribbed rayon, of the improved Oxford Burgon shape. The B.D. is of black superfine cloth of the same shape as the Doctors'. The B.Mus. is of the same shape as the B.A., LL.B. and B.Sc., but is of cream figured damask silk. The Ph.D. is of claret coloured cloth. The D.Mus is of the same shape as the Doctors' (*i.e.* of the improved Oxford Doctors' shape) but is of cream figured damask silk. All the Higher Doctors' hoods are of scarlet superfine cloth with semi-circular cape of the improved Oxford Doctors'. The necks of all hoods are cut in one piece with a single central seam and no neck bands are let in. Edging of all hoods is forbidden except that Masters' hoods are ordered to be edged ¼" with the lining silk (turquoise blue) round the cape portion only : all Masters' hoods are of the London shape, with well-rounded cape.

National University of Ireland (Dublin, Cork and Galway)

B.A.	Green and White.
M.A.	Green, White and Blue.
LL.B.	Green and Prune.
LL.D.	Green and Prune.
M.B., B.Ch., B.A.O.	Green and Scarlet.
M.Ch.	Green, White and Scarlet.
M.A.O.	Green, White, Scarlet and Gold.
M.D.	Green and Scarlet.
B.Mus.	Green and Coral Pink.
D.Mus.	Green and Coral Pink.
Ph.D.	Green, Maroon and Faculty colour.
B.Sc.	Green and St. Patrick's Blue.
D.Sc.	Green and St. Patrick's Blue.
D.Litt.	Green and White.
D.Litt.Celt.	Green and Saffron.
B.D.S.	Green, Silver Grey and Scarlet.
M.D.S.	Green, White, Silver Grey and Scarlet.
B.Comm.	Green and Strawberry.
M.Comm.	Green, White and Strawberry.
M.Econ.Sc.	Green, White and Strawberry.
D.Econ.Sc.	Green, White and Strawberry.
B.Sc.Agric.	Green and Light Green.
M.Sc.Agric.	Green, White and Light Green.
B.Sc.(Dairying)	Green and Orange.
B.Soc.Sc.	Green, White and Maroon.
B.Eng.	Green, lined terra-cotta poplin.
M.Eng.	Green, White and a border of 3″ terra-cotta.
M.Vet.B.	Green and Celtic Blue.
M.Vet.M.	Green, White and Celtic Blue.
B.Arch.	Green and Gold.
M.Arch.	Green, White and Gold.
B.Agric.Sc.	Green and Light Green.
M.Agric.Sc.	Green, White and Light Green.

Note:—Bachelors' hoods are of the simple shape, Masters' and Doctors' are of the full shape.

Leeds

B.A.	Dark Green.
M.A.	Dark Green and White.
B.D.	Dark Green, Scarlet and White.
D.D.	Scarlet, Dark Green and White.
LL.B.	Light Green.
LL.M.	Light Green and White.
LL.D.	Scarlet and Light Green.
M.B., Ch.B.	Dark Green and Light Green.
Ch.M.	Dark Green, White and Light Green.
M.D.	Scarlet, Dark Green and Light Green.
B.Mus.	Dark Green and White.
Ph.D.	Green and Scarlet.
B.Ch.D.	Dark Green and Middle Green.
M.Ch.D.	Dark Green, White and Middle Green.
B.Sc.	Middle Green.
M.Sc.	Middle Green and White.
D.Sc.	Scarlet and Middle Green.
D.Litt.	Scarlet and Dark Green.
M.Ed.	Dark Green, White and Middle Green 1″ laid on the lining.
B.Com.	Light Green and Dark Green.
M.Com.	Light Green, White and Dark Green.

Note:—Bachelors' and Masters' hoods are of the simple shape and Doctors' hoods are of the full shape.

Leicester

B.A.	Red, lined with Silver Grey.
B.Sc.	Red, lined with Royal Blue.
M.A.	Red, lined with Silver Grey.
M.Sc.	Red, lined with Royal Blue.
M.Ed.	Red, lined with Tartan Green.
Ph.D.	Red, lined with a watered taffeta of lighter shade.
D.Litt.	Silver Grey, lined Red.
D.SC.	Royal Blue, lined Red.
LL.D.	Black, lined Red.

Note:—Bachelors' hoods are of a special simple shape, and all other hoods are of a specific small full shape.

Liverpool

B.A.	Black, Apple Blossom and Fur.
M.A.	Black and Apple Blossom.
LL.B.	Black, Bronze and Fur.
LL.M.	Black and Bronze.
LL.D.	Scarlet and Bronze.
M.B., Ch.B.	Black, Lavender and Fur.
Ch.M. M.Ch.(Orth.)	Black and Lavender.
M.D.	Scarlet and Lavender.
Ph.D.	Scarlet, Black and Velvet.
B.Sc.	Black, Slate Blue and Fur.
M.Sc.	Black and Slate Blue.
D.Sc.	Scarlet and Slate Blue.
D.Litt.	Scarlet and Apple Blossom.
B.D.S.	Black, Dark Red and Fur.
M.D.S.	Black and Dark Red.
B.Eng.	Black, Orange and Fur.
M.Eng.	Black and Orange.
D.Eng.	Scarlet and Orange.
B.V.Sc.	Black, Grey and Fur.
M.V.Sc.	Black and Grey.
D.V.Sc.	Scarlet and Grey.
B.Arch.	Black, White with two narrow lines of Black Velvet, Fur.
M.Arch.	Black, White with two narrow lines of Black Velvet.
B.Com.	Black, Citron and Fur.
M.Com.	Black and Citron.
M.Rad.	Black and Lavender.
Ph.D.	Scarlet, Black and Velvet.

Note:—Bachelors' and Masters' hoods are simple shape Doctors' are full shape.

London

B.A. M.A. D.Lit.	Russet Brown.
B.D. M.Th. D.D.	Sarum Red.
LL.B. LL.M. LL.D.	Mid-blue.
M.B., B.S. M.S. M.D.	Violet.
B.Mus. M.Mus. D.Mus.	White Watered.
B.Sc. M.Sc. D.Sc.	Yellow-Gold.
Ph.D.	Claret.
B.Pharm.	Old Gold.
B.D.S. M.D.S.	Olive Green (corded).
M.S.(Dent. Surg.)	Violet.
B.Vet.Med. M.Vet.Med.	Lilac.
B.Sc.(Eng.) M.Sc.(Eng.) D.Sc.(Eng.)	Yellow-Gold.
B.Sc.(Est. Man.) B.Sc.(Vet. Sci.).	Same as B.Sc.
B.Com. M.Com.	Orange.

Note:—All London hoods are of identical shape (full shape with rounded cape). Bachelors' hoods are lined with Faculty colour 3″ only, Masters' are fully lined, Doctors' are all of scarlet superfine cloth fully lined with Faculty colour silk. Bachelors who are registered Members of Convocation are entitled to wear hoods of black corded ottoman silk, the remainder of the hood being fully lined with fine ribbed white silk. The B.Mus. hood is an exception and is of mid-blue corded silk with 3″ lining of white watered silk, but fully lined with white *watered* silk if a Member of Convocation. The Ph.D. hood is of claret coloured cloth fully lined with claret coloured silk, and *may* be edged with silk of the Faculty in which the degree was taken. Bachelors' hoods (except B.Mus.) and Masters' hoods are black, only Members of Convocation being allowed silk hoods.

Manchester (Victoria University)

B.A.	Black, Blue and Fur.
M.A.	Black and Blue.
B.D.	Black, Heliotrope and Fur.
D.D.	Gold and Gold.
LL.B.	Black and Violet.
LL.M.	Black and Violet.
LL.D.	Gold and Gold.
M.B., Ch.B.	Black and Red.
Ch.M.	Black and Red.
M.D.	Gold and Gold.
Mus.B.	Dark and Light Blue.
Mus.D.	Gold and Gold.
Ph.D.	Gold and Gold.
B.Sc.	Black, Salmon and Fur.
M.Sc.	Black and Salmon.
D.Sc.	Gold and Gold.
D.Litt.	Gold and Gold.
B.D.S.	Black, Fawn and Fur.
M.D.S.	Black and Fawn.
D.D.S.	Gold and Gold.
B.A.(Theol.) B.A.(Mus.)	Black, Blue and Fur.
B.A.(Econ.) B.A.(Admin. B.A.(Com.)	Black, Orange and Fur.
M.A.(Econ.) M.A.(Admin.) M.A.(Com.)	Black and Orange.
B.Sc.(Tech.)	Black, Terra-cotta and Fur.
M.Sc.(Tech.)	Black and Terra-cotta.
M.Ed.	Black and Bluish-Green.

Note:—All hoods are of the simple shape and are worn back to front with the tippet or liripipe outwards.

Nottingham

B.A., M.A.	Light Blue and Cherry and Black.
B.D.	Light Blue and Purple and Black.
D.D.	Light Blue and Purple and Scarlet.
LL.B., LL.M.	Light Blue and Maroon and Black.
LL.D.	Light Blue and Maroon and Scarlet.
B.Mus.	Light Blue and Pink and Black.
D.Litt.	Light Blue and Cherry and Scarlet.
B.Sc., M.Sc.	Light Blue and Royal Blue and Black.
D.Sc.	Light Blue and Royal Blue and Scarlet.
Ph.D.	Light Blue and Faculty Colour and Claret.
B.Sc.(Agric.), M.Sc.(Agric.)	Light Blue and Green and Black.
D.Sc.(Agric.)	Light Blue and Green and Scarlet.
B.Sc.(Eng.), M.Sc.(Eng.)	Light Blue and Light Navy and Black.
D.Sc.(Eng.)	Light Blue and Light Navy and Scarlet.
B.Pharm.	Light Blue and Grey and Black.
M.Pharm.	Black, Light Blue and Grey.
M.Ed.	Light Blue and Lilac and Black.

Note:—All hoods in this University are of the full, Cambridge, shape. All Bachelors' hoods are of black stuff, lined for 3″ only with light blue silk. The hoods of all Masters and of Bachelors in Divinity are of black silk, and lined throughout with light blue silk.

The hoods of Doctors in Philosophy are of claret coloured silk or cloth lined throughout with light blue silk. The hoods of the Higher Doctors are of scarlet superfine cloth lined throughout with light blue silk.

All hoods in this University are bound (cowl portion only) with a ribbon of the appropriate faculty colour

The Faculty colours are :—

Arts	Cherry red.
Theology	Purple.
Law	Maroon.
Music	Pink.
Education	Lilac.
Science	Royal blue.
Pharmacy	Dove grey.
Agriculture and Horticulture	Green.
Engineering and Mining	Light Navy blue.

Oxford

B.A.	Black, half-lined and edged with white fur.
M.A.	Black silk, lined crimson or shot crimson silk.
B.D.	Black, lined fine ribbed black silk.
D.D.	Scarlet superfine cloth, lined fine ribbed black silk
B.C.L.	Medium blue silk, lined or trimmed with white fur.
D.C.L.	Scarlet superfine cloth, lined crimson silk.
B.M., B.Ch.	Medium blue, half-lined and edged with white fur.
M.Ch.	Black silk, lined and edged with blue silk.
D.M.	Scarlet superfine cloth, lined crimson silk.
B.Mus.	Lilac silk, half-lined and edged with white fur.
D.Mus.	Cream silk brocade, with apple-blossom embroidery, lined with cherry crimson silk.
D.Litt., D.Sc.	Scarlet superfine cloth, lined with grey silk.
B.Litt.	Light blue, half-lined and edged with white fur.
B.Sc.	Same as B.Litt.
B.Phil.	Dark blue silk, lined with white silk.

Note:—The Oxford Bachelors' hoods (except B.D. & B.Phil.) and the M.A. hood are either of Burgon or Oxford shape. The B.Phil. and M.Ch. hoods are always of Oxford shape. The B.D. and all Doctors' hoods are of the correct full apron shape. B.A., M.A., M.Ch., and B.D. hoods are of corded black silk; the other Bachelors' hoods are of corded or ribbed silk of the colour shown, lined or trimmed with white fur. When the Burgon shape is used the hood is half-lined and edged with fur, but for the Oxford shape only an edging of fur is used.

Reading

B.A.
M.A.
D.Litt.
B.Sc.
M.Sc.
D.Sc.
Ph.D.

All Reading hoods are lined with cream coloured silk. Bachelors' hoods are of dark blue lined with cream silk to a depth of 3″. All hoods are full shape. All Doctors' hoods are of scarlet superfine cloth fully lined with cream silk, of the full shape, except Ph.D., which is of crimson cloth lined with cream silk (maroon Russell-Cord is generally used).

St. Andrews

M.A.	Black, cherry lining.
B.D.	Wood Violet, white fur edging.
D.D.	Wood Violet, white lining (satin).
B.L.	Pimento, white edging.
M.B., Ch.B.	Medici Crimson, white fur edging.
Ch.M.	Medici Crimson.
LL.B.	Pimento, white fur edging.
LL.D.	Pimento, white lining (satin).
M.D.	Medici Crimson, white lining (satin).
Mus.B.	Cerulean blue silk edged with white fur.
Mus.D.	Cerulean blue silk or cloth with a white lining (satin).
Ph.D.	Nanking Blue, white lining (satin).
B.Sc.	Purple Lilac, white fur edging.
D.Sc.	Purple Lilac, white lining (satin).
B.Litt.	Saffron Yellow, white fur edging.
D.Litt.	Saffron Yellow, white lining (silk).
B.D.S.	Claret, white fur edging.
M.D.S.	Claret.
D.D.Sc.	Claret, white lining (satin).
B.Com.	Black, green lining, white fur edging.
B.Phil.	Gold, white fur edging.
B.Ed.	Black, primrose lining, white fur edging.

Note:—All hoods of this University are of the full shape with well-rounded capes.

Sheffield

B.A.	Green, Fur and Strawberry.
M.A.	Green and Strawberry.
LL.B.	Green, Fur and Pale Green.
LL.M.	Green and Pale Green.
LL.D.	Red and Pale Green.
M.B., Ch.B.	Green, Fur and Red.
Ch.M.	Green, Red and White.
M.D.	Red and Red.
B.Mus.	Green, Strawberry, White Fur and Silk.
D.Mus.	Red, White and Strawberry.
B.Sc.	Green, Fur and Apricot.
M.Sc.	Green and Apricot.
D.Sc.	Red and Apricot.
D.Litt.	Red and Strawberry.
B.D.S.	Green, Fur and Rose Pink.
M.D.S.	Green and Rose Pink.
B.Eng.	Green, Fur and Purple.
M.Eng.	Green and Purple.
D.Eng.	Red and Purple.
B.Met.	Green, Fur and Steel Grey.
M.Met.	Green and Steel Grey.
D.Met.	Red and Steel Grey.

Note:—All hoods of this University are of the full shape

Southampton

Faculty colours :—

Arts	Mid-cerise
Law	Blue (Univ. silk)
Science	Rich gold
Engineering	Orange
Economics	Light green
Education	White

B.A.
M.A.
D.Litt.
B.A.(Law)
LL.B.
LL.M.
LL.D.
B.Sc.
M.Sc.
D.Sc.
B.Sc.(Eng.)
M.Sc.(Eng.)
D.Sc.(Eng.)
B.Sc.(Econ.)
M.Sc.(Econ.)
D.Sc.(Econ.)
M.A.(Educ.)
Ph.D. (in all Faculties)

All hoods are lined throughout with the University silk, a peacock blue. All Bachelors' hoods are of black ribbed rayon of the improved Oxford Burgon shape. The cowl portion only is edged inside and outside with ⅜″ of the Faculty colour, except in Law, in which case the lining is turned over ⅜″ on to the outside to form the edging, and B.A.(Law) which has an added edging of mid-cerise of ⅜″ on the outside of the cowl portion. All Masters' hoods are of the London shape, but with well rounded cape, the cowl portion is edged ⅜″ inside and outside with the Faculty colour except LL.M., in which case the lining silk is turned over ⅜″ on the outside to make the edging. The cape of Masters' hoods is edged ⅜″ with the peacock-blue lining silk. All Ph.D. hoods are of claret-coloured cloth fully lined with peacock-blue silk. All the Higher Doctors' hoods are of scarlet superfine cloth fully lined with peacock-blue silk. All Doctors' hoods (incl. Ph.D.) are of the improved Oxford D.D. shape. Neck bands are prohibited for all hoods, the neck of which must be cut on the curve in one piece with a single central seam.

Wales

B.A.	Black and Green shot Blue (3″).
M.A.	Black and Green shot Blue.
LL.B.	Black and Purple shot Red (3″).
LL.M.	Black silk lined with Red silk shot with Purple.
LL.D.	Scarlet and Purple shot Red.
M.B., Ch.B.	Black and Black shot Green and White.
M.D.	Scarlet and Black shot Green and White.
B.Mus.	Blue and Pearl silk lining to a depth of 3″.
M.Mus.	Black silk fully lined with Pearl-coloured silk.
D.Mus.	Scarlet and Pearl.
B.Sc.	Black and Black shot Yellow.
M.Sc.	Black and Black shot Yellow (3″).
D.Sc.	Scarlet and Black shot Yellow.
Ph.D.	Crimson and Faculty colour.
D.Litt.	Scarlet and Green shot Blue.

Note:—Bachelors' hoods are of the simple shape, Masters' and Doctors' hoods are of the full shape.

USEFUL FACTORS

$(a+b)^2=a^2+2ab+b^2$
$(a-b)^2=a^2-2ab+b^2$
$a^2-b^2=(a+b)(a-b)$
$a^3+b^3=(a+b)(a^2-ab+b^2)$
$a^3-b^3=(a-b)(a^2+ab+b^2)$
$x^4+x^2y^2+y^4=(x^2+xy+y^2)(x^2-xy+y^2)$
$a^3+b^3+c^3-3abc=(a+b+c)(a^2+b^2+c^2-ab-bc-ca)$
$a^2(b-c)+b^2(c-a)+c^2(a-b)=-(a-b)(b-c)(c-a)$
$bc(b-c)+ca(c-a)+ab(a-b)=-(a-b)(b-c)(c-a)$
$a(b^2-c^2)+b(c^2-a^2)+c(a^2-b^2)=(a-b)(b-c)(c-a)$

ARITHMETICAL PROGRESSION

Last term $= a + (n-1)d$

Sum to n terms $= \frac{n}{2}[2a + (n-1)d]$

GEOMETRICAL PROGRESSION

pth term $= ar^{p-1}$

Sum to n terms $= a\frac{r^n - 1}{r-1}$ or $a\frac{1-r^n}{1-r}$

Sum to infinity when $r < 1$ $= \frac{a}{1-r}$

PERMUTATIONS AND COMBINATIONS

$${}^nP_r=n(n-1)(n-2)\,.\,.\,.\,.\,.\,.\,.\,(n-r+1)=\frac{\lfloor n}{\lfloor n-r}$$

$${}^nC_r=\frac{n(n-1)(n-2)\,.\,.\,.\,.\,.\,(n-r+1)}{\lfloor r}=\frac{\lfloor n}{\lfloor r\ \lfloor n-r}$$

BINOMIAL THEOREM

$$(a+x)^n = a^n + na^{n-1}x + \frac{n(n-1)}{1\,.\,2}a^{n-2}x^2 + \ldots + {}^nC_r a^{n-r}x^r + \ldots\ldots + x^n$$

MENSURATION FORMULÆ

LINES { Pythagorean Theorem $a^2 = b^2 + c^2$; Circumference of circle $= 2\pi r$

PLANE AREAS { Parallelogram $= bh$; Triangle $= \frac{1}{2}bh$; Trapezium $= \frac{1}{2}(a+b)h$; Circle $= \pi r^2$; Ellipse $= \pi ab$

CURVED SURFACES { Cylinder = circum. base × height. Cone $= \frac{1}{2}$ circum. base × slant. Conical Frustum $= \pi(R + r)s$; Sphere $= 4\pi r^2$

VOLUMES { Prism (or Cylinder) = area base × height; Pyramid (or Cone) $= \frac{1}{3}$ area base × height; Prismoid $= \frac{h}{6}(A + B + 4C)$; Sphere $= \frac{4}{3}\pi r^3$

TRIGONOMETRY

(a) $\pi = 3{\cdot}14159\ldots$ [approximations are $\frac{22}{7}$ and $\frac{355}{113}$

A Radian $= 57°\ 17'\ 44{\cdot}8''$ nearly.

(b) $\sin^2\theta + \cos^2\theta = 1$

(c)

Degrees	0°	30°	45°	60°	90°
Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
Sine	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
Cosine	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tangent	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞

(d) $\sin(-\theta) = -\sin\theta$; $\cos(-\theta) = \cos\theta$
$\sin(90° - \theta) = \cos\theta$; $\cos(90° - \theta) = \sin\theta$
$\sin(90° + \theta) = \cos\theta$; $\cos(90° + \theta) = -\sin\theta$
$\sin(180° - \theta) = \sin\theta$; $\cos(180° - \theta) = -\cos\theta$
$\sin(180° + \theta) = -\sin\theta$; $\cos(180° + \theta) = -\cos\theta$

(e) If $\sin\theta = \sin\alpha$, then $\theta = n\pi + (-1)^n\alpha$
If $\cos\theta = \cos\alpha$, then $\theta = 2n\pi \pm \alpha$
If $\tan\theta = \tan\alpha$, then $\theta = n\pi + \alpha$

(f) $\sin(A+B) = \sin A\cos B + \cos A\sin B$
$\cos(A+B) = \cos A\cos B - \sin A\sin B$
$\sin(A-B) = \sin A\cos B - \cos A\sin B$
$\cos(A-B) = \cos A\cos B + \sin A\sin B$

$\sin C + \sin D = 2\sin\frac{C+D}{2}\cos\frac{C-D}{2}$

$\sin C - \sin D = 2\cos\frac{C+D}{2}\sin\frac{C-D}{2}$

$\cos C + \cos D = 2\cos\frac{C+D}{2}\cos\frac{C-D}{2}$

$\cos D - \cos C = 2\sin\frac{C+D}{2}\sin\frac{C-D}{2}$

$2\sin A\cos B = \sin(A+B) + \sin(A-B)$
$2\cos A\sin B = \sin(A+B) - \sin(A-B)$
$2\cos A\cos B = \cos(A+B) + \cos(A-B)$
$2\sin A\sin B = \cos(A-B) - \cos(A+B)$

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$

$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$

$\sin 2A = 2\sin A\cos A$
$\cos 2A = \cos^2 A - \sin^2 A = 1 - 2\sin^2 A = 2\cos^2 A - 1$

$\sin 2A = \frac{2\tan A}{1+\tan^2 A}$; $\cos 2A = \frac{1-\tan^2 A}{1+\tan^2 A}$

$\tan 2A = \frac{2\tan A}{1-\tan^2 A}$

$\sin 3A = 3\sin A - 4\sin^3 A$
$\cos 3A = 4\cos^3 A - 3\cos A$

$\tan 3A = \frac{3\tan A - \tan^3 A}{1 - 3\tan^2 A}$

$\sin\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}}$; $\cos\frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}}$

$2\sin\frac{A}{2} = \pm\sqrt{1+\sin A} \pm \sqrt{1-\sin A}$

$2\cos\frac{A}{2} = \pm\sqrt{1+\sin A} \pm \sqrt{1-\sin A}$

(g) $\log_a mn = \log_a m + \log_a n$

$\log\frac{m}{n} = \log_a m - \log_a n$

$\log_a m^n = n\log_a m$
$\log_a m = \log_b m \times \log_a b$

(h) $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ $\quad \cos A = \frac{b^2+c^2-a^2}{2bc}\ldots$

$\sin\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}\ldots\ldots \cos\frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}\ldots$

$\tan\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}\ldots\ldots$

$\sin A = \frac{2}{bc}\sqrt{s(s-a)(s-b)(s-c)}\ldots\ldots$

$a = b\cos C + c\cos B,\ldots\ldots$

$\tan\frac{B-C}{2} = \frac{b-c}{b+c}\cot\frac{A}{2}\ldots\ldots$

$\Delta = \sqrt{s(s-a)(s-b)(s-c)} = \frac{1}{2}bc\sin A = \frac{1}{2}ca\sin B = \frac{1}{2}ab\sin C$

(i) $R = \frac{a}{2\sin A} = \frac{b}{2\sin B} = \frac{c}{2\sin C} = \frac{abc}{4\Delta}$

$r = \frac{\Delta}{s} = (s-a)\tan\frac{A}{2} = \ldots = \ldots$

$r_1 = \frac{\Delta}{s-a} = s\tan\frac{A}{2}$

Area of a quadrilateral inscribable in a circle, $= \sqrt{(s-a)(s-b)(s-c)(s-d)}$

$\frac{\sin\theta}{\theta} = 1$, when θ is very small.

$\sin\alpha + \sin(\alpha+\beta) + \sin(\alpha+2\beta) + \ldots$ to n terms

$$= \frac{\sin\left\{\alpha + \frac{n-1}{2}\beta\right\}\sin\frac{n\beta}{2}}{\sin\frac{\beta}{2}}$$

$\cos\alpha + \cos(\alpha+\beta) + \cos(\alpha+2\beta) + \ldots$ to n terms

$$= \frac{\cos\left\{\alpha + \frac{n-1}{2}\beta\right\}\sin\frac{n\beta}{2}}{\sin\frac{\beta}{2}}$$

MISCELLANEOUS DATA.

1 metre = 100 cm. = 1000 mm. = 0·001 Km.
1 yard = 3 ft. = 36 in. = 0·9144 metre.
1 mile = 8 fur. = 320 po. = 1760 yards.
1 Hectare = 100 acres = 10,000 sq. metres.
1 acre = 4 roods = 4840 sq. yds. = 0·4047 Hectare
1 litre = 1 c. dm. = 100 cl. = 0·01 Hl. = 0·001 c. metre.
1 gallon = 4 qt. = 8 pt. = 0·1606 c. ft. = 4·546 litres.
1 quarter = 8 bush. = 32 pk. = 64 gal.
1 Kilogram = 1000 g. = 0·001 tonne.
1 lb. = 16 oz. = 7000 grains = 453·6 grams.
1 ton = 20 cwt. = 80 qr. = 2240 lbs.
1 litre of water weighs 1 kg.; 1 c. ft. of water weighs 62·3 lbs.
1 gallon of water weighs 10 lbs.
A circle of a radius r has a circumference $2\pi r$ and an area πr^2, where $\pi = 3{\cdot}1416$, $\frac{1}{\pi} = 0{\cdot}3183$, $\pi^2 = 9{\cdot}8696$.
Base of natural logarithms is $e = 2{\cdot}7183$.
The acceleration of a falling body is 32·2 feet per sec. per sec., or 981 cm. per sec. per sec.
1 horse-power = 550 foot pounds per second = 746 watts.
1 atmosphere = 760 mm. of mercury (30 in.) = 1·03 Kg. per sq. cm. = 14·7 lbs. per sq. inch = 1010 millibars.
1 statute mile = 5280 feet = approx. 1·6 kilometres.
1 sea mile = 6080 feet = approx. 2000 yds.
1 cable = $\frac{1}{10}$ sea mile.
1 shackle = $\frac{1}{8}$ cable.
1 knot = 1 sea mile per hr. = approx. 100 ft. per min.
1 ton (ship capacity) = 100 c. ft. of water.

Gravity—"g" at lat. 45° 980·6 | Poles 983·2
(*cm./sec./sec.*) Equator 978·0 | Greenwich 981·17

Earth—Mean Diameter = 7918 miles.
Mean distance from Sun = 93,004,000 miles.
Mean Density = 5·53 gm./cm.^{3}
Mass = $5{\cdot}9 \times 10^{21}$ tons.

Sun—Diameter = 865,400 miles.
Volume = 1,300,000 times that of Earth.
Mass = 332,000 times that of Earth.

Moon—Mean distance from Earth = 238,857 miles.
Diameter = 2,160 miles.

Mechanical Equivalent of Heat.
= 778 ft. lb. in lb. ° F. units.
= $4{\cdot}18 \times 10^7$ ergs in grm. ° C. units.

Latent Heats (calories per gm.) of fusion, Ice = 79·6
of vaporization, Water = 539
of fusion, Lead = 6

Velocity of light *in vacuo* = 186,282·6 miles per second.

MECHANICS

$$v = u + ft$$
$$s = ut + \tfrac{1}{2}ft^2$$
$$v^2 = u^2 + 2fs$$
$$P = mf$$
$$\text{or } P = \frac{w}{g} f$$

Time of swing of Pendulum—
$$t = 2\pi \sqrt{\frac{l}{g}}$$

AREAS AND VOLUMES

$\pi = 3{\cdot}14159$
Circumference of circle = $2\pi r$
Area of circle = πr^2
Vol. of sphere = $\frac{4}{3}\pi r^3$
Surface of sphere = $4\pi r^2$
Vol. of cylinder = $\pi r^2 h$
Vol. of cone = $\frac{1}{3}\pi r^2 h$

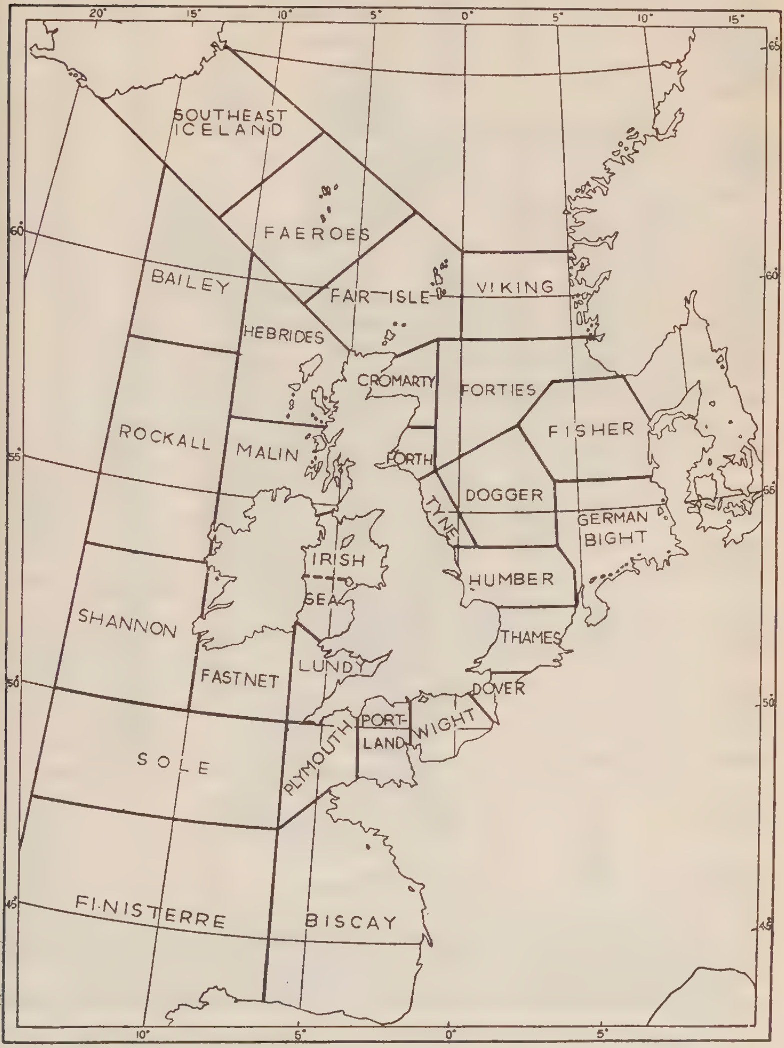
UNITS AND DIMENSIONS

	Symbol.	Dimension.	Absolute Unit.	Practical Unit.	Ratio.
Length	l	L	centimetre	micro-millimetre	10^{-7}
				light-year	946×10^{15}
			foot	mile	5280
Mass	m	M	gram	—	
			pound	—	
Time	t	T	second	—	
Velocity	v	LT^{-1}	cm per sec.	—	
			ft. per sec.	miles per hr.	1·47
				knots	
Acceleration	f	LT^{-2}	cm. per sec. per sec.	—	
			ft. per sec. per sec.	—	
Momentum	mv	MLT^{-1}			
Force	F	MLT^{-2}	Dyne	—	
			poundal	poundweight	32·2
Work, Energy	U	ML^2T^{-2}	erg	joule	10^7
			foot-poundal	foot-pound	32·2
Power	P	ML^2T^{-3}	ergs per sec.	watt	10^7
			foot-poundals per sec.	foot-pounds per sec.	32·2
				horse-power	$1{\cdot}77 \times 10^4$

CHEMICAL NAMES OF COMMON SUBSTANCES

Alcohol = Ethyl Alcohol (C_2H_5OH).
Alum = Potassium Aluminium Sulphate ($K_2SO_4.Al_2(SO_4)_3.24H_2O$).
Aqua fortis = Nitric Acid (HNO_3).
Bi-Carbonate of Soda = Sodium Hydrogen Carbonate ($NaHCO_3$).
Blue Vitriol (Blue Stone) = Copper Sulphate ($CuSO_4.5H_2O$).
Boracic Acid = Boric Acid (H_3BO_3).
Borax = Sodium Borate ($Na_2B_4O_7.10H_2O$).
Calomel = Mercurous Chloride (Hg_2Cl_2) (laxative, non-poisonous).
Chalk = Calcium Carbonate ($CaCO_3$).
Common Salt = Sodium Chloride (NaCl).
Corrosive Sublimate = Mercuric Chloride ($HgCl_2$) (violently poisonous).
Epsom Salts = Magnesium Sulphate ($MgSO_4.7H_2O$).
Fire Damp = Methane (CH_4) + air.
Glauber Salts = Sodium Sulphate ($Na_2SO_4.10H_2O$).
Green Vitriol = Ferrous Sulphate ($FeSO_4.7H_2O$).
Hypo = Sodium Thiosulphate ($Na_2S_2O_3.5H_2O$).
Lime = Calcium Oxide (CaO).
Oil of Vitriol = Sulphuric Acid (H_2SO_4).
Plaster of Paris = Calcium Sulphate $(CaSO_4)_2H_2O$.
Red Lead = Triplumbic Tetroxide (Pb_3O_4).
Sal Ammoniac = Ammonium Chloride (NH_4Cl).
Sal Volatile = Impure Ammonium Carbonate ($[NH_4]_2CO_3$).
Saltpetre = Potassium Nitrate (KNO_3).
Salts of Lemon = Potassium Hydrogen Oxalate (KHC_2O_4).
Spirit of Salt = Hydrochloric Acid (HCl).
Sugar of Lead = Lead Acetate ($Pb[C_2H_3O_2]_2.3H_2O$).
Verdigris = Basic Copper Acetate ($-Cu[C_2H_3O_2]_2.Cu[OH]_2$).
Vinegar = Dilute Acetic Acid ($C_2H_4O_2$).
Washing Soda = Crystalline Sodium Carbonate ($Na_2CO_3.10H_2O$).
White Lead = Basic Lead Carbonate ($2PbCO_3.Pb[OH]_2$).

SEA AREAS USED IN WEATHER FORECASTS



ELEMENTS

Element.	Symbol.	Atomic Number.	Atomic Weight.
actinium	Ac	89	227
aluminium	Al	13	26·97
americium *	Am	95	243
antimony	Sb	51	121·76
argon	A	18	39·944
arsenic	As	33	74·91
astatine *	At	85	210
barium	Ba	56	137·36
berkelium *	Bk	97	249
beryllium	Be	4	9·02
bismuth	Bi	83	209·00
boron	B	5	10·82
bromine	Br	35	79·916
cadmium	Cd	48	112·41
calcium	Ca	20	40·08
californium *	Cf	98	249
carbon	C	6	12·010
cerium	Ce	58	140·13
caesium	Cs	55	132·91
chlorine	Cl	17	35·457
chromium	Cr	24	52·01
cobalt	Co	27	58·94
copper	Cu	29	63·57
curium *	Cm	96	245
dysprosium	Dy	66	162·46
einsteinium *	E	99	255
erbium	Er	68	167·2
europium	Eu	63	152·0
fermium *	Fm	100	255
fluorine	F	9	19·00
francium *	Fr	87	223
gadolinium	Gd	64	156·9
gallium	Ga	31	69·72
germanium	Ge	32	72·6
gold	Au	79	197·2
hafnium	Hf	72	178·6
helium	He	2	4·003
holmium	Ho	67	164·94
hydrogen	H	1	1·0080
indium	In	49	114·8
iodine	I	53	126·92
iridium	Ir	77	193·1
iron	Fe	26	55·84
krypton	Kr	36	83·7
lanthanum	La	57	138·92
lead	Pb	82	207·21
lithium	Li	3	6·940
lutetium	Lu	71	175
magnesium	Mg	12	24·32
manganese	Mn	25	54·93
mendeleevium *	Mv	101	256
mercury	Hg	80	200·61
molybdenum	Mo	42	96
neodymium	Nd	60	144·27
neon	Ne	10	20·183
neptunium *	Np	93	237
nickel	Ni	28	58·69
niobium	Nb	41	92·91
nitrogen	N	7	14·008
nobelium †	No	102	253
osmium	Os	76	190·2
oxygen	O	8	16·000
palladium	Pd	46	106·7
phosphorus	P	15	30·98
platinum	Pt	78	195·23
plutonium *	Pu	94	244
polonium	Po	84	210
potassium	K	19	39·096
praseodymium	Pr	59	140·92
promethium *	Pm	61	147
protactinium	Pa	91	231
radium	Ra	88	226·05
radon	Rn	86	222
rhenium	Re	75	186·31
rhodium	Rh	45	102·91
rubidium	Rb	37	85·48
ruthenium	Ru	44	101·7
samarium	Sm	62	150·43
scandium	Sc	21	45·10
selenium	Se	34	78·96
silicon	Si	14	28·06
silver	Ag	47	107·88
sodium	Na	11	22·997
strontium	Sr	38	87·63
sulphur	S	16	32·066
tantalum	Ta	73	180·88
technetium *	Tc	43	99
tellurium	Te	52	127·61
terbium	Tb	65	159·2
thallium	Tl	81	204·39
thorium	Th	90	232·12
thulium	Tm	69	169·4
tin	Sn	50	118·7
titanium	Ti	22	47·90
tungsten	W	74	183·92
uranium	U	92	238·07
vanadium	V	23	50·95
xenon	Xe	54	131·3
ytterbium	Yb	70	173·04
yttrium	Y	39	88·92
zinc	Zn	30	65·38
zirconium	Zr	40	91·22

* In the cases of these elements, which are very rare or not found in nature, but have been artificially prepared, atomic weight in the chemical sense is meaningless; the integral mass of the most stable isotope known is given.

† The validity of the evidence for the discovery of this element has been questioned.

Note: The new elements with an atomic number higher than that of uranium 238 are termed Transuranics.

GAS LAWS

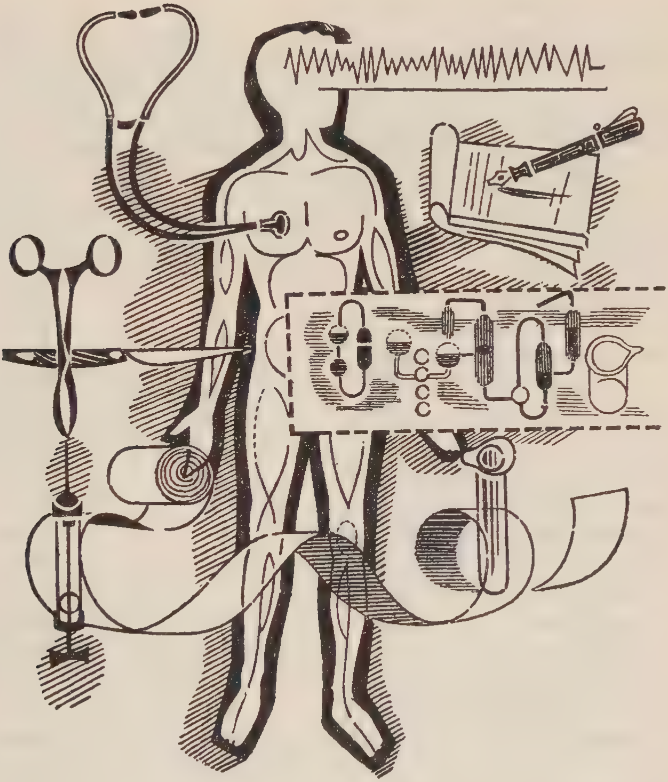
Boyle's Law (1662) pV = constant

Charles' Law (1787) $\frac{pV}{T}$ = constant.

Van der Waal's equation $\left(p+\frac{a}{V^2}\right)(V-b) = RT$ where a and b are constants.

Adiabatic expansion of a gas pV^{γ} = constant where $\gamma = \frac{C_p}{C_v}$.

Medical Matters



In recent times it has become apparent that people want to know more about medicine. The choice is thus not between knowing and not knowing but between accurate and inaccurate information. Here we attempt to give an objective account of recent developments, but not to usurp the function of the family doctor.

TABLE OF CONTENTS

Medical Matters

PART I. INTRODUCTION.

In past editions the Medical Section has taken the form of a dictionary which gave information on various medical subjects under separate headings arranged in alphabetical order. In this edition we are attempting something different: to make a sort of small medical text-book for the layman. There are two reasons for this. First, it was felt that some people might, out of general interest, want to get an overall picture of modern medicine and learn something about the progress going on in the field. Such people can read the section right through as a continuous narrative. More seriously, however, we began to feel that small snippets of information arranged in alphabetical order can be misleading. For example, if you look up "poliomyelitis" and find that it is a disease caused by a virus and controlled by a vaccine you will not be much the wiser unless you know what these words mean. So, too, if you believe yourself to have a stomach ulcer, it will not be of any help to look up "stomach ulcer" if, in fact, you have gastritis. With this new method, you will be able to look down a section dealing with diseases of the stomach to find which seems most likely to be the one which is troubling you. (Of course, unless your symptoms are slight, you would be very foolish to try to diagnose your own illness—that is a doctor's job—however, you *are* entitled to satisfy your curiosity!) But for those who preferred the old form arranged in alphabetical order there is an index at the end of the section, and all that is necessary is to look it up to find the reference. If that is how you prefer your information, you will have lost nothing by the way the section has been rewritten.

(a) HOW TO USE THE SECTION.

Diseases do not exist in watertight compartments, but doctors arrange them according either to their cause or the area of the body affected. This plan has been followed here, and at the beginning of each part an account of the group of diseases under discussion is given. Unless you know enough already, you would be wise to read it.

Here is some advice about your attitude to disease in general, and your use of this section in particular.

First of all, and obviously, no book is a substitute for the doctor, and when you are ill you must see him. There are good and bad doctors, competent and incompetent ones, just as in any other profession or trade; so choose a doctor you can trust, *and then believe what he tells you and carry out his advice.* There is no use complaining about the whole medical profession just because you are dissatisfied with your own G.P. If you are, you should change him.

Secondly, *never* believe what you hear from non-medical sources. Literally millions of people are made miserable every year by taking to heart nonsense told them by others, who may well be quite unaware of the harm they do, or even have the very best intentions. In any medical matter ask your doctor, and ignore your next-door neighbour's asked-for or unasked-for advice. Doctors are sometimes wrong, but they are much less likely to be wrong than someone without a medical education. Remember, too, that the statement that there is no cure for a disease does not necessarily mean that it is deadly; baldness, for example, if not curable, is hardly serious.

Thirdly, don't try to diagnose your own trouble or decide what treatment you think you should have. This section will have failed completely in its intentions if it puts you in the position of a character described by an English humourist, who, from a medical dictionary, discovered that he had every disease listed in it with the solitary exception of housemaid's knee. Diseases which appear to the layman to have the "same" symptoms may be vastly different in seriousness: influenza and poliomyelitis, for example, may, in the initial stages, appear very similar. So also may stomach ulcer and cancer of the stomach. No human being is infallible, but it is most important that you should go to the person who is best fitted to know—your doctor.

Lastly, you should not be misled into thinking that you can always tell the seriousness of a disease by the general appearance of the patient. Children, in particular, may have a high temperature, or even be delirious, on one day, and the next be out of bed and wanting to get back to school. On the other hand, many of the most dangerous fevers (as we shall see later) are accompanied by a low temperature and do not appear particularly dramatic in the initial stages. Thus a young woman who may be aware of nothing wrong but lack of energy and getting easily tired may be dangerously ill with tuberculosis of the lungs.

The best rule is to seek medical advice either when you have suddenly become ill with symptoms you don't understand or (and this is equally important) if you have gradually been feeling less fit over a period of time. Perhaps, too, it is wise to call your doctor if you have been ill with *anything* for more than three days. You should *not* call in a specialist before seeing your G.P., as is so often done in America and on the Continent. Specialists are very clever, but are naturally prejudiced in favour of their own subject; for example, an eye specialist will be predisposed to think of your headache in terms of eyestrain, an ear, nose, and throat specialist in terms of sinus trouble, and a psychiatrist in terms of mother-in-law trouble. Therefore you should first have a check from your G.P., who knows a little of all these things and probably a great deal about you and your past history. He will then advise you about a specialist if necessary.

(b) NEW VIEWS ON MEDICINE.

(1) Body and Mind. In former times, or, at least during the nineteenth century, the body was regarded as a sort of machine belonging to you in much the same way that you own your watch. You went to your doctor and, in effect, said: "Now what on earth are you going to do about my stomach?"—and you spoke as if, somehow, your stomach didn't have anything to do with the *real* you—it was just an awkward thing that happened to be annoying you. But we know now that this is not so—that your body *is* you, that it is a

fort fighting against such enemies as poisons, parasites, germs, cancer, injuries, things you are sensitive to (which we call allergens), and two others—not enough of the right kind of food, and anxiety. Your anxieties and worries can kill you just as surely as the other agents, and can prevent recovery or retard it when you are already ill.

A stomach ulcer therefore is not just something that is happening to you—you are happening to it. Your fears, your jealousies, your hatreds, your inability to get on in life, can be (in some cases) just as deadly as germs or poisons—in fact, they act by setting free glandular poisons in your blood-stream. Scientists have discovered a reaction which they call the "stress response," and we now know that stress can ultimately lead to sickness or death without any bodily injury at all. Thus, Dr. L. J. Saul, a leading American doctor, writes: "Emotional stress in which there is no physical damage can produce responses which lead to actual damage and even to death." Rats in the laboratory can be killed through long exposure to fear caused by loud noises or other forms of shock without even being touched.

This stress factor is emphasised not because it is more important than the other enemies of the body or mind (it would be better to say body-mind), but because, as we shall see later, it does cause serious diseases, and, secondly, as mentioned already, it influences the process of recovery. A person who is afraid or has no hope is less likely to recover from pneumonia or another disease than one who is hopeful, who has peace of mind and confidence.

(2) **New Views about Health.** A great deal of nonsense has been talked about the healthy life; at one time we were told to take eighteen chews to each bite, to do deep breathing, to take plenty of exercise, to get lots of fresh air, to eat regularly (or to indulge in peculiar diets). But more recently, eminent doctors have cast doubt on most of these fancies. Exercise is perfectly all right if you like it, but athletes who indulge in violent exercise have not always been noted for longevity. Fresh air is pleasant and stimulating, but, where actual breathing is concerned, it is no better than the air in most rooms. Certainly, one of the problems of our time is air pollution by smoke and Diesel fumes, which are highly dangerous, but at present we are considering ordinary fresh air in comparison with the air indoors, and, in this case, the experts say there is little difference so far as health is concerned.

A balanced diet containing correct amounts of the basic food substances is essential, but there is no evidence that when, or at what intervals, you eat makes the slightest difference—unless you are a sufferer from stomach ulcer, in which case it is necessary that the intervals between meals should not be too long. The whole business of having meals at fixed intervals is nothing but a social convention, and in modern life obviously a matter of convenience.

Sleep, too, is a necessity. But different people require vastly different amounts of sleep. Some manage on as little as three hours, others seem to believe that they need ten or more, and there are well-authenticated records of people who never sleep at all. For example, a certain Dr. Pavoni in Northern Italy did not sleep for sixty years and made a virtue of necessity by specialising in night calls! Insomnia is unpleasant, but its only harmful effect results not from sleeplessness itself but from worry about it; for many people seem to believe that if they do not sleep they will go mad or at least become seriously ill. This is quite untrue.

In a number of studies of men and women who lived to a ripe old age it was found that the only factors in common between them were that they had a good balanced diet of healthy food, that they had contented minds, and that they were interested in something which gave them an aim in life. They also came of long-lived families—for living a long and healthy life depends partly upon heredity.

So the main rules of health are: do not think too much about your health unless it gives you trouble; have an interest in life and be prepared to sacrifice a lot for it (nothing useful has ever been done by those who are always "taking care" and being over-cautious); eat a good balanced diet; do not worry, and have a contented mind.

(3) **New Drugs.** A great surgeon, the first of the moderns, was Ambroise Paré, who died in 1590, and one of his best known sayings was: "I apply the dressing, but God heals the wound." He was quite right; for until about forty years ago, or even less, all the physician could do was to put the patient in as favourable a state as possible to enable his body to cure itself. That is to say, there were hardly any specific drugs—drugs that had a direct effect on the disease. There was quinine, discovered by the Spaniards in America, which was specific for malaria, and there were iron (specific for anæmia) and digitalis (specific for certain types of heart disease), but otherwise nothing until the nineteenth century, when Paul Ehrlich discovered Salvarsan, which is specific for syphilis. Ehrlich died in 1914, having conceived the brilliant idea of drugs which he described as "magic bullets"—*i.e.*, drugs which, like bullets, would be aimed at the real cause of the disease. They would, that is to say, be specific.

Since then a large number of such drugs have been discovered. First, the antibiotics, such as penicillin, discovered in 1928 by Sir Alexander Fleming with the co-operation of Sir Howard Florey and Dr. E. Chain, who, in 1939, were able to make penicillin available to the public in sufficient quantities by new techniques of production. Penicillin is practically non-poisonous (although it is possible to become allergic to it, sometimes with serious results). It can kill some germs in a dilution of one part of penicillin to one hundred million parts of water; it is effective against streptococci, the cause of blood-poisoning, sepsis in wounds, and many other diseases; and also against the germs of anthrax, gonorrhœa, meningitis of some types, syphilis—a whole list of plagues which have troubled man for centuries. Blood-poisoning, whether from wounds or childbirth, used to be almost incurable—now the rate of cure is 80–90 per cent.; anthrax and gonorrhœa have an almost 100 per cent. rate of cure. In pneumonia the rate is about 90 per cent., and early syphilis can be cured in a week, instead of the previous two to three years.

But this was only the beginning. Other antibiotics—streptomycin, terramycin, erythromycin, and many others—are helping to wipe out the terrible scourges of the human race, in particular, in the case of streptomycin, tuberculosis. The sulpha group of drugs—sulphonamide, sulphaguanidine, sulphathiazol, etc.—have also proved a great boon. Secondly, there are the preparations from the endocrine glands which will be described later. Children who were doomed to the form of idiocy known as cretinism can now be transformed into normal happy individuals, and myxœdema, a similar condition developing in adult life in previously normal people, is also curable. Both diseases are due to lack of secretion from the thyroid gland, and this lack is replaced by tablets of thyroid extract. Similarly, sex hormones, male and female, are used successfully in women's diseases of the reproductory system, and, even more important, are now used in the treatment of breast cancer and, in men, cancer of the prostate gland. Cortisone, although not so valuable as preliminary reports suggested, is nevertheless capable of producing remarkable effects when used in the right type of case.

The antihistamine drugs are used in dealing with illnesses due to allergy (undue sensitiveness to substances harmless to normal people). They

help in some types of asthma, in hay fever, in some skin diseases, and from the antihistamine group there has been developed a remarkable new group of substances used in psychiatry—the so-called tranquillising drugs. In suitable cases the tranquillisers go to the root of the trouble in mental illness—anxiety, and, without making the patient sleepy, relieve his tension. Drugs in this group—known under the trade names of Largactil, Pacatal, Suavitil, and many others—have revolutionised the position in mental hospitals, and further advances are to be expected in the same direction.

Many other new drugs have been discovered, but they obviously cannot all be mentioned here —for example, there is coumarin, which, by reducing the power of blood to clot, helps in such serious heart diseases as coronary thrombosis, which is due to clotting of blood in the tiny blood-vessels which feed the heart muscle. But enough has been said to indicate the general trends, and more will be mentioned in what follows.

(4) New Methods in Surgery. Only a few years before the Second World War many surgeons were saying that surgery had reached its extreme limits. It was impossible, they believed, to improve on the delicate techniques then reached. But events have proved them wrong. Operations on the heart, for example, which would have been inconceivable a short time ago are now carried out daily—the heart can be opened and defects of the all-important valves made good. "Blue Babies" or adults with a heart disease which might have led to their death in a few years are now cured by surgery, and it is possible during such operations to cut off all the blood from the heart by deflecting it through tubes to an artificial heart outside the body—a machine which pumps the blood round the body whilst the real heart is at rest.

This however, will be described in more detail later.

Cancer of the œsophagus was formerly regarded as inoperable, but in a new operation the part of the œsophagus with the cancerous growth may be removed completely and replaced by a plastic tube.

Then there are the new anæsthetics, such as Pentothal, which are injected into a vein in the arm instead of being breathed in through a mask, as were ether and chloroform or ethyl chloride. Penthothal is much safer, and avoids the unpleasant after-effects of vomiting and nausea, which usually followed the old type of anæsthetic. Most curious of all, anæsthetists use the poison curare, used by South American Indians to poison their arrow-heads. Curare produces paralysis, but in small doses merely gives the degree of muscle relaxation which is so important to the surgeon when he is operating.

Lastly, we might mention the new techniques of plastic surgery. Thus large areas of skin which have been destroyed by severe burns can be replaced by shaving off thin layers from another part of the body. These do not need to cover completely the whole damaged area: small pieces are scattered over the wound and gradually grow together. Corneal disease (the cornea is part of the "window" of the eye, and when it becomes opaque the patient cannot see) is treated by removing the diseased cornea and replacing it by a cornea removed from a dead body, or sometimes from an eye which has had to be removed from a live patient for other reasons. There are, in fact, "cornea banks" where corneas are kept in refrigeration for future use, just as there are "blood banks" for use in blood transfusions. Other advances in surgery will be described elsewhere in the section.

(5) New Approaches in Social Medicine. Medicine has passed through many phases from the time when disease was regarded as a punishment from the gods or a sign of devil possession to the present era, when increasingly there is a tendency to look on society as the patient. Indeed, one commonly hears doctors and sociologists nowadays talking about "the sick society."

The early primitive stage came to an end—at least in one part of the world—when in Greece, five centuries before Christ, Hippocrates and others began to teach that all diseases were due to natural causes. But after the first ray of hope the outlook began to deteriorate when, during the Middle and Dark Ages (that is, from the fall of the Roman Empire right up to the fifteenth century), there was a return to the belief in devil possession and supernatural causes.

Eighteenth-century medicine in Europe was materialistic, regarding the body as a machine. It was founded upon a sort of pseudo-science—although, of course, there were always individual exceptions, physicians such as Sydenham in England, who, avoiding all theories, based their work on observation of the patient. This mechanistic approach persisted right through the nineteenth century, but medicine became more and more truly scientific, and the century saw the most rapid advances in the field ever known until our own times: the discovery of germs by Pasteur, of antiseptics to combat them by Lister, of vaccination by Jenner and anæsthetics by the American Wells and the Scot Simpson. The use of the microscope by Virchow, who was a German, brought great advances in the understanding of disease and Ehrlich, another German, conceived, as we have already seen, the idea of "magic bullets" which would attack the germs at the root of a disease without harming the patient. But one of the greatest of all these great men is perhaps the least known. His name was Edwin Chadwick.

From the earliest period of recorded history human communities had been constantly ravaged by great plagues which swept over their lands year after year, killing untold millions. Such plagues are recorded in the Bible and other ancient books, but, when town life became more and more common, as during the Roman Empire and the Middle Ages in Europe, the overcrowded conditions were even more favourable to the spread of disease. The Black Death of 1349 wiped out almost half the population of Europe. But, even in the first quarter of the nineteenth century in London, tens of thousands died from typhus, typhoid, and small-pox—and not only these, for periodically cholera would be brought into the country by travellers from abroad.

In the face of these terrible visitations the individual physician was helpless. He could not treat each one of the many sick even had he known how, and Chadwick's claim to fame rests on the fact that he was the first man to think in terms of *social* control of diseases, by so dealing with their causes that they were prevented from arising at all. In order to wipe out typhoid and cholera, he argued, we must ensure clean water supplies; for these diseases are caused by germs carried in polluted water. In order to attack typhus and plague, one must get rid of the lice which carry the germs of typhus and the rat-fleas which carry the germs of plague (including, of course, the rats, which, in turn, carry the fleas).

In the past, some attempts had been made to segregate the sick to prevent the spread of disease —for example, in the case of leprosy (which, strangely enough, we now know to be less infectious than most germ-borne diseases). But segregating those who are sick with typhoid or cholera is of little use if others are still drinking polluted water, just as it is of little use segregating plague cases if rats with their infected fleas are allowed to run at large. So these early attempts met with little success, due to lack of understanding of how the infections were passed on.

Chadwick was born in a Lancashire farmhouse where the children were washed every day all over, and he ruthlessly drove an obsession with

cleanliness into the heads of his countrymen until, later in the century, it was possible for the German philosopher Treitschke to tell his class in Berlin: "The English think soap is civilisation." Although this remark was meant cynically, there is little doubt that soap, if it is not civilisation in itself, has played a greater part in making civilisation possible than many more elaborate remedies. A population riddled with chronic infectious illness has neither the time nor the energy to apply to the arts or sciences, and soap did a great deal to reduce infection.

One of the first Public Health measures was introduced by Chadwick and others when they brought in legislation to purify the water supply of London. Previously, the citizens had used water from the Thames (they still do, but only after it has been filtered and sterilised at the waterworks!), and from filthy, refuse-laden ponds and springs.

Later, Chadwick helped to found the Poor Law Commission, and produced a Report in 1842, the principal suggestions of which were: a municipal water supply for all towns; scientific drainage both in town and country; and an independent health service with large powers for dealing with those who endangered the lives of others by polluting water or causing nuisances. He also proposed a national service for interment of the dead; for in those days bodies often remained for days in the overcrowded homes of the poor without burial.

What has the twentieth century contributed to the concept of social health? Well, of course, there has been a great deal of legislation along the lines initiated by Chadwick to control disease, and a great many other measures have been introduced concerned with the idea of positive health—not merely preventing bad health, but trying to bring about the highest possible state of good health. Orange juice, milk, and good meals for schoolchildren have brought about a transformation in child health which has become apparent to the least observant in the last ten or fifteen years. And the National Health Service (which is discussed elsewhere) is in the direct line of descent from early nineteenth-century legislation.

But in future years it is probable that the main achievement of the twentieth century in social medicine will prove to be its extension of the term "social health" to cover every aspect of community life, not only in such subjects as bodily health and its control by social means, but also such problems as mental illness, crime, delinquency, drug addiction, and so on. What we are now asking ourselves is: how far are these problems produced by society itself, and if this is the case, how far can we go in preventing them by social means?

Crime, of course, is by definition "bad," but a policy which merely condemns and punishes the prisoner will never help us to discover what caused him to take to crime in the first place. The theory of "an eye for an eye and a tooth for a tooth"—that is, the theory of retribution—is inadequate; for what we are really concerned with is the function of all law: to reduce criminality. Any method which does not do this or does not do it adequately is a method we can ill afford.

If, for example, we find that crime (or mental illness or a high suicide rate) is significantly more frequent amongst refugees and displaced persons or members of minority groups, we no longer interpret this as showing that Poles, West Indians, or such immigrant groups as the Irish labourer are more wicked or more mentally unstable than ourselves. The reason is that, in a strange land, their old way of life, which previously controlled their behaviour, has broken down, and they have not as yet been able to absorb the new way in the country of their adoption. That this is so is our fault as much as theirs; for it is our duty, not only to give such people impersonal "justice," but also to help them to become assimilated. Yet only too often they are met by the man in the street with suspicion and hostility—an attitude which is likely, on their part, to arouse more hostility. They become "rebels without a cause."

Much the same is true of many of our own youth who were growing up during the War: their beliefs (religious and otherwise) have disintegrated; they are both jealous and contemptuous of the older generation: they are in a society whose values are changing so rapidly that the gulf between the outlook of old and young becomes ever greater. Hence the "Teddy boy," whose activities may be perfectly harmless, but are not always so. He, too, is a rebel, without any very clear idea against what he is rebelling.

Social medicine takes the view that these problems can never be dealt with solely by moralising and retribution, but only by dispassionately analysing their causes and dealing with them. In this century we have developed a social conscience. Not always, it is true, a very well-informed social conscience, but at least this is a good beginning. There are organisations for dealing scientifically with delinquency, for dealing with problem children, for spreading knowledge about cancer in order to show people that it can be successfully treated if taken in time. The organisation known as "Alcoholics Anonymous" has, on the whole, been more successful in treating alcoholics by social means than have any of the individual medical methods. Mental illness is also treated by group methods, which, together with the new drugs, have revolutionised the position in mental hospitals.

We can well say with John Donne, who died in 1691, that "no man is an island . . . every man's death diminisheth me; for I am involved in mankind." This is the attitude of twentieth-century social medicine.

Summary. Perhaps we can sum up our progress in the past hundred years more dramatically in terms of hard facts.

One hundred years ago, a surgical operation was never undertaken except under the gravest circumstances. There were no anæsthetics and no antiseptics, and the operation was carried out by a surgeon in a filthy tail-coat, stained with the congealed blood of countless operations (indeed the surgeons of that time took pride in the dirty condition of their coat as showing how much experience they had previously had). Germs and the part they play in producing disease were unknown, and Paul Ehrlich had not yet been born, so there were no "magic bullets" to attack syphilis, or sera for diphtheria and other diseases. The mentally ill were simply locked up with little treatment and subjected to such indignities as the strait-jacket and the padded cell; now they are given treatment which becomes more effective each year, the padded cell and strait-jacket have gone, and in the more progressive hospitals even the ward doors are not locked.

Only ten or twelve years ago you would very likely have died if you had developed pneumonia, "childbed fever" after the birth of a child, meningitis, dysentery, typhoid, or tuberculosis. With such infections as blood-poisoning you would have had practically no chance at all. Today, the sulpha drugs and the antibiotics have changed all that. Syphilis and gonorrhœa were lifelong tragedies both to the patient and his family, but now they, too, can be conquered.

The National Health Service has brought the possibility of good treatment equally to all, and other bodies—some of them privately run—deal with alcoholism and neurosis, with rehabilitation of the mentally and physically ill, with spastics, birth control, and marriage guidance. It is up to us to see that all these facilities are used to the full by all who need them.

PART II. DISEASES ARRANGED ACCORDING EITHER TO THEIR CAUSE OR THE AREA OF THE BODY AFFECTED.

THE INFECTIOUS DISEASES

INTRODUCTION.

INFECTIOUS diseases are those which are caused by an invasion of the body by organisms from outside (the word "organism" simply means other living things, and we are using this word because, as will be seen later, it is not only what are known as "germs" which can cause infection). We know, too, that what is generally typical about this group is: (*a*) that the disease can be passed on from one person to another, and (*b*) that it is usually accompanied by a raised temperature or fever. Now (*a*), of course, is always true, because the definition of an infectious disease is one that can be passed on to others, but (*b*) is not always true, because a few infections produce little or no temperature, and also because it is possible to have a raised temperature (again in only a few cases) without any infection. For example, certain types of brain injury, tumour, or hæmorrhage can produce a raised—or lowered—temperature, and so can the injection of some foreign substance such as milk into the muscles. This is known as "protein shock," and was at one time used in the treatment of certain illnesses. Finally, solutions of dead germs, such as the anti-typhoid vaccine given to protect troops during the War, may lead when injected to very high temperatures. But, by and large, we are entitled to suppose that the patient with a raised temperature is probably suffering from an infection.

Types of Infection.

As we have seen, it is not only germs which cause infections—so from now on we shall give germs their proper name of "bacteria." Here is a list of the chief offenders which are liable to attack our bodies: bacteria, spirochætes, viruses, fungi, amœbæ, parasites, and worms. Of these, bacteria and viruses are by far the most important, but let us look at them all more closely.

Bacteria are tiny living things which can be seen only under a fairly powerful microscope. Some are like clusters of grapes (staphylococci), others are like rods which may be linked together in chains (streptococci). They are given these names because "staphylos" is the Greek word for a bunch of grapes, and "streptos" means a chain. Yet others are comma-shaped (such as the cholera vibrio), or shaped like a drumstick—a rod with a small knob at the end (the tetanus bacillus, which causes lockjaw).

It would be a mistake to think that all bacteria are harmful; for without some species we could not survive for long. Bacteriologists divide them according to their behaviour in the human body into three groups: saprophytic, parasitic or pathogenic, and symbiotic. The *saprophytic* organisms are the bacteria normally found in the skin, mouth, and intestines; they do us neither harm nor good. The *parasitic*, or as they are more usually called, pathogenic (*i.e.*, disease-producing) organisms, are the harmful ones with which we are naturally more concerned. Lastly, there are the *symbiotic* organisms, which, whilst taking something from the body, give something in return. For example, cattle would not be able to digest the cellulose of the grass they eat were it not for helpful bacteria in the lower parts of the intestines, and there are certain bacteria in the large intestine of man which build up vitamin B2.

Bacteria have two peculiar characteristics: each reproduces by splitting into two separate individuals, a process which, incidentally, happens every hour or so, and it has been calculated that if no bacterium were destroyed, one individual could produce a mass of bacteria larger than the whole world in a matter of a few weeks (since each of the offspring also divides into two, which in turn divide again—the progression goes: one gives birth to two, these two to four, the four to eight, eight to sixteen, sixteen to thirty-two, and so on—you will see, if you work it out, that in a short period the figure becomes astronomical). Fortunately, many bacteria have accidents, so for the present the world is safe! The other curious thing about bacteria is that, barring accidents, they are potentially immortal. Under ideal conditions in which no bacteria were killed, none would die; for a bacterium there is no death from old age, no corpse except when it is actively destroyed. It simply goes on dividing, dividing, and subdividing for ever.

How, then, are bacteria destroyed? Briefly, the answer is that most are destroyed by the natural defences of the body of whatever host they are preying on; others are destroyed by antiseptics and the new drugs; and many are destroyed when they are excreted from the body in the sputum or through the bowels and land in places where they are dried up and cannot survive —although some bacteria in such circumstances can form what are called "spores," rather like the seed of plants, so making it possible for them to survive in a state of suspended animation for months on end until picked up accidentally by another unfortunate host. Finally, bacteria, in addition to all these possibilities, face another danger: they may themselves develop disease. This disease is caused by even more minute organisms known as bacteriophages (viruses which affect bacteria), discovered by the French bacteriologist d'Hérelle a good many years ago. Attack by bacteriophage causes whole groups of bacteria (known as "colonies") to disintegrate and become harmless.

Although bacteriophage has been used in the treatment of some diseases in human beings, this method has now been largely given up, since the new drugs are infinitely more effective.

Spirochaetes. Spirochætes, like bacteria, are minute organisms, but differ in being shaped somewhat like a corkscrew and in being able to move (which many bacteria cannot do). Their progress is produced by a sideways wriggling motion. The two main diseases caused by spirochætes are syphilis and spirochætal jaundice. Spirochætal jaundice is carried by rats, and is common in those who work in mines. It is now rare in Britain, but still occurs in Japan, Egypt, and Malaya; the infection is passed through the skin where the excreta of infected rats mingles with water on damp ground in the mine where miners kneel. Infection may also occur through eating infected food.

Viruses. Unlike bacteria, viruses are too small to be seen under an ordinary microscope. They can, however, be photographed in some cases under an electron microscope, which uses a magnetic field instead of a glass lens and a stream of electrons in place of a beam of light. Viruses cause such diseases as typhus, measles, mumps, poliomyelitis, smallpox, and chickenpox—not to mention such plant and animal diseases as tobacco mosaic disease and foot-and-mouth disease, which often have serious economic consequences. Other virus diseases are psittacosis (an infection of parrots and similar birds which can be transmitted to Man), swine fever in pigs, influenza in Man, and myxomatosis in rabbits. They also cause, it is believed, the common cold.

The main characteristics of viruses are, first, that they can only grow in living cells—unlike bacteria, which readily grow in the laboratory on plates containing a jelly made from meat broth, gelatin, milk, and other delicacies. The scientist, therefore, must keep them in portions of living tissue kept alive outside the body. Secondly, they are so small that they pass through the pores of the finest filter. Thirdly, a first attack usually produces immunity for life. Second attacks of the common virus diseases mentioned above are very rare; but, unfortunately, this rule does not apply to influenza or the common cold. Fourthly, there is reason to believe that viruses represent an extraordinary intermediate stage between the living and non-living; they can, for instance, be produced in crystalline form and yet are just as dangerous when "thawed out." Lastly, the virus diseases have proved for the most part to be

little affected by the new antibiotics and other drugs, although vaccination in smallpox and the injection of sera from infected patients in other infections may give immunity for longer or shorter periods.

Viruses are also responsible for typhus, yellow fever, sand-fly fever—familiar to troops in the Middle East during the last War—and dengue fever. All of these are tropical diseases, although typhus used to be common in England just over a hundred years ago. In this country virus pneumonia and virus hepatitis (a liver disease accompanied by jaundice) are not uncommon, although little known to the average layman.

Fungi. Some infections are caused by fungi—that is to say organisms belonging to the same group as moulds, mushrooms, and toadstools. Penicillin and some other antibiotics are produced from moulds, so, as in the case of bacteria, some fungi are helpful; they even help to destroy each other, for actinomycosis, the most serious of fungal diseases, which can cause infection of the jaw, the large intestine, and even the lungs, is destroyed by penicillin injections.

Most fungal infections are trivial and limited to the skin. But, although trivial, they can be unsightly and uncomfortable. Ringworm of the scalp, dhobie itch—an infection of the groin spread by infected underclothing—and so-called "athlete's foot" are caused by a fungus.

Amœbae. Amœbæ are tiny, formless jelly-like masses, the largest of which (a harmless type found in stagnant ponds in Britain and elsewhere) is just visible to the naked eye. It is about the size of the head of a pin. Amœbæ move, in the species which are capable of moving, by pushing forward a part of the "jelly" in the appropriate direction and causing the rest to flow into the advancing portion. Like bacteria, they reproduce by dividing into halves, each of which becomes a new amœba.

The main human diseases caused by amœbæ are: amœbic dysentery (not to be confused with bacillary dysentery), sleeping sickness or trypanosomiasis, which is caused by a special kind of amœba known as a trypanosome, and malaria. All these will be discussed later in more detail, and all that need be said here is that these diseases, terrible though they once were, are well on the way to being controlled. We know, in fact, *what* to do in prevention and cure, and only human ignorance and lack of money (which is so freely spent on destructive ends) prevent them being wiped out altogether.

Parasites. These are small insects which live on the skin. The main ones in this country are lice, fleas, and the parasites of scabies. In themselves they are not dangerous, but some can carry the germs of very dangerous conditions: the flea, plague; the louse, typhus; and another, the mosquito, malaria and yellow fever.

Worms. Worms live in the human intestine, but the only common types found in Britain are threadworms, the tiny thread-like worms which cause irritability and itching in the skin of children, less often in adults; round-worms, somewhat resembling the ordinary garden earthworm, which seldom lead to symptoms; and tapeworms, which may reach a length of 10 or even 20 ft. Many parasitic worms (like some human beings) lead a double life—they spend part of their life in the human intestine and the other part in the muscles of another animal. The tapeworm, for example, whilst in the human intestine, lays eggs which pass out of the body in the excreta, and are then swallowed by pigs, especially in those parts of the world where human excreta are used as manure in the fields. In the pig, the eggs form cysts in the muscles—meat infected in this way is known as "measly pork"—and when, in turn, the meat is eaten by Man, the process in the intestine begins all over again.

Less common types, from our point of view, are the Russian tape-worm (which, as befits a Russian, grows to nearly 30 ft.!); this type is spread by caviare or undercooked infected fish. The small, leaf-shaped liver fluke, lays eggs which are passed into canals or pools in tropical countries in the urine of infected people, hatch out and enter a water snail, and finally leave the snail in the form of small parasites which pierce the skin of bathers, whence they pass to the liver and subsequently the bladder and rectum. This is a serious condition, as is also filariasis (another tropical disease), for which, unlike bilharzia—caused by the liver fluke—no cure is known. The tropical disease known as loa-loa is caused by a variety of filaria.

How the Infection is Spread.

Infection is spread in many ways, some of which have already been mentioned. In the common fevers found in Europe and elsewhere one of the most frequent ways is by *droplet infection*—that is to say, by minute drops carrying the germs which are coughed or sneezed into the air by someone already suffering from the disease. Such droplets can be projected into the air for 10 ft. or more, and when breathed in by someone within range infection may result. Next commonest mode of spread is perhaps by *infected food, water,* and the dirty hands of those who prepare food: cholera, dysentery, food-poisoning, and typhoid are spread in this way. Spread by *direct contact* is found in the venereal diseases (usually, but not always, spread by sexual intercourse with someone who already has the disease), and, of course, lice, fleas, and other parasites, including the scabies mite, are spread by contact with the infested individual—or sometimes with his clothes or bed linen. Spread through an *intermediary host,* whether it be lice, fleas, or mosquitoes carrying infection, or the various means adopted by worms, has already been described above, so no more need be said. Lastly, the infection may result from *bacteria already within the body*; for example, the bacillus coli which lives in the large intestine is there harmless, but if it gets into the bladder or the ureters (the tubes leading from kidney to bladder) a quite unpleasant result may follow in the form of cystitis or pyelitis.

How the Body Deals with Infection.

The body has many mechanisms of defence against intruders, but suffice it to say here that there are two main ones. First, substances known as antibodies and antitoxins are produced in the blood—the antitoxins to neutralise the poisons produced by the invaders, the antibodies to render them helpless, for example, by causing them to clump together so that they can more easily be dealt with by the second defence mechanism. This second mechanism is provided by the white cells in the blood, some of which (the phagocytes) act like amœbæ and swallow up and destroy the germs. Antibodies and antitoxins can be transferred from one individual to another and are used in medicine both to prevent infection and to cure it. This is known as immunisation, and can be active or passive. Active immunisation is produced by injecting either a solution of dead bacteria, as in the case of anti-typhoid injections, or by injecting live, but weakened, strains of the organism, as in the case of smallpox vaccination. In both cases the body is stimulated to produce its own immune substances. Passive immunisation is used either for people who have been in recent contact with infection or who are already ill, and in this case the antitoxins produced in another person who has had the illness are injected in the form of serum—*i.e.*, the liquid part of the blood without the blood cells. Active immunity may last a long time, but passive immunity is always short-lived.

Antiseptics.

We have already discussed the other ways in which bacteria are destroyed, and now need only make brief mention of antiseptics, and antibiotics. The earliest antiseptic was carbolic acid, used by Lister in his operating-theatre in the form of a fine spray directed throughout the operation on the wound, or sometimes in the form of steam from a kettle containing a solution of carbolic. But carbolic is dangerous, and since Lister's time many more useful antiseptics have been discovered. Acriflavine, thymol, and other old

favourites have been discarded too. The various forms of carbolic are still used to disinfect drains, but, to tell the truth, the use of antiseptics nowadays is very limited. In surgery the *antiseptic* method has given way to the *aseptic* method—instead of fighting sepsis we see to it that no possibility of sepsis is present before operating: all instruments, the surgeons' and nurses' hands, the skin, are sterilised—the instruments by boiling, the dressings by dry heat, the hands by soap and water, and almost the only antiseptic used is to clean the patient's skin in the area to be operated on.

Antiseptics are used as first-aid treatment for cuts and wounds, but should be applied only once as a general rule—that is, when the wound is first received. Even so, the modern doctor would probably prefer to use sulphonamide or penicillin powder.

Antiseptic sprays to purify the air of a room or to destroy germs lurking in the dust on the sick-room floor—or any other floor—are practically useless. To quote the *British Medical Journal*: "There is no good scientific evidence that any of the chemical air-disinfectants can control the spread of infection in places such as schools, offices, or cinemas. Nor is there good evidence that any substantial effect on the spread of illness can be obtained by disinfection of dust."

Neither is there any good reason to believe that mouth-washes and gargles have any effect other than making the mouth feel fresher and (temporarily) removing mouth odour—by covering it up with the scent of the antiseptic. Mouth-washes are in contact with the bacteria for far too short a time to have any damaging result, and, in the case of tonsillitis and other diseases, all the important bacteria are hidden far out of any danger from gargles.

Antibiotics.

The antibiotics—penicillin, streptomycin, erythromycin, terramycin, aureomycin, and chloramphenicol—have already been dealt with, and only two important practical points need to be mentioned. These are that although most of such drugs are entirely safe under ordinary conditions, it is extremely dangerous for the layman to use them without medical guidance. If, for example, people get into the undesirable habit of sucking penicillin lozenges for sore throat and keep on doing this every time the sore throat returns, they may become sensitised to penicillin so that, when they become really ill—say, with pneumonia—the serious illness no longer responds to the drug. Or the same habit may make them allergic or hypersensitive to penicillin, and an injection given later may have serious and even fatal results. In any case it is doubtful whether such lozenges have any effect.

Another possibility is that excessive use of antibiotics may kill not only the dangerous bacteria, but also the ones which are helpful to the body. When this happens, other types of organism which are not affected by antibiotics will multiply in the absence of the bacteria which normally keep them under control. Thus chloramphenicol or aureomycin, by killing useful germs in the large intestine, may cause vitamin B2 deficiency, and when the non-sensitive organisms have their natural enemies removed they may step in and multiply, causing inflammation of the mouth, diarrhœa, and occasionally a fatal bowel infection.

General Treatment of Fevers.

Fevers are ordinarily heralded in by a rise in temperature which is noticeable either by a flushed face or by alternate sensations of heat and cold. These are known as "rigors," and a patient with a high temperature may be shivering.

A high temperature does not necessarily (especially in a child) mean that the trouble is serious—in diphtheria, for example, the temperature is ordinarily rather low, whereas in relatively trivial conditions it is often fairly high.

Even the trained physician finds it difficult to tell one fever from another in the early days; for most of the common fevers begin in more or less the same way. It is only when a rash or some other more definite sign becomes evident that a certain diagnosis can be made, and these may not show themselves until the patient has been feeling "run-down" and fevered for some days. Incidentally, although a clinical thermometer is a very useful thing when properly used, many a doctor must feel that, in unskilled hands, it is a menace. The "fussy" type of mother who is constantly taking her child's temperature whenever it looks in the slightest degree different from usual (probably it is simply feeling justifiably bored with its parents), not only causes anxiety to herself but also gives the habit of anxiety to her child. The child is made to feel that the world is a dangerous place, full of germs and all sorts of causes for fear—as indeed it is, but one needs a sense of proportion, and other dangers which we think much less about are at least as frightening and twice as deadly as most germs. Whatever you do, don't get the thermometer habit; your child, so far as fevers are concerned, is a good deal tougher than you.

Briefly, then, the way to treat a fever in the early stages before the doctor comes, and before one knows exactly what is wrong, is as follows:

(1) Put the patient to bed.

(2) Give little, and easily digested, food; if the patient wants none, give none.

(3) Give plenty to drink—the proprietary preparations containing lemonade and glucose are excellent, but water, weak tea with sugar, or home-made lemonade with squeezed-out lemon juice and sugar, are also suitable.

(4) There is no good reason for giving aspirin, unless to relieve headache or other pains. Since believing this goes against the grain of long-established tradition, we quote from a leading text-book on drugs: "The use of aspirin is very limited because the reduction of temperature is rarely necessary." For very high temperatures, the patient may be packed with ice (this is mainly for heat-stroke), but the most effective way in the fevers ordinarily met in this country is to give the patient a hot bath or sponge him with hot water. This opens the pores and increases sweating. Aspirin is a good pain-reliever; it reduces temperatures—which, as we have seen, is rarely necessary; but it does *not* cure colds or help you to sleep (unless, of course, the sleeplessness is caused by pain). Proprietary drugs containing aspirin with codeine or phenacetin are no better than aspirin alone.

THE INFECTIOUS FEVERS.

The remarks made above apply to the management of *any* fever, and we are now going to discuss particular infectious diseases, beginning with the common childhood fevers, then passing on to less common ones, tropical diseases, and worm and parasitic infestations.

The common infectious fevers are caused by bacteria or viruses, and it is useful to know the meaning of the following terms: *incubation period* is the time which elapses between being infected and developing symptoms; *prodromal period* is the time which elapses between the end of the incubation period and the appearance of a rash; *quarantine period*, the maximum time during which a person who has been in contact with the infection may develop the disease—it is usually two days more than the incubation period; *isolation period*, the time a patient is supposed to be isolated.

Views regarding the common infectious fevers have changed a good deal in recent years. Disinfection of rooms is now regarded as almost useless, and more cases are treated at home. Quarantine in the case of the common fevers is thought by a good many doctors to be a waste of time, since all it can do is to postpone infection from early childhood to early adult life, when it is

likely to be more serious. For it is a characteristic of these fevers that they affect the adult much more violently than they do the child. However, on this, and all other points, you will have to be guided by the opinion of your family doctor.

Virus Diseases.

First, we shall take the common virus diseases, measles, chickenpox, and rubella or German measles, then the other virus diseases, mumps, infective hepatitis, virus pneumonia, and some less common conditions which do not always produce a typical rash as in the case of the first three.

In nearly all of these fevers there is a long incubation period, and one infection gives immunity for life.

Measles. The first sign is the appearance of symptoms rather like a severe cold. The eyes become red, and exposure to light is unpleasant, the nose runs, the throat becomes inflamed, and a dry, harsh cough develops. There may be headache, and the temperature rises to 102° or more. Usually the patient is a child between the ages of eight months and five years, and especially typical is the development of so-called Koplik's spots, which are small, bluish-white, raised spots seen on the inside of the cheek at the back of the mouth. The rash begins on the fourth day, and shows on the forehead and behind the ears, spreading within a day downwards over the whole body; in another two days it starts to disappear, but often leaves behind a sort of brownish staining which may last for one to two weeks.

Measles is not usually serious, but it can lead to complications, such as bronchopneumonia and infection of the ear, which are now preventable by the use of sulpha drugs or penicillin (although these drugs have no effect on the virus itself, but solely on the bacteria which have invaded the lungs and ear during the illness). The only other treatment is the use of cough medicine if cough is troublesome and aspirin for headaches. Quarantine period for contacts is three weeks; isolation period three weeks.

Rubella or German Measles. A mild fever, similar to measles except that the rash is usually the first sign that anything is wrong, and the temperature is rarely above 100°. The eyes may be pink, and there are enlarged glands at the back of the neck. The rash disappears completely in thirty-six hours. Quarantine period for contacts is twenty-one days; isolation period seven days from the appearance of the rash. There are no complications.

German measles, in itself, is harmless, but it has recently been discovered that if a woman gets the disease in the early months of pregnancy malformations in the child may appear at birth. Hence some doctors believe that children should have the opportunity of contracting German measles before they grow up. There is no special treatment, except the general rules for fevers given above.

Chickenpox. In children chickenpox is a mild fever which begins with the appearance of tiny blisters on the chest and back. These later spread outwards to the legs, arms, and face, and cause itching. Treatment is the general one for fevers already described. Calamine lotion or dusting powder will be helpful for the irritation, and the child's nails should be cut short to prevent scratching and infection of the spots. Quarantine three weeks; isolation, until last scab disappears. Whereas children are usually little bothered by chickenpox, young adults may be much more drastically affected—a temperature of 104° is not uncommon, and there may be severe headache.

Mumps. Everyone knows the typical appearance of the patient with mumps—the swelling in the salivary glands in front of the ears which makes the face look full. This causes pain later on, and it may be difficult to open the mouth. Temperature is not usually high (about 101°). Although uncomfortaole, mumps is rarely dangerous, but orchitis—swelling of the testicles—is sometimes a complication. Fluid diet should be given if eating is painful, with mouth-washes, and rest in bed. Quarantine, twenty-six days; isolation for a week after the swelling has gone.

Infective Hepatitis. "Hepatitis" means inflammation of the liver, and infective hepatitis, which is much the commonest cause of jaundice in young adults, is a virus infection of the liver. In fact, this disease caused serious difficulties during the Italian campaign of 1943, and has probably become more frequent (or, at any rate, more frequently recognised) in this country since the War. The main symptoms are fever, followed by jaundice, which is first noticed in the whites of the eyes as yellow staining, then in the skin. The urine becomes coloured also, and this is most easily noticed if, on shaking in a bottle, the froth shows coloration. If the froth remains white, no jaundice is present. Treatment is a matter for the doctor, but great care should be taken, both by the patient and those in contact with him, to wash the hands thoroughly after urinating or defæcating, after handling utensils from the sick-room, and both before and after eating; for the disease is very infectious.

Virus Pneumonia. Pneumonia is usually caused by bacteria, and when we speak of pneumonia, that is the type we ordinarily refer to. Virus pneumonia is known by doctors as "pneumonitis," and is believed to be closely related to influenza. There is no specific treatment so far, and since diagnosis is a specialist matter, little more need be said except that the symptoms in general resemble those of ordinary pneumonia. Psittacosis, another virus disease, can also lead to pneumonia, and although there is no specific treatment for virus infections of the lungs, it is always worth while trying the antibiotics or sulpha drugs in view of the possibility that the lung condition may be caused by a secondary invasion by bacteria.

Influenza. While serious epidemics of influenza take the form of a very dramatic and often fatal disease—for example, the epidemic of "Spanish 'flu" which followed the First World War killed more people than the actual fighting—the milder type more usually seen is difficult to distinguish from the common cold. In fact, many people who complain of "a dose of the 'flu" are suffering from simple colds.

However, a sudden onset, aching in the muscles of the back and legs, and redness of the eyes, would suggest influenza, and especially typical is the depression and weakness which follows influenza but not a cold. The measures suggested above for the general treatment of fever should be applied; but the depression and weakness which follows influenza can now be dramatically relieved in many cases by injections of "Parentrovite," a highly concentrated vitamin solution.

Colds. Although everyone thinks he, or she, knows what a "cold" is, the issue is not so simple; for the symptoms of fever, running nose, and a run-down, "headachy" feeling are found in many illnesses. They may be observed, as we have seen, in the early stages of measles before the arrival of the rash, or in a number of other fevers, such as whooping cough. Mild attacks of influenza (see above) may resemble the common cold, and blocking of the nose with discharge and fever may be due to sinusitis—although here there is usually pain above, between, or below the eyes. Lastly, similar symptoms result without any infection at all in allergic conditions, of which hay fever is a typical example.

A great deal of research has been done on the common cold, and it has been shown that genuine colds are a virus infection, that they have nothing to do with getting cold or damp in bad weather, and that some people get colds when exposed to infection, whereas others do not.

For all these conditions except the allergic type, the treatment is the same: bed, if the temperature is raised; two tablets of aspirin three times a day (nobody could stop you taking them, anyhow); a soothing cough mixture if there is any irritation of the throat causing soreness, hoarseness, or cough; and inhalations of menthol or Friar's Balsam—a few crystals of menthol or a teaspoonful of the balsam in a pint of boiling water—to clear the head. If desired, an inhaler, "Benze-

drex" or one of the other proprietary ones, may be used in place of the menthol or balsam.

Poliomyelitis. "Polio," or infantile paralysis as it used to be called, is a virus infection of the motor nerves—the nerves of movement—at the point where they leave the spinal cord. Fortunately, all the nerves are never affected, but only a few controlling one or more muscle groups. If these groups happen to be the ones controlling breathing or swallowing (which, fortunately, is not very common) the results may be serious, but ordinarily the muscles affected are those of the legs or arms. Poliomyelitis is most common in children under five years, but adults are also susceptible. Usually it occurs in small epidemics after hot weather, that is in Summer or Autumn, and it often seems to strike at fairly healthy normal people. This, however, is not because healthy people are specially prone as such, but because those living under less hygienic conditions are more likely to have developed immunity. In point of fact, the majority of cases of polio are so mild that they are never discovered at all, and paralysis does not develop; such people are specially dangerous, precisely because they pass unnoticed and spread the disease to others.

Like many other infections, polio begins with sore throat, fever, and sometimes vomiting five to ten days after contact. There may be severe headache and rigidity of the neck muscles. Paralysis is noted about the second or third day after this, and is usually at its maximum from the start, although this is not always the case. This stage lasts two or three weeks, by which time the temperature is down and the paralysis greatly improved, although further improvement may go on up to eighteen months after the acute stage.

Specific drugs are useless in this disease, but the new vaccine (a modification of the Salk vaccine is at present being used in Britain) promises to prevent infection in many cases. However, when the illness is already present attention is directed mainly to relief of discomfort, resting and splinting the affected limbs, and preventing spread of infection to others. The Kenny method, devised by Nurse Kenny, and much publicised as a means of reducing permanent paralysis, is not believed by most doctors to be any improvement upon orthodox methods. The use of the iron lung is restricted to cases where the muscles controlling breathing are attacked, and any permanent paralysis of the limbs can often be helped by surgical operation.

Encephalitis. This is an infection of the brain caused by a virus, first noted in Vienna in 1916. There was an epidemic in London in 1918, but it is not very common today.

Encephalitis begins with the same symptoms—headache, sore throat, and shivering—as most fevers, but the temperature is usually not much raised. This initial stage is followed by sleepiness (hence the name "sleepy sickness"—not to be confused with "sleeping sickness," a tropical disease found in Africa), weakness, delirium, and twitching of the muscles. There is often a curious expressionlessness in the face, known as Parkinsonism after the English physician who, in the early nineteenth century, described it as following certain diseases of the brain.

Encephalitis is a serious infection. Most unpleasant are its possible after-effects: Parkinsonism, which may persist and get progressively worse (see Paralysis Agitans), and what is known as Juvenile Pseudo-psychopathia. The latter is a very distressing condition in which children who have recovered from the physical effects of encephalitis later become delinquent: they are liable to show violence, lying, stealing, or become involved in sexual offences. Although they remain intelligent and know they are doing wrong, they are unable to control themselves. Of course, these after-effects do not occur in all cases. But the fact that criminal behaviour can be produced by physical disorders should be well noted by those who seem to suppose that almost everyone has complete control over his acts and that only the insane lack this control.

Smallpox. Smallpox was once common in Western Europe, and, as late as the early nineteenth century, was not unknown in Britain. Now, since the introduction of vaccination, it is comparatively rare in industrialised countries, although the occasional case turns up. Jenner, who introduced vaccination, noted that dairy-maids who had suffered from the mild disease known as "cow-pox," contracted from the udders of infected cows, and transmitted to the hand of the dairy-maid, did not develop smallpox. In fact, cow-pox is a mild form of smallpox modified by transmission through cattle. Vaccination should be carried out at the age of three months, and repeated at the ages of seven, fourteen, and twenty-one years—also at any time when an epidemic occurs.

Smallpox attacks people of all ages and is carried by excreta and droplet infection, but particularly by the dried scales on the skins of convalescent patients; it is now most common in the tropics.

The disease begins with shivering, headache, and backache, and the temperature is raised to 102–104°. On the third day a rash appears, which turns into small blisters on the sixth day, and the blisters become filled with pus by the ninth day. On the twelfth day they burst and form crusts. Unlike chickenpox, in which the rash starts in the middle of the body and works towards the outer parts, smallpox produces a rash which begins in the scalp, forehead, wrists, and feet and then moves towards the middle.

Smallpox is a serious disease, and the result depends largely upon whether the patient has been vaccinated within seven years of the attack. Contacts should be vaccinated and kept under observation for sixteen days; the patient must be isolated until all the scabs have separated and the skin healed.

Glandular Fever. The other name for this illness is the jaw-breaking one of "infective mononucleosis," so we had perhaps better keep to the more common one. Glandular fever is an acute infectious disease of children, probably—but not certainly—caused by an, as yet, undiscovered virus. It occurs in epidemics at schools, especially in Spring, and the main symptoms are a high fever with enlargement of the lymph glands, especially at the back and sides of the neck; there is also a sore throat. Usually the glandular swellings go down in about two to three days, but the patient may feel unwell and have a raised temperature for several weeks. The disease, however, is not dangerous.

Typhus. This disease used to be known as "jail fever," because it was frequent in prisons; but overcrowding, poverty, and bad hygienic surroundings anywhere are suitable conditions for epidemics of typhus. Improved conditions in industrialised countries have made it unusual, since typhus is caused by a virus carried from one person to another by lice, and where lice are absent the virus is helpless to enter the human body.

Typhus comes on suddenly with a rise in temperature of about 102°, but within four days it may be as high as 107°. There may, or may not, be a rash at this time, and in the second week, when the temperature is at its highest, there is delirium, weakness, and a feeble pulse. The typical typhus rash appears about the fifth day as reddish blotches on the chest, abdomen, and wrists.

Typhus is, needless to say, very serious and there is no specific treatment. In fact, most of the doctor's efforts must be directed towards preventing spread to others by destroying all lice with D.D.T.

Rabies. Finally, we shall deal very briefly with a number of less common virus diseases, beginning, as is appropriate, with *hydrophobia or rabies*, since it was in this infection that the great French scientist Louis Pasteur (1822—95) showed the possibility of prevention by vaccination. Unlike Jenner, with his ready-made cowpox virus, which we have seen to be the virus of smallpox weakened by natural passage through cows, Pasteur had to weaken the rabies virus by passing it through rabbits. The rabbits were infected, and after death the spinal cord was dried and powdered, a solution passed through another

rabbit, and so on until the virus was sufficiently weakened.

Rabies is spread by the bite of infected animals, usually dogs, cats, or wolves, who are driven mad by the disease; in Trinidad, however, it has been spread by vampire bats. Those who are bitten usually show no symptoms for six weeks or more, but sooner or later convulsions and delirium arise, which within four to five days are fatal.

There is no cure once the symptoms have developed, but Pasteur's serum, if given soon after the bite, prevents illness in the vast majority of cases—the sooner after the bite, the better the outlook. Dogs should be muzzled in areas where the disease is common, but quarantining imported dogs has made the infection almost unknown here.

Psittacosis. This is another virus disease which is of interest mainly in that it is spread by birds of the parrot group, such as parrots, love-birds, macaws, and the rest. It occasionally occurs here in people who have been in contact with birds of this type, and is serious both to the bird and its owner. As in the case of rabies, quarantine regulations have greatly reduced the likelihood of infection in Britain.

The symptoms of psittacosis are fever, cough, and bronchitis. The disease is especially dangerous to old people.

Sandfly Fever, or phlebotomus fever, *Dengue*, or breakbone fever, and *Trench Fever* are all somewhat similar conditions in that they resemble influenza and are rarely fatal. They are all due to viruses, spread in the first case by sandflies in tropical climates; in the second by mosquitoes in tropical climates; and in the third by lice in temperate climates. They are all typical "soldiers' diseases"; the first two were common in the Middle East and Far East during the last War, the third during the First World War in France.

Yellow Fever. Of all the virus diseases, only three can be prevented by vaccination—smallpox, hydrophobia, and yellow fever. Yellow fever is carried by a mosquito known as Stegomyia, common in South and Central America and in African ports. For its spread, it therefore needs: a hot climate, the stegomyia mosquito, and an infected person.

In 1898 the United States was at war with Spain in Central America, where yellow fever was a serious problem. Following this war the United States, by this time acutely aware of this terrible disease, asked a Dr. G. E. Waring to deal with it in Havana, where it was rife. But Waring died of yellow fever, as had many millions before him, without knowing its cause, and it was left to Water Reed, who died in 1902, to prove the connection between the mosquito and yellow fever. By a vigorous war on the mosquito, the disease is now almost non-existent in Havana, and Reed's discovery made possible the building of the Panama Canal (Ferdinand de Lesseps, the builder of the Suez Canal, had made a similar attempt in Panama, but had been beaten, amongst other factors, by yellow fever).

In yellow fever there is a sudden high temperature, aching of limbs and head, jaundice, and black vomit; the pulse-rate falls as the fever rises. Previous vaccination seems to be preventive if undertaken in time.

Conclusion.

All these virus diseases have this in common: that there is no specific cure, although smallpox, rabies, yellow fever, and poliomyelitis can be prevented by vaccination, or by the social control of the creatures carrying the virus (social control is effective in stopping other virus diseases, as we have seen). There is usually a long incubation period. Finally, it seems that a new serum, known as gamma globulin, can give protection lasting about two weeks against polio, measles, and German measles. Since the protection is very temporary, it is up to your doctor to consider whether the disease is serious enough to justify this protection or whether it is better to have the disease and ensure life-long protection.

Bacterial Diseases.

Bacterial diseases differ from virus infections in a number of respects: their incubation period tends to be shorter; having the disease once does not often confer lifelong protection; and unlike virus diseases, most bacterial diseases respond to the new sulpha drugs and antibiotics. In many cases it is possible to inoculate against the disease to prevent it occurring, as we have seen is possible with only a few of the virus diseases.

Scarlatina. This infection, usually known as scarlet fever, is found in connection with sore throats caused by a type of streptococcus. One attack usually, but not always, produces immunity, and most cases occur in children under twelve years old, rarely, however, in infancy. The incubation period is commonly three days, and begins with sore throat, fever, headache, and vomiting. The rash appears on the second day, first on the neck and chest, then over the rest of the body; it is in the form of a red background with bright red spots superimposed, and is most apparent in the arm-pits, on the front of the elbow-joints, the back of the knees, and in the groin. The face is flushed, and there is an area of pallor around the mouth. The throat is red, the tongue yellowish, but the yellow fur later gives way to a bright red "strawberry" appearance. By the end of a week the patient, under favourable conditions, begins to feel better, and convalescence begins with the third week. Complications are infections of the ear, kidney, and the heart.

Medical opinion has greatly changed in recent years as to the treatment of scarlatina: the old picture of fever hospital, disinfection, fumigation, and (as one authority puts it) "the baking of books and boiling of toys and clothes" has gone, and nowadays most cases are nursed at home with only simple precautions to prevent spread from throat to throat. Large doses of penicillin or some other antibiotic are given, and in this way the likelihood of complications is much reduced. Quarantine period: those contacts who react positively to the Dick test (a skin test which shows up those who are still susceptible to the disease and thus not immune) may be kept in quarantine for a week; isolation period for the patient is four weeks.

Diphtheria. This used to be an extremely serious disease, but immunisation has made it milder and much less common; it is important, therefore, that all children should be immunised, although it should not be thought that this gives absolute protection. Sometimes diphtheria vaccine and whooping-cough vaccine are combined, but there are those who disapprove of this procedure, so you should be guided by the opinion of your own G.P.

In a typical case of diphtheria the incubation period is about three days; the patient is a child who becomes ill and pale-looking (*i.e.*, the onset is not sudden, as in many fevers, but insidious); the temperature is only slightly raised to, perhaps, 99° or 101°, and although there may be no complaint of sore throat, examination will revea inflammation with—and this is typical of diphtheria—a grey membrane spread over the tonsils, the palate, and the back of the mouth generally. The diphtheria germ does not spread within the body. It stays at the place where it entered (in this case the throat) and sends its toxins throughout the body.

Even after the acute phase is over the patient must not be allowed to walk, because the diphtheria toxin is particularly poisonous to the heart. The ordinary rule is at least one or two months in bed. There is an anti-toxin which helps to get the patient over this stage, but the sensible thing to do is to have your child protected before infection occurs.

Diphtheria also occurs in the larynx—in pre-inoculation days many children choked to death with this form of the infection; in the nose; and, although this is not generally known, wounds can be infected. The so-called "Desert sores" of the North African campaign seem to have been caused by diphtheria-like organisms.

Diphtheria may lead to paralysis of the throat, with difficulty in speaking or swallowing, and paralysis of the eyes or limbs; these are due to

neuritis caused by the influence of the toxin on the nerves.

Whooping Cough. For many years whooping cough has been regarded merely as a bother to the patient and a nuisance to others, as, in fact, a trivial disease. Unfortunately, this is not so: because statistics show that it causes more deaths than polio, diphtheria, scarlet fever, and measles all put together.

Whooping cough begins in a child as an ordinary cold with cough and slight fever, and this stage lasts for a week or ten days. Then the "paroxysmal stage" begins as a series of coughs following in rapid succession, during which time the patient is unable to breathe. The "whoop" is caused by the noisy indrawing of breath when the fit stops. The face may become blue and congested. Bronchitis is usually present, and bronchopneumonia may result as a complication, so inoculation of all children before the disease has a chance to strike them is most important.

Once whooping cough has begun, there is no specific treatment, although modern drugs can reduce the frequency of the fits of coughing. The antibiotic chloramphenicol has been used for this disease, but the general opinion is that it is ordinarily of little benefit. Chinese physicians have described whooping cough as the "hundred-days cough," and the cough may, indeed, continue for at least a hundred days.

Food Poisoning Diseases.

Strictly speaking, there is no such thing as "food poisoning" if one is thinking of "poisoning" in terms of anything apart from germs. But not so long ago it used to be thought that decomposition of food in itself produced poisons known as "ptomaines" which were deadly to those who swallowed them. All food poisoning is caused by infection of food with bacteria and by no other cause—unless, of course, we are thinking of the kind of poisoning which is the concern of the lawyer rather than the medical man.

Here we are considering those diseases which are commonly spread by contaminated food or drink. The classification is not scientific, but then no scientific classification has as yet been devised. First, we shall deal with typhoid, paratyphoid, and dysentery—uncommon here in Britain, although Sonné dysentery is fairly frequent. Then there is gastro-enteritis (which means irritation of the stomach and intestines), which is caused by staphylococci and the germs of the salmonella group, and lastly, botulism, which is rare.

Typhoid and Paratyphoid. These diseases are spread by infected water, food, or hands—especially uncooked food, such as milk, salads, oysters, and shellfish. Flies, too, play some part in spreading the disease. Some people are "carriers" and carry and excrete the germs without being themselves affected; for example, "Typhoid Mary," a carrier in the United States in the early years of this century, spent a large part of her life in custody as a public danger, although she did not show any symptoms of typhoid. Nevertheless, this woman caused a great deal of illness in others in her chosen profession of cook.

The influence of Chadwick's propaganda for pure water supplies is shown by the fact that deaths from typhoid, still 332 per 1,000,000 in 1870, fell to 198 per 1,000,000 at the beginning of this century. In the 1920s the death-rate was only 25 per 1,000,000, and now it is even less.

Typhoid fever begins like most fevers with headache, raised temperature, and general feeling of unwellness. This stage lasts about a week, and then the rash appears in the form of rose-red spots on the front of the chest and abdomen and on the back. In the second week there is great weakness, sometimes diarrhœa, flatulence, and mental dullness, together with dry and cracked lips and tongue. The third week is the week, in hopeful cases, of gradual decrease in temperature and other symptoms, and the fourth week is the week of convalescence.

Complications are perforation of the intestine (which needs surgical treatment), delirium, and bronchitis.

Paratyphoid fever is a milder form of typhoid (there are two forms, A and B); ordinarily it can be diagnosed only by scientific tests. The main thing is to inoculate with T.A.B. vaccine and to protect food supplies; it is much easier to prevent typhoid than to cure it.

Dysentery. Dysentery may be caused *either* by a bacterium or an amœba; the first type is known as bacillary dysentery, the latter as amœbic dysentery (which is dealt with under tropical diseases). Infection is spread in much the same way as in typhoid. There is high fever, abdominal pain, and diarrhœa, at first consisting of fæcal matter, then blood and mucus. In severe cases the death-rate used to be over 20 per cent.

Various bacilli cause dysentery. The common tropical types are the Shiga and Flexner groups, but in this country most epidemics are due to the milder Sonné group.

However, in all these infections sulphaguanidine, one of the sulpha drugs, brings rapid relief, but care must be taken to avoid infection of other people.

Diarrhœa and Vomiting. Leaving out typhoid and paratyphoid fevers and dysentery, there is a group of infections known as "D. & V."—diarrhœa and vomiting. In Britain D. & V. is mostly due to:

(1) Salmonella infection.
(2) Staphylococcal infections.
(3) Other bacteria, ordinarily harmless, such as bacillus coli, when present in sufficient quantity.

Salmonella Infections are the most serious of this group; they affect the small intestine and produce vomiting, severe abdominal pain, and diarrhœa. These symptoms occur about one day after eating infected food and usually clear up within about two weeks, but occasionally death results. Salmonella bacteria are most likely to be found in meat, egg powder, vegetables, and ducks' eggs, but staphylococci are liable to grow in milk products, such as ice-cream and cream buns. Food poisoning from staphylococci is seldom severe, and recovery takes place in about a week. Nevertheless, it is extremely infectious, and causes a great deal of lost time in industry and temporary illness in institutions; for it is in such situations that it is most likely to occur.

Staphylococcal Food Poisoning has greatly increased in recent years, so it is important to know what circumstances are likely to cause it. The reason for its increase has nothing to do, as many people suppose, with the greater use of canned foods, but it has much to do with the greater use of communal feeding and canteen meals. It is *possible* for bacterial toxins in infected food to bring about illness even when the canning process has killed the bacteria, but it is certainly extremely rare. Canned foods, in fact, are much safer than so-called "fresh" foods in this respect—except when they have been opened, left about, and then re-heated. The same applies to the re-heating of any kind of food.

The real enemy is the canteen worker with a boil, a discharging nose, dirty hands, or a septic finger. Occasionally food may be infected in the larder by rats or mice, but the sort of canteen or restaurant where this can happen has little to commend it! Frankly, these infections are caused by dirty or stupid people who do not realise that their sore finger or boil can become someone else's diarrhœa and vomiting. Where children are concerned, the outlook is potentially more serious, and in the early part of this century the Summer-time "procession of baby coffins" was all too familiar. Infection is much more common in artificially fed babies or in older children who eat infected ice-cream. However trivial the condition may seem, diarrhœa and vomiting with fever in a child should never be ignored. Those in charge of canteens or restaurants must ensure that staff is supervised, that anyone with a septic infection is put off duty, and that all know about washing after visiting the lavatory and absolute cleanliness.

Bacilli normally present in the intestine, such

as bacillus coli, can cause infections if absorbed in large amounts, or if of a different strain from those in the patient's intestine. They are not usually serious.

Botulism. Now uncommon, this is the disease which used to be known as "ptomaine poisoning" on the theory that it was caused by poisons produced by bad food apart from germs. In the 1920s a party of picnickers at Loch Maree in the Scottish Highlands developed botulism and a number died, with the result that the disease attracted much public attention. Botulism is caused by a germ, the bacillus botulinus, which is peculiar in that, like tetanus, its poison attacks the nervous system rather than the intestines, resulting in fits, double vision, paralysis beginning in the face and spreading downwards, and difficulty in swallowing. It is found in tinned fruits or vegetables containing the toxin even when the germ has been killed, but, as we have already seen, the toxin comes from the bacilli, not from decomposition of food as such (in fact, food does not decompose in the absence of germs). Death is common in botulism, but an antitoxin is now available which, if used in time, can cure the disease.

Tuberculosis. No disease causes more public concern, and no disease is more difficult to describe, than tuberculosis; for, like the streptococcus or the staphylococcus, the tubercle germ can attack many different parts of the body and manifest itself in many ways. Furthermore, it is a widely spread disease, infecting not only humans but also cattle, birds, and reptiles. But here we shall be concerned with those types common to Man—the human and bovine (*i.e.*, the type occurring in cattle which can be spread to man by infected milk).

The tubercle bacillus is particularly hardy, so that when coughed or spat out on the ground it continues to be infectious for a long time. Infection is therefore caused by: (*a*) drinking infected milk; (*b*) droplet infection through having germs coughed in the face; (*c*) breathing in infected dust. In other words, tuberculosis is caused by absorption through either the lungs or the intestines; the former is common in adults, the latter in children.

But there is a good deal more to the problem than this; we know, for example, that over 90 per cent. of people in industrialised countries have been infected with T.B. in early life and have conquered the infection. So the question arises: what conditions predispose to T.B.—why do some people get over the early infection and others not? There are two answers to this question: one is certain—that those who are impoverished and do not get enough food are liable to T.B.; the second is not so certain—that mental stress plays some part. Yet there is reasonably good evidence that such stress as a broken love-affair can cause lowered resistance to breakdown so that when germs are encountered infection will occur.

In children, lung tuberculosis is not common, but tuberculosis of the bones and glands is, as is also infection in the abdomen, the kidney or spine, and, worst of all, tuberculous meningitis. These are often of the bovine type from infected milk. Ordinarily, T.B. in children is less serious than adult infections; but tuberculous meningitis used to be almost invariably fatal until streptomycin was discovered.

Adult tuberculosis usually occurs in the lungs or the pleura—the thin membrane surrounding the lungs. In younger people miliary tuberculosis, which is a form of T.B. blood-poisoning or septicæmia, is a very serious condition, and the infection spreads throughout the whole body in a few weeks.

Lung infection begins gradually in someone who has previously felt unwell. There may be cough, and later blood-stained sputum (although blood which is coughed up does not necessarily prove that T.B. is present). Whatever means of treatment are used, the struggle between disease and patient is likely to be fairly long, but the outlook is now good. However, there is little reason to suppose that fresh air or a sanatorium in Switzerland produces any better results than treatment at home.

Prevention depends on legal action ensuring tuberculosis-free herds of cattle; on control of spread of the disease by those "open" cases who carry germs in their sputum; on the use of vaccination in childhood with B.C.G. vaccine (which you can ask your doctor about).

Many methods are used in treatment; new drugs, such as steptomycin and P.A.S., lung surgery, rest, and so on. At any rate, tuberculosis is being got under control, but anyone who is worried can get a free X-ray at the nearest Mass Radiography Centre. For children, there are skin tests to show whether there is susceptibility to T.B.

Septicaemia. Commonly known as "blood-poisoning," is one of those diseases of which text-books prior to the Second World war used to say: "death usually occurs."

Blood-poisoning occurs generally by spread from some septic area such as a wound (or even a small prick), after childbirth, or any place where certain germs have got admission to the body. The most usual germ is the streptococcus, although the pneumococcus—which ordinarily causes pneumonia—and the staphylococcus may also cause septicæmia.

Fever comes on suddenly and rises rapidly with headaches, sweating, and shivering. The patient is obviously very ill, and later there is wasting and delirium. The white blood cells increase in number. Septicæmia sometimes occurs without any apparent local infection in those who are weak and debilitated.

Pyaemia is a type of septicæmia which leads to the formation of numerous abscesses throughout the body. Its symptoms are the same as described above, except that the causative germ is usually the staphylococcus, and abscesses are found which may need surgical treatment.

However, in both conditions the state of affairs has been revolutionised by the use of the sulpha drugs and antibiotics; cure is now the rule rather than the exception.

Septicæmia should be suspected when any small wound or cut is followed by high temperature and the symptoms described above.

The word "*Toxaemia*" is used when the germs stay in their original position and produce symptoms by spreading their toxins throughout the body. Tetanus, diphtheria, and some kinds of childbirth infection come into this category; the symptoms may vary from mild disturbance to severe illness.

Meningitis means inflammation of the meninges, the covering which, like a layer of plastic, lies over the brain and spinal cord, just as the pleura covers the lungs and the peritoneum covers internal organs in the abdomen. (Hence inflammation of the pleura is known as pleurisy, and inflammation of the peritoneum as peritonitis.)

Various germs may cause meningitis, for example, the bacillus of tuberculosis, the pneumococcus, which ordinarily causes pneumonia, and the streptococcus or staphylococcus, but ordinarily the word refers to *Cerebrospinal Meningitis* or "spotted fever" caused by the meningococcus and occurring at times as an epidemic. It is commonest in the years from infancy to the early twenties, and begins suddenly with headache, vomiting, and fever. The temperature rises quickly, and pain develops in the back and legs; on the second or third day a rash appears on the body, and particularly on the inside of the thighs. Later there is stiffness of the neck, the head may be drawn back, vomiting persists, and the headache can be so severe as to cause the patient to scream with pain.

Fortunately, this type of meningitis (and most of the others) respond to treatment with antibiotics or the sulpha drugs, so the risks are very much less than formerly.

Pneumococcal Meningitis is an unusual complication of pneumonia, and the septic types (*streptococcal or staphylococcal*) arise either following an infected fracture of the skull or from infection of the ear or mastoid.

Tuberculous Meningitis has already been mentioned; originally always fatal, it is now treatable with streptomycin.

All these diseases are very much a matter for

specialist and hospital treatment, but it is worth while mentioning *benign lymphocytic meningitis*, in which, although all the symptoms of meningitis are present, recovery without specific treatment is invariable. Meningitis, which was during the First World War and after what polio is to us now, is no longer common, and when taken in time is easily treated.

Tetanus is usually known as "lockjaw" because there may be difficulty in opening the mouth, although this is simply part of a spasm of all the muscles of the body. The tetanus bacillus is found in rich soil—hence the disease is less common in desert areas—and tetanus resembles rabies in that: (*a*) it enters at a wound; (*b*) it affects the nervous system; (*c*) it results in fits and ultimately death.

However, active immunisation with T.T. (tetanus toxoid) has resulted in the disease becoming uncommon, and even when developed, treatment with antitoxin, anæsthetics, and curare may lead to cure.

The bacillus is anærobic (*i.e.*, does not use oxygen) and is most likely to occur in such situations as when a man digging manure or working in his garden sticks a fork through his foot, or, in war-time, when he is wounded in soil contaminated with manure.

Undulant fever, also known as Malta fever or abortus fever, falls into two types: melitensis, which infects goats, and abortus, cattle and pigs. Man gets the disease by reason of close contact with or drinking the milk of infected animals. (The name abortus is given because abortion is produced in cattle and sows.)

In Undulant Fever, as one would suppose, the fever goes up and down for two to three weeks; it may then go down and rise again, persisting for many months. The disease may occur in Britain, but modern drugs are on the whole successful in dealing with it. A striking feature of the disease is the combination of a high temperature with an appearance of relative well-being.

Another disease carried by mammals is *Glanders* or *Farcy*, spread by horses. In glanders there is discharge from the nose and sometimes pneumonia. Occasionally the disease is fatal. In farcy abscesses form, usually along the lymph vessels. Both conditions are very contagious, and treatment is a matter for a specialist; infected horses should be destroyed.

Cholera. Cholera could be classified under the head of food-poisoning, because it is mainly spread by infected water (however, like typhoid, it can also be spread by flies, infected food, and carriers); it could also be classified as a tropical disease, since, although it used to be found in Europe, it is now mainly rife in India.

Also like typhoid, cholera is caused by a bacillus, and can be prevented by early innoculation and care over food supplies—boiling water and milk, washing uncooked foods in chlorinated water, and keeping flies away.

The fever begins in the usual way with a short incubation period, followed by abdominal pain, severe vomiting, and diarrhœa. Later with the loss of fluid from the body there may be cramps in the muscles, diarrhœa increases, and the motions become of the typical "rice-water" type —*i.e.*, there is no solid matter, and the appearance is that of water to which a little milk has been added. This stage is followed by collapse, with low pulse and cold hands and feet. Death, if adequate treatment is not available, results in about 70 per cent. of cases.

Anthrax. The bacillus of anthrax, like that of tuberculosis, can exist outside the body for long periods, and, like that of tetanus, then takes the form of spores or seed-like bodies. It is spread by infected cattle and horses, which get the disease from eating grass containing spores.

In human beings the form the disease takes depends on where the germ alights; sometimes it comes from infected shaving-brushes, when it causes a large sore, like a boil, on the face, known as "malignant pustule"; sometimes it develops on those who inhale the dust from infected hides or wool (hence the name "wool-sorters' disease," which is a form of bronchitis with blood-stained sputum); lastly, it may arise through eating infected meat, when the result is intestinal anthrax.

In all cases the outlook is serious. Death is common, preceded by a high temperature, skin symptoms in the first instance, lung symptoms in the second, and food-poisoning symptoms in the third. Serum and arsenical preparations were formerly used, but now the sulpha drugs seem to offer more promise.

Diseases Caused by Fungi.

There are only two important groups of disease caused by fungus: the serious *actinomycosis* and the relatively harmless, if unpleasant, *ringworm*. Ringworm or tinea will be dealt with later; it affects the hair, the body, the groin (dhobie itch, already referred to), and the feet (athlete's foot). Actinomycosis is spread by a fungus in barley and grasses which may reach the human mouth, settle around bad teeth, and thence pass to the lungs, the bone of the jaw, and even to the intestines or brain. Fortunately, this unpleasant fungus, which was once difficult to eradicate, has proved susceptible to penicillin.

The Venereal Diseases.

The venereal diseases are those caused—or at least that is what the name means—by the goddess of love, Venus. Venus, of course, causes a great deal of trouble, but venereal disease is not necessarily the worst she can do. There are two diseases usually caused by sexual intercourse, and therefore described as venereal; others can be caused in this way, but are not usually so described.

Gonorrhœa is the result of an infection by the bacillus of gonorrhœa, and ordinarily comes on after a period of three to seven days following intercourse. However, babies can get an infection of the eyes, known as ophthalmia, from their mother if she is infected, and gonorrhœa in young children is often the result of being in contact with infected towels or clothes. The disease in adults is evident when there is a thick, creamy discharge from the sexual organs and sometimes pain on passing water; in infants ophthalmia is prevented by the use of silver nitrate eye-drops at birth. Gonorrhœa is fairly easily cured by the use of sulpha drugs or penicillin; in fact, although the idea is not popular with moralists, it is much more easily cured than the common cold.

Syphilis is more serious, and is nearly always caused by sexual intercourse. Stories about lavatory seats are simply stories, although it is occasionally possible to get syphilis by other than sexual means: for example, it has happened that a man playing football has been infected through his hand being grazed by the teeth of someone with syphilis. But this is very unusual, although kissing can spread the disease. Children, too, can be born with syphilis (the so-called congenital syphilis).

Adult syphilis begins with a sore, known as a hard chancre, at the point where the spirochæte of syphilis has entered; this may be on the lips, through kissing; on the sexual organs, through intercourse; and very rarely, as explained above, elsewhere. In a short time the chancre disappears and all may seem to be well, but this primary stage is followed by a secondary stage with sore throat, a rash, headache, and enlargement of glands. This, if left alone, also clears up, but is followed by the tertiary stage, in which a chronic infection develops in some part of the body which, presumably, is most susceptible in the particular individual. Thus there may be chronic syphilis of the skin, the bones, the heart, liver, or nervous system.

In the nervous system, the commonest forms are the two diseases of *tabes dorsalis*, in which the spinal cord is infected, and G.P.I. (general paralysis of the insane), in which the brain and mind are affected. These will be discussed under Nervous Diseases.

In congenital syphilis the pregnant mother gives her child syphilis. Such infants are often still-born or premature, they look wizened, like a little old man, and amongst other symptoms are eye

disease, "snuffles," a flattened nose, and when the adult teeth appear the front ones may be notched at the biting surface.

The treatment, of course, is very much a matter for a specialist, but diagnosis is usually made through the Wassermann blood test. It was for syphilis that Ehrlich produced his "magic bullet"—an arsenical drug, known as salvarsan. This is still used in chronic cases, but when discovered early, penicillin seems to clear up the disease more rapidly. G.P.I., once hopeless, is now treated by malarial therapy with a good deal of success.

It is important to understand about venereal disease in general: (1) that it happens to many people who are no worse than anyone else; (2) that many patients believe themselves to have V.D. when, in fact, they have not; (3) that the best thing to do is to see your doctor as soon as possible—he is not concerned with your morals, and the sooner you go, the sooner you will get well; (4) every sore in the sexual area need not be V.D. There are other diseases which may be contracted as venereal infections.

Chancroid produces small septic ulcers around the sex organs, with swelling of the local glands in the groin, which may suppurate. It is caused by a bacillus, and can usually be cleared up by sulpha drugs within a week. Scabies and lice often pass from one body to another during sexual intercourse, but are not usually thought of as venereal in origin, although in many cases they are.

Tropical Diseases.

Nothing is more difficult than to define the term "tropical diseases." One might define them as the diseases which occur in tropical climates—but then measles occurs there too; and if they are defined as those diseases which are found *only* in the tropics, the solution is no easier, since leprosy, cholera, smallpox, and typhus are usually listed as tropical diseases, yet were found in this country until fairly recently—and the odd case still is.

But what a story could be told about the conquest of those infections which were—and many still are—the scourge of humanity! One day when generals and dictators are forgotten we shall remember that great international army of physicians and bacteriologists who have saved millions of lives and infinitely reduced human suffering: Koch and Ehrlich of Germany, Pasteur and Roux of France, Ross and Jenner of Britain, Reed of America, Noguchi of Japan, and many others. We shall remember how the Jesuit priests brought quinine from Peru to Europe in 1638, the first drug to save people from malaria; how in tropical heat Ronald Ross (1857–1932) peered for hours through his microscope to discover the connection between malaria and the mosquito until the sweat running from his brow rusted the instrument; how Major Walter Reed's work in Havana (1851–1902) made possible the building of the Panama Canal, and think, too, of the American soldiers who died in helping him to find the cause of yellow fever. In mentioning Jenner once more, we should recall Lady Mary Montagu (1689–1762), who brought the practice of vaccination to England from Turkey—or, rather, the practice of "variolation," which meant inoculating with the pus from smallpox cases. This was, of course, a dangerous practice, but the idea was there. Noguchi, one of the great bacteriologists of the nineteenth century, was the son of a poor peasant. He often had to steal to get enough bread even to keep alive, but was later to help in our understanding of syphilis and many tropical diseases.

Yet there is still much to do. Take, for example, the case of Egypt, one of the world's poorest countries, supporting with the help of water from the Nile about 24 million people. But if the river gives food and drink it does other things; for it carries the disease of bilharzia, which kills thousands of peasants yearly. In the villages of Egypt as many as 90–100 per cent. of the population suffer from this terrible disease. The infantile mortality rate is the second highest in the world—29·5 per cent.—seven times higher than that of Holland; the average expectation of life amongst the lower classes is thirty-one years, of the upper classes fifty to sixty years. The country is ridden with bilharzia, ankylostomiasis, malaria, plague, amœbic dysentery, typhus, tuberculosis, and pellagra. Blindness, due to trachoma and other diseases, affects tens of thousands. Such a situation cannot be treated simply by pouring drugs into the country; what is necessary is social control, to enforce purification of the water supplies, the use of insecticides such as D.D.T. to kill the disease-bearing pests, and removal of the causes of extreme poverty (tuberculosis and vitamin deficiencies which are common in Egypt are diseases of malnutrition).

Relapsing Fever, common in India and Africa, is caused by bad hygiene (rubbing infected lice into the skin); the germ is a spirochæte, similar to that of syphilis, but the disease is non-venereal. Relapsing fever gets its name from the fact that the temperature remains high (103–106°) for about a week, returns to normal for a week, and rises again. There may be three to five relapses of this sort. Cure can be brought about by the arseno-benzol drugs used in syphilis. Lice, of course, should be dealt with.

Epidemic Jaundice (also known as Weil's disease or—if you prefer it—ictero-hæmorrhagica spirochætosis), is also caused by a spirochæte, and spread by rats. Now it is rarely found in Europe, although it occurred in the trenches during the First World War, in men working in sewers, and in the women who worked in the fish market of Aberdeen, which at one time was rat-infested. It is rarely fatal, but leads to high fever and jaundice. Anti-syphilitic drugs are useless, but some of the new antibiotics may help.

Yaws is also a spirochætal disease, common in the tropics and particularly in children. It is unpleasant, but not serious, and tends to clear up in a year or so. There are raspberry-like growths on the skin, which disappear with the drugs used in syphilis (although the condition is non-venereal). The Wassermann reaction, positive in syphilis, is also positive in yaws.

Leprosy. Whereas syphilis, relapsing fever, epidemic jaundice, and yaws are caused by spirochætes, leprosy is caused by a bacillus resembling the bacillus of tuberculosis. Leprosy, in fact, should not be included here at all, for it is non-spirochætal, and not necessarily a tropical infection. But, apart from all the difficulties of classification already mentioned, leprosy *is* usually thought of as a tropical disease (although it is fairly common in Iceland and used to be so in Western Europe); it *is* thought to be deadly contagious (although it is, in fact, only very slightly contagious); and it *is* thought to be incurable (although young ladies with a mission in life who wish to go to a leper colony will find that it can be cured). One wonders why leper colonies exercise so much more attraction over some people than mental hospitals, T.B. sanatoria, or cancer clinics; but there it is. So there are many misunderstandings about this disease, and placing it in the wrong part of the medical section is probably the least.

Leprosy is not hereditary, and not very infectious without intimate contact, although this contact need not be necessarily sexual. It takes the from of nodules under the skin which form ulcers and can lead to the loss of a finger or toe. At first there is fever and large red patches which coalesce to form swellings with loss of sensation. The patches are on the face, forearms, and thighs; on the face they give a "leonine" appearance—*i.e.*, resembling the face of a lion. In other cases the main nerves in the forearm are affected, so that, as in the first type, the fingers and toes may drop off. Leprosy may go on for thirty or more years, sometimes getting better and then relapsing; occasionally recovery without treatment occurs. The treatment is an old Indian one in a modified form—chaulmoogra oil—and on the whole, it is fairly successful.

Plague is another disease caused by bacteria, common in Europe at one time, but now largely restricted to Asia. Nevertheless, it caused millions of deaths in Europe during the years

1348 and 1668, and was the "Black Death," which, indeed, changed the course of history. Interested readers may read Hans Zinnser's *Rats, Lice, and History* about this aspect of the disease. Plague is carried by the bite of the rat flea, but, once people become infected, spread may occur from one to the other by droplet infection—*i.e.*, by coughing and sneezing. After an incubation period of two to ten days, fever develops, rather like severe influenza, and in a day or two the glands in the groin begin to swell, followed perhaps by swelling of the glands elsewhere. This is the usual type of plague, but it is also possible to get disease of the lungs from droplet infection and blood-poisoning from infection of the blood-stream. Both the latter types are almost invariably fatal, and even the glandular type (bubonic plague) has a mortality of about 80 per cent. There is a vaccine to prevent plague before it develops and a serum which may be used on the sick.

Although we have little space to discuss the subject of plagues and epidemics in general, it is worth noting that serious epidemics have almost always followed wars, revolutions, and economic and political collapse. Thus the Black Death followed the break-up of the Roman Empire, and, in the fourteenth century, accompanied the end of mediæval civilisation. The Napoleonic wars were followed by other epidemics, and the wars of the 1830s in Europe were followed by influenza. In the most widespread outburst of influenza after the First World War, more people were killed by the disease than in all the fighting of four years. It is a reflection on the peculiar mentality of Man that this devastating epidemic, which affected almost the whole world, occupies little space in his history books—we still, with few exceptions, regard history as the doings of kings, queens, and generals. Yet, in 1918, 20 million men, women, and children died from influenza, and no cure has, as yet, been found! Later we shall see that many millions of people die yearly from starvation or vitamin deficiencies. Yet these facts—the real facts of life—we rarely hear about.

Protozoal Diseases.

Nearly all the diseases caused by protozoa are tropical diseases, although one of the best-known protozoans is the harmless amœba found in British ponds. Protozoal diseases are caused by these organisms, large in comparison with bacteria, which are really one-celled plants. Viruses are neither animals nor plants, are much smaller than the other two groups, and have some distinctive characteristics described elsewhere.

The only important diseases caused by protozoa are sleeping sickness or tryanosomiasis, malaria, and amœbic dysentery (as contrasted with bacillary dysentery), another disease, leishmaniasis—also known by the numerous names of kala-azar, dum-dum fever, and, in milder form, Delhi boil, Oriental sore, or Bagdad sore—will also be mentioned briefly. These infections are few, but important in their influence on Man; for, as Dr. Clark-Kennedy has pointed out, malaria until recently was responsible for one-fifth of all human sickness, sleeping sickness not so long ago caused a large part of Central Africa to be uninhabitable, and in some areas of the tropics there are probably more people with, than without, amœbic dysentery.

Malaria. The word, of course, means "bad air," just as "influenza" means "influence"—in Italian *influenza di freddo*—the influence of cold. Human beings have a natural tendency to suppose that, when two events occur together, then one must be caused by the other. Yet, although malaria and "bad air" may often go together, and influenza and cold, it does not follow that bad air (whatever that may be) causes malaria nor that cold causes influenza. In fact, the anopheles mosquito carries the amœba of malaria, and the mosquito prefers climates which some people might describe as "bad," but it is the amœba, not the air, which causes the disease. Anyhow, the unfortunate mosquito might well use the phrase honoured by many generations of schoolmasters: "It hurts me more than it hurts you!" For the mosquito, too, is sick, and passes on its sickness to the person it bites.

There are several types of plasmodium—which is the scientific name for this amœba—producing attacks of fever varying in severity and frequency: benign tertian, quartan, and malignant quartan. Entering the body from the mosquito bite, the parasites penetrate the blood cells, multiply there, and finally burst into the blood stream. When this happens the temperature rises, and then they return to the cells to carry out once more the same procedure. Depending on the type, the attacks of fever may be at intervals of three or four days, severe or milder. When someone with malaria is bitten by a mosquito the infection can be transmitted to the next person it meets, but malaria is not infectious from one person to another directly. Quinine, of course, is the time-honoured remedy, but many other drugs are now available: mepacrine, palmaquine, atebrin, and even a sulphonamide derivative known as promin have been tried. The drug must be taken long enough for the infection to die out, otherwise relapses can occur even after leaving a malarial country (but it is only fair to say that, just as some people continue to give themselves the title of "Major" when they have left the Army, so others long in Britain continue to describe attacks of cold or 'flu as "my old malaria again," when, to say the least of it, they are exaggerating).

Important as are the drugs used in the treatment of malaria, even more so is the control of the parasite-bearing mosquito. The eggs of mosquitoes hatch in water, and there the young or larvæ forms can be attacked by pouring oil on the surface of pools so that they are unable to breathe, or by introducing small fish which have a partiality for them. Adult mosquitoes can be killed by D.D.T. and other insecticides or kept away by nets over beds and skin creams. Finally, anti-malarial drugs can be taken in dangerous areas. Whereas mosquitoes were once well on the way to getting rid of Man, now Man is well on the way to getting rid of mosquitoes.

Blackwater Fever is a sequel to malaria in tropical Africa and some parts of India. Rather illogically, it is described as "Blackwater," although the urine is red and the skin is yellow but the result is due to breaking down of the red blood cells by some malarial toxin. Possibly too much quinine may help in producing the illness. Treatment is to give plenty of fluids and no quinine or any other anti-malarial drugs in the early stages. The death-rate is about 25 per cent.

Trypanosomiasis or sleeping sickness—not to be confused with *sleepy* sickness, which has already been dealt with under the name of encephalitis lethargica—is essentially an African disease (although also found in tropical America) spread by the tsetse fly. Its cause is the type of protozoan known as a trypanosome, almond-shaped with vibrating membranes at the sides which enable it to move through the blood-stream, rather like a flat fish in the water.

There are three stages of the disease: first, the stage of fever with enlarged glands and a rapid pulse, which may continue off and on for three years; secondly, the stage of trembling hands, legs, and tongue, vacant expression, and slow and stumbling speech; thirdly, and lastly, the stage of low temperature, apathy, wasting of the muscles, and possibly death.

Treatment is with arsenical drugs—such as tryparsamide or Bayer 205—which give good results in early cases. Preventive measures in infected areas include the destruction of tsetse flies by insecticides, the cutting down of forests near rivers which are inhabited by tsetse flies, and some authorities have suggested the shooting of big game which may form a "reservoir" of the parasites, whence tsetse flies can carry them to human beings. For similar reasons infected people should not be allowed to move to non-infected areas.

Amœbic Dysentery, also known as *Amœbiasis*, is caused by the *Entamœba histolytica*, an amœba whose cysts are found in food, water, or spread by infected fingers or flies. There is mild fever and

diarrhœa which contains blood. The disease may become chronic, and can cause abscesses, usually in the liver but sometimes in the lungs. Amœbiasis is treated and usually cured by injections of emetine hydrochloride, but in the chronic phase the drug known as Yatren is used in the form of an enema.

Leishmaniasis, kala-azar, or dum-dum fever, is another amœbic disease, probably spread in this instance by the bite of sandflies. It is also known as tropical splenomegaly—enlargement of the spleen in ordinary language—since infection results in enlargement of the spleen and liver, low, irregular fever, and death within a year or so. A milder form, affecting the skin, is known as Delhi boil, Oriental sore, or Bagdad sore, does not lead to kala-azar, and is fairly readily cured. The cure for both conditions is to give injections of tartar emetic, which reduces the death-rate from kala-azar from 80 per cent. to about 5 per cent.

Diseases Caused by Parasitic Worms.

Many types of worms infest human beings and other animals. They are interesting for such reasons as their size (which may range from the almost invisible to 30 ft. or more), their life histories, and their serious or trivial consequences on their hosts. We shall mention only a few groups here, and mainly the ones likely to be met with in Europe—the tapeworms, the roundworms, and the threadworms—although some tropical types will be described briefly.

Tapeworms, as we have seen earlier, like many other types of intestinal worm, lead a double life. What usually happens is that the worm breeds in the human intestine, the eggs pass out in the fæces, and are then swallowed by animals eating contaminated material. In the animal the eggs hatch out into larvæ—primitive forms which penetrate the muscle, forming cysts—and Man is infected in turn by eating its meat. Thus *Taenia Solium* gets into the flesh of pigs, which, if imperfectly cooked (measly pork), causes infestation of the intestine in Man. It reaches a length of about 10 ft. *Taenia saginata*, which reaches a length of about 20 ft., is spread in imperfectly cooked beef, and in Baltic countries *dibothriocephalus latus* gets into the human intestine from caviare or undercooked fish. It reaches the awesome length of 30 ft.

Now all the worms we have mentioned so far are found in the human intestine, and the cysts, which are much more dangerous and unpleasant, in the animal's muscles. But in some worms the reverse happens, with the adult in the animal's intestines and the cysts in Man. Thus in Australia the dog tapeworm (*taenia echinococcus*) produces cysts in both sheep and Man. This is known as hydatid disease, and may remain unsuspected until cysts in the lungs, liver, or elsewhere become infected or rupture. *Trichinella spiralis* is similar in action, being found in the intestines of pigs and getting into the muscles or other organs of Man. The main difference is that this worm migrates from the pig's intestines into its muscles, whence it reaches Man in undercooked pork meat or sausages. The muscular cysts cause swellings and sometimes pain. There are changes in the blood, swelling of the face and leg in the early stages, and fever. A minor epidemic occured in England in 1941. *Taenia echinococcus* and *trichinella spiralis* are small—not more than ¼ in. in length—but are more serious in their consequences than the large worms. Treatment is very difficult, and ordinarily all that can be done is to deal with individual cysts when they make themselves apparent.

The large tapeworms, *taenia solium* and *saginata* and *dibothriocephalus latus*, produce varying symptoms or none at all. Usually they are not discovered until some segments of the worm are excreted, but there may be mild indigestion, excessive hunger, and occasionally anæmia. However, when the worm is discovered the patient, not unnaturally, is likely to become anxious and uncomfortable at the thought of "having" a tapeworm; these symptoms are caused by the worry rather than the worm.

Treatment is, of course, a matter for a doctor, but purging followed by extract of male fern is usually successful. One has to make sure that the head of the worm has been removed, otherwise it will continue to grow.

Roundworms are similar both in appearance and size to ordinary earth-worms and the eggs reach Man, not from an animal, but from the contaminated fingers of someone else who handles food. They give rise to no symptoms, and are noticed only when discharged in the fæces or occasionally vomited up. They can be removed by the use of santonin.

Threadworms, as the name suggests, are like small ⅛–½-inch-long pieces of white thread. They are very common in children, and live mainly in the cæcum—*i.e.*, the part of the large intestine near the appendix. The males, which are the smaller ones, remain there, but the females pass down towards the rectum at night-time and lay their eggs in the area around the anus. Infection is by contaminated hands handling food—especially uncooked food—and water. Threadworms are not serious, and cause few symptoms other than itching around the anus and between the legs, but heavily infected children may show symptoms of anæmia. The nervousness often shown by such children is usually the result of the irritation produced by the worms in the anal region. Infection is not common in adults, and in children tends to disappear at puberty.

Treatment is, in theory, simple; for the worms are easily destroyed by a number of drugs, such as gentian violet, thymol, or one of the proprietary remedies. Ointment is applied to the itching area, and the child should be prevented from scratching. However, since the eggs may lie about the house for some time, reinfection often happens, especially if there are several small children in the home who may pass the disease from one to another.

The idea that intestinal worms in general are likely to cause loss of weight by absorbing food eaten by the patient is largely mistaken; for, although it is true that they do live on this food, the amount taken is certainly not enough to be significant.

Tropical Worms. *Bilharzia* has been mentioned before in connection with its frequency in Egypt, although it is also found in other parts of Africa, Arabia, and Iraq. There are two main types: one infecting the bladder (*schistosomum hæmatobium*), the other the rectum (*schistosomum mansoni*). Bilharzia is more correctly known as schistosomiasis.

The parasite's fantastic life-history begins when a man bathes in infected water, and the small swimming forms known as cercariæ pierce and enter his skin—or they may enter the body by drinking infected water. From the skin they pass to the portal vein below the liver, remain there six weeks until they become adult and then swim against the blood-stream down to the pelvis, where the female lays eggs which have a sharp spine. The eggs penetrate into the bladder or rectum—depending on the type of fluke—and pass out in the fæces or urine. If they enter water they hatch out into small moving forms which seek out a water-snail, develop further in its body, and leave it in the form of cercariæ ready to find a new human victim. The female fluke is slender and round, about 1 in. in length, the male, flat and leaf-shaped, is about ⅓ in. long, and, as we have seen, their grisly courting takes place in the portal vein, whence the impregnated female passes to the bladder (hæmatobium) or rectum (mansoni) to lay her eggs.

Infection results in raised temperature and, in the urinary type, blood in the urine; in the intestinal type blood is found in the fæces, and there are symptoms resembling dysentery—*e.g.*, diarrhœa. Treatment in both cases is by injections of antimony tartrate. Needless to say, attempts should be made at prevention by telling people to avoid infected canals (usually easier said than done), and by periodically cutting off the water supply to the canals to kill the snails.

Without treatment, the disease may go on for many years, when it may recover of itself or lead to slow death. A third type of schistosomiasis is found in the Far East (*schistosomum japonicum*);

it is similar to the intestinal type described above, and the treatment is the same.

Hookworm Disease, or ankylostomiasis, is found in many parts of the world, especially in miners who work on damp ground. It has even been found in Cornwall! The tiny worm enters the body usually through the feet, passes through the blood-stream to the lungs, eats through into one of the bronchial tubes, climbs the windpipe, and passes down the œsophagus into the stomach to end up in the duodenum. It causes anæmia, can be fairly readily cured, but is occasionally fatal.

Elephantiasis. Some types of parasitic worm are spread by insects. Thus in *Filiarisis* mosquitoes inject by their bites the infantile forms of a tiny worm which enters the lymphatic channels; there the blockage they cause leads to the swelling of the legs and the lower part of the body, known as elephantiasis. In the evenings, when mosquitoes usually fly, the newly born infantile forms pass into the blood-stream, where they are sucked up by other mosquitoes to infect more hapless humans. So far, no certain cure is known, but antimony tartrate in some cases seems to give good results.

Lice and other insect pests will be dealt with under skin diseases.

PHYSICAL INJURIES

INTRODUCTION.

Our bodies are subject to physical injuries as well as to bacteriological and other ones, so here we are going to deal with injuries caused by such things as falling, cutting and piercing, changes in pressure of the surrounding atmosphere, atomic radiation, and poisons. Obviously the subject is much too large to be dealt with except very briefly, and in any case most of these injuries, other than the most trivial, have to be treated by specialists.

Falling may occur either when we trip or slip or are knocked down whilst our feet are already on the ground, or when we fall from a height. In the first case we are likely to have to deal with fractures or bruises, but in the second the injuries, although of a similar nature, are more serious. Also, whereas in the first case there need be no great mystery about the injuries produced, in the second we have to consider a number of factors. For example, if someone falls out of a window a great deal depends on the momentum of their body when they hit the ground, and momentum is weight multiplied by velocity. So, by and large, the heavier the body and the farther it falls, the greater the damage is likely to be. Thus an ant could fall from the top of a skyscraper without much injury, because it is too light to possess much momentum, and a baby falling from a first-storey window is less likely to be badly injured than its mother should she fall.

Other factors, of course, are also important—for instance, *how* someone falls and *on what part of their body*. Falling on the head, other things being equal, is more dangerous than falling on the side. So, too, as parachutists are taught, some ways of landing are safer than others: it is important to have the muscles relaxed, to land feet first, and gradually as it were " crumple up." That is why drunk people often get off so lightly when they fall, since their muscles are relaxed.

Car Injuries are another type of " fall " peculiar to our own age of fast-moving transport. If we think of a fall as being essentially a change in momentum, then we can so describe the situation when a car or an aircraft travelling at speed is suddenly forced to stop. When this happens, the vehicle in which we are moving stops, but our body goes on; hence in air-liners suddenly brought to a halt the passengers may be thrown forward with such force as to be killed or seriously injured. (This, of course, is why seat belts are used prior to taking off or landing.) In a car, too, collision or sudden braking from great speed may cause the passengers to be thrown through the windscreen or against some part of the car, bringing about death, often from internal injuries, even when the vehicle itself is only slightly damaged.

Bruises and Abrasions. A bruise occurs when a blow to some part of the body damages the underlying tissues without breaking the skin. At first there may be little to see, but, later, bleeding under the skin causes the typical " black-and-blue " appearance, as in a black eye. The black-and-blue coloration is caused by breaking down of the blood pigments when they get into the tissues. A similar appearance can result without physical injury when a varicose vein ruptures; in both cases the coloration may pass down under the skin—thus a small ruptured vein in the thigh may cause black-and-blue pigmentation in the lower parts of the leg.

None of this is usually serious. If there is no pain, nothing need be done, but if there is, cold compresses or lead lotion on lint may help; the colour goes in its own good time, and is not changed by any treatment.

An *abrasion* is an injury in which the skin is broken without the injury being deep. It should be treated as a shallow wound—that is, it should be washed in soap and water and a clean dressing with Vaseline applied to prevent sticking. If desired, the injury may be washed with a reliable disinfectant (Milton, Dettol, or some other); but only the first time, and the *washing with disinfectants should not be repeated*. The reasons for this are: (*a*) that all disinfectants delay healing if continued; (*b*) that, after the first application, the dangerous germs are deep down beneath the surface and out of reach.

Wounds may be classified in many different ways. Thus we may talk of superficial wounds, meaning that they are not deep—but a shallow wound in some parts of the body (for example, in the wrist or the neck) could be serious if one or other of the important blood-vessels or nerves lying near the surface are injured. Wounds in these areas must be treated as important if there is much bleeding or, in the case of the hand or foot, loss of feeling or movement. In fact, *any* wound needs medical attention in either of these circumstances, or if there is shock or the possibility of bacterial contamination.

Other wounds may be deep and wide on the surface, whereas some may be deep with a small entrance wound. The latter are known as penetrating wounds, and are usually due to sharp piercing instruments such as knives or bullets. There is likely to be a good deal of shock and hæmorrhage and greater or less damage to internal organs (although a penetrating wound may miss organs one would have expected it infallibly to pierce). If abdominal organs are penetrated sepsis may be spread from *inside* the body by the intestinal contents escaping into the abdominal cavity. This can result in peritonitis.

The Response of the Body.

It is typical of all living things that they react to changes in the environment, whether this takes place at the highest level of the mental processes or at the simpler level of response to injury or disease. This is what is described by scientists as the principle of *homeostasis*, which means that there exists a tendency to maintain the body in a constant state. Thus, to take some examples, if the body loses fluid from sweating, thirst arises and the urine becomes reduced in amount and more concentrated, so that, on the one hand, fluid input is increased and output decreased until the balance is restored. If salt is taken in excess of requirements the amount of urine is increased to wash away the excess. So, too, the amount of the sugar circulating in the blood normally remains constant no matter how much is taken in, the excess being stored in the liver in the form of glycogen, which is similar to starch; if still more sugar is taken in it is transformed into fat.

Now, when the surface of the body is broken, as in wounds, similar attempts at restoring the original state are made. First, bleeding occurs, which tends to wash away dirt and germs, then the blood clots, forming a sort of seal over the wound. New cells known as fibroblasts, increase in number and grow into the clot, knitting the edges of the wound together. Capillaries (*i.e.*,

tiny blood-vessels) grow into the clot, too, to carry to the injured area food for the growing cells and substances (antibodies) which combat any germs which have got in. Finally, the fibroblasts shrivel up and contact, drawing the edges of the wound together just as a doctor's stitches would, and the situation of the wound is shown only by white scar tissue.

It should be noted that the more complex body cells do not regenerate. When a muscle is cut, for instance, the cut area is not filled by muscle cells but by scar tissue; nerves can regenerate provided the injury is only to the nerve—the long filament which stretches from the parent nerve cell—but when the cell itself is destroyed regeneration is impossible. Even so, the body does its best; for the scar tissue uniting a cut muscle is strong and remains as a sort of adhesive holding the ends together, and in brain damage, although the destroyed cells never grow again, others take over their function as far as possible. (There are so many brain cells in excess of what we actually need that even quite extensive brain damage may lead to little practical defect, but much depends upon what area of the brain is affected.)

When sepsis occurs in a wound, whether it be a pin-prick or a larger injury, local attempts are made to solve the problem. We have seen that blood aids in this by creating substances which destroy the germs or their poisons, and the white blood cells, known as phagocytes, destroy the germs as an amœba swallows its prey. Substances known as agglutinins cause the germs to clump together so that they are more easily dealt with. Finally, new cells form a fence around the infected area, cutting it off from the rest of the body–this, of course, applies to boils and abscesses as well as to wounds.

If, in spite of these local defences, the sepsis spreads, the body responds by producing more phagocytes, more agglutinins, and more antibodies or antitoxins. Fever, too, occurs, and is one of the signs that a wound is septic and that the sepsis is spreading. But there are intermediate defences, because the lymph vessels carry the germs to the nearest lymph glands· in the arm-pit in the case of the arm, in the groin in the case of the leg, and elsewhere throughout the body. The passage through the lymph vessels is marked by red lines on the arm or leg (lymphangitis) or swelling of the glands (lymphadenitis). These, too, are danger signals after any sepsis, because they mean that the first line of defence has broken down and that medical treatment is urgently needed.

Haemorrhage may be small or great in amount, and may come from a vein or an artery. If from a vein, the blood is dark and flows slowly, if from an artery, it is bright red and the flow pulsates. If the bleeding is severe there is shock and the blood-pressure is lowered, but once the trouble is over, new blood cells develop in the bone marrow to replace those lost. A doctor may aid this process by giving iron in mild cases or by blood transfusion in more serious ones.

Of course failure may result. There may be shock, which is caused by the liberation from damaged cells of a substance known as histamine, and this may cause danger to life in some cases. Or infection sometimes breaks down each line of defence, leading to blood-poisoning. Or excessive bleeding which cannot be stopped can also lead to death—in the blood disease known as hæmophilia the blood fails to clot, and even a slight injury may bring about fatal results from continued slow bleeding.

Fractures are classified according to whether they are simple or compound, that is, whether there is a wound over the area or not, the latter being the more dangerous, because of the possibility of infection. Or one can classify them according to whether the broken parts are separated; for obviously parts which are not separated are likely to heal with greater ease (in children, when the bones are softer, the type of fracture known as the "greenstick fracture," in which the bones bend rather than completely break, is common). Lastly, they can be classified according to the bones broken; for, depending, of course, on the seriousness of any particular injury, the possible complications differ in various areas of the body. In head fractures, concussion, injury to the brain, serious hæmorrhage, and sometimes mental changes can occur; in spinal fractures, when the spinal cord which passes through the bony tube is damaged, there may be paralysis or death, depending on the level of the injury; in fractures of the ribs or pelvis internal organs, such as the lungs or bladder, may be torn or ruptured—although this is not too common.

Certain parts of the skeleton are more liable to fracture than others, so, although in theory any bone in the body may be broken—even the small bones of the hand, foot, or wrist—two of the best-known types of injury are Colles' fracture of the wrist (caused by falling on the outstretched hand) and Pott's fracture of the ankle (often caused by slipping off the edge of a pavement). These fractures, of course, are named after the surgeons who first described them. Signs of danger in the case of other types of fracture are: in the skull, unconsciousness, confusion, bleeding from the nose or ear; in the ribs, pain on taking a deep breath; in the pelvis, passing of blood in the urine. Injuries to the skull or spine should always be regarded as potentially serious, although they are not necessarily so.

Injuries to the skull take many forms. A blow may render the patient unconscious, and there is usually loss of memory for the few minutes *before* the accident, although this is not necessarily serious. On the other hand, a relatively slight blow may tear a blood-vessel (middle meningeal hæmorrhage), causing little or no disturbance of consciousness, but leading to death in a few hours. (For example, those who have been drinking may fall, apparently lightly, on the head, be taken to a police cell and found dead in the morning due to this type of hæmorrhage.)

Then there is the hazard of boxing which results from many blows to the head during fights—the condition of being "punch drunk." Such injuries can lead to loss of memory, mental dullness, and sometimes criminal behaviour; the "punch-drunk" boxer at the best degenerates into a sparring partner or a pathetic exhibit in a Fun Fair, taking on all comers. At the worst he may become an inmate of a prison or mental hospital.

Bones heal by the formation of a bony substance between the severed ends known as "callus." But first the bones have to be joined, and this is done by splinting or plaster casts; in some cases by nailing the bones (especially in the case of fracture of the head of the femur—that is, where the thigh bone joins the hip joint—a fracture often found in old people). Lastly, bone grafts can be used in difficult cases and a piece of bone from someone else or from the same person used to join the severed fragments.

Burns. Burns are ordinarily caused by fire or by boiling liquids, but they may also be caused by corrosive fluids, such as strong acids or alkalis. There are three degrees of burns: first-degree burns produce simply a slight redness of the skin, as in a mild scald; second-degree burns damage all but the deepest layers of the skin; third-degree burns cause damage right down to the tissues beneath. Generally speaking, burns are not dangerous if they involve less than one-third of the body's surface; but second- or third-degree burns involving more than one-third of the body are a serious danger to life.

So we have to consider, first, the depth of the burn, and secondly, its extent. The second factor is usually more important than the first. In any burns other than those which are trivial, the following rules must be observed:

(1) Treat for shock (*i.e.*, warmth; hot, sweet tea; and disturb the patient as little as possible).

(2) Use *absolutely nothing* in the way of dressings on the burn, and certainly not ointments or fatty substances.

(3) If there is likely to be a long wait for medical attention, bathe or submerge the patient in a bath of salt or baking soda (one teaspoonful to a pint of water).

(4) Leave the burned clothes alone, and on no account try to remove them.

Skin Grafts. In any injury, whether it be a wound or burn, new skin grows in slowly from the edges. But this cannot go on regardless of the size of the wound, and so a large denuded area has to be filled in with skin from elsewhere, and ordinarily this is taken from the thigh. Grafts may be taken in the form of large shavings of the upper layers of the skin which are spread over the denuded area, or small pieces (about ⅛–¼ in. in diameter) may be scattered over it.

Injuries caused by Atmospheric Conditions.

Changes in atmospheric pressure are found in two circumstances: when we go very deep down or very high up. Ordinarily, the air at ground level presses on our bodies with a pressure of 30 lb. to the square inch, and this has two effects: it keeps the lungs expanded against the ribs, and so makes breathing possible (if the chest is punctured the lungs collapse, since the pressure is then the same on both sides of the chest wall), and it forces oxygen and nitrogen into the blood-stream (the oxygen is necessary to life, the nitrogen is not, but both gases are the main components of air).

Now, it follows that when atmospheric pressure increases more of these gases are dissolved, or forced, into the blood, and when it decreases the gases—nitrogen in particular—start coming out. This becomes a problem only when the nitrogen comes out too quickly due to a sudden reduction in pressure. For example, in deep-sea diving or in caissons—the diving-bells used in underwater engineering construction—pressure may rise to four times the normal because in diving-suits air has to be forced down and in caissons the pressure has to be raised to keep water out. If, in such a situation, decompression is too sudden the blood in someone being raised too rapidly to the surface literally effervesces: the nitrogen leaves it in the form of bubbles, which may cause pain in the muscles, temporary paralysis, or even death from bubbles reaching the brain. The muscle cramps, once known as "the bends," are now uncommon, since the risks are well known and decompression is gradual. The treatment is to send the man down again and raise him gradually.

A similar condition, *Decompression Sickness*, occurs in aircraft flying at a height of 30,000 ft. or more. Since pressures are lower at high altitudes, the nitrogen leaves the blood and causes symptoms like those of caisson disease, although milder. This, of course, does not occur in modern pressurised aeroplanes, in which the pressure remains constant at any altitude.

Sunstroke. Until fairly recently it was usual to distinguish between sunstroke and heat-stroke, the first being supposedly caused by the direct influence of too much sun, the second being caused by excessive heat—for example in a steel foundry. In point of fact, there is no such thing as sunstroke, and both conditions are caused by excessive *heat*, whether brought about by the sun or under industrial circumstances. There is, therefore, no need whatever for sun-helmets or spine pads in the tropics; for the fact is that the head can be exposed to any amount of sunshine, and, provided that the body is kept cool, the worst that can occur is painful sunburn (especially in those with bald heads).

The symptoms of heat-stroke are headache, dizziness, and high fever; treatment is directed to reducing the temperature by cold bathing, ice packs, and cold drinks. When the condition occurs in industry there may be cramps caused by excessive sweating; in this case saline solution—one teaspoonful of salt to a pint of water—should be given. Heat cramps occur mainly in hot, moist atmospheres: in stokers, miners, and steel workers.

Frost-bite. This condition, well known by name if not experience, occurs in climates where one is exposed to severe cold—especially when this is accompanied by high wind and great altitude. The cold causes the small blood-vessels, mainly of the feet and hands, to contract, and later there is release of histamine, which produces shock and dilation of the vessels. The result is œdema or swelling, large blisters, and gangrene. Frost-bite is avoided by the use of warm clothing and soft, well-greased boots or gloves.

The treatment which should not be used is the one read of in books—rubbing with snow; heat, too, is to be avoided. The proper treatment is to keep the part moderately warm between the thighs or armpits of a comrade, having previously cleaned it with mild antiseptic and covered with clean wool or gauze. Sometimes amputation is necessary, but this should be delayed as long as possible, since some degree of recovery is always likely.

Sea-sickness, which troubled Lord Nelson more than the French warships, has been widened in scope in the natural course of technical progress by the addition of train-, air-, and car-sickness. All are due to the same cause: a rolling or up-and-down motion which affects the organs of balance, and, it must be added, a large element of imagination. There are many modern drugs which can prevent the trouble: antihistamines, sedatives, hyoscine, amphetamine, but nearly all of these are unobtainable without a prescription, and in any case one has to discover by trial and error which is most suited to the individual case. The solution, then, is to ask your doctor's advice.

The Effects of Atomic Radiation.

Here we are concerned with injuries produced by rays similar in nature to those of light which cause sunburn, but shorter in wavelength and more penetrating. Such rays do not necessarily arise from the explosion of nuclear weapons; for they include X-rays and the alpha, beta, gamma, and neutron radiation produced by radioactive elements as they spontaneously disintegrate or disintegrate artificially in a cyclotron. In addition, they include the cosmic rays which enter the Earth's atmosphere from outer space, all of which are dealt with in greater detail in the Science Section.

Radiation of this type is dangerous to the human body, but it is dangerous in a selective way, damaging the skin, the bone marrow, and the sex cells. Thus, exposure to X-rays for a comparatively brief period leads first of all to reddening of the skin after an interval of from a few days to two weeks, and a still longer exposure causes permanent destruction of the hair follicles so that the hair does not grow again. The penalty for considerable exposure to X-rays or the emanations of radium is, as the early workers found to their cost, chronic ulceration with the possibility of cancer. But this is not all. Ionising radiation destroys the bone marrow which produces red blood cells, and can thus lead to fatal anæmia, known as aplastic anæmia. There is also considerable evidence that leukæmia, in which the white blood cells proliferate, is on the increase and may be caused by radiation. Acting on the sex cells of men and women, fertility is decreased, and those children who are born may be abnormal; large doses cause sterility. Nuclear weapons produce the ordinary results of any explosion—blast and burning—but radiation is their peculiar speciality, as was shown when the Japanese fishing-boat *Fukuryu Maru* was showered with radioactive dust during an experimental explosion at Bikini in 1954. In this case the fall-out of an explosion many miles away killed one of the crew, and subsequent study has shown that the radioactive cloud which follows such an event may travel several times around the world before settling. A report published by H.M. Stationery Office (*Hazards to Man of Nuclear and Allied Radiation*) in 1956 belittles the influence of atomic explosions, which, it says, at the present rate will not increase radiation more than 1 per cent. But what is given with one hand is taken away with the other; for it is pointed out that X-rays as used in medicine may increase the danger to the sex-cells by 20 per cent., and that H-bomb explosions produce radioactive strontium, which by replacing the calcium in our bones can cause serious disease. The amount of radioactive strontium in the atmosphere is already at a dangerous level, and if explosions continue the position in the not too distant future will be serious. It is known, too, that the total amount of radioactive material surrounding us is in-

creasing, whether from nuclear weapons, industrial sources, medical instruments, or even the apparently innocuous luminous wrist-watch. These are the facts, and even if the danger were a good deal less than it is, they would be worth considering.

Atomic Medicine.

Radiation of the type we have been discussing may also be useful to Man, and for many years it has been known that X-rays can not only bring about cancer but also cure it. More recently, however, use has been made of radio-isotopes—that is, elements which have been made radioactive in a cyclotron. In medical and biological research such elements are capable of being traced throughout the body by the use of special instruments, so that it is possible, for example, to find what happens to iron from the moment it is taken in to the moment when it is built into the red blood cells which carry oxygen around the body. Similarly, the growth of animals and plants may be studied in detail. Such activated atoms are known as "tracers," and it seems likely that much more will be found out about biological processes with their aid. *See also* F54.

Radioactive substances are also used in the treatment of disease. Thus cancer of the thyroid has been treated for many years by means of radium or X-rays, which have the defect that they do not penetrate deeply enough unless they are so powerful as to damage tissues other than the tumour. Now, iodine entering the body ultimately reaches the thyroid gland, and when this iodine is made radioactive the radiation which destroys the cancer cells is given off within the gland itself. And it does this with the least possible damage to surrounding tissues, with the additional advantage that it can be taken by mouth in the form of a "radioactive cocktail."

DRUG ADDICTION

INTRODUCTION.

Poisoning.

This is a common enough event if we include under the term our own prejudices: "intestinal poisoning" (the polite name for constipation); alcoholism (if we don't like alcohol); and even meat (if we happen to be vegetarians). However, here we are talking of poisons in the sense that Dr. Crippen and other gentlemen understood—substances which are seriously dangerous to life. Such substances need not, of course, be used with any criminal intent, and in fact some of them gain entry to the body in quite innocent ways. Thus mercury, once used in the treatment of syphilis, can cause chronic poisoning, as also can lead and many other substances used in industry. There is, too, the curious state of *allergy*, dealt with elsewhere, in which substances not ordinarily harmful to human beings cause illness and sometimes death in those who are sensitive to them. There is nothing so harmless that it cannot cause harm to *someone*, nor is there anything so harmless that in sufficient amounts it cannot cause harm to *anyone*.

There are poisons such as prussic acid and its derivatives which are almost instantaneous in their action; others which, if given in relatively small doses, produce sooner or later symptoms which often mimic those of disease (*e.g.*, mercury, lead, arsenic). Some poisons have unusual effects, as strychnine, which causes fits, and curare, formerly used on the tips of poisoned arrows, which causes paralysis. Curare is now used in surgery to relax the muscles during an operation. Lastly, there are the supposed "poisons" which fond imagination endows with dangerous properties, particularly towards nagging wives, boring husbands and mothers-in-law; of these ground-up glass is perhaps the chief. Regrettably or otherwise, it must be reported that ground-up glass is completely harmless—unless, of course, the pieces are so large and sharp that even the least suspicious victim might have reason to wonder. So, too, cigarette ash, which is supposed to have an effect (one wonders what) when dropped in someone's drink, is quite innocuous. Sea-water, which, it is alleged, causes the shipwrecked mariner who is rash enough to drink it to go mad, produces no such effect—however, it does increase thirst.

Each poison has its appropriate antidote, but here only general rules can be given. These are: (1) send immediately for a doctor; (2) give drinks of milk, white of egg, or strong tea; (3) afterwards, give as much as possible of a mixture containing a heaped teaspoonful of salt to a cup of warm water—which should cause vomiting; (4) when a narcotic poison has been taken (*i.e.*, one which makes the patient sleepy), keep him awake by walking him about and by giving strong tea or coffee.

Every doctor has the experience of being asked by patients from time to time whether the medicine they have been given is a "drug"—to which the only sensible answer would be: "It depends on what you mean by a drug." (The *Oxford Dictionary* defines the word as a "simple substance used alone or as an ingredient in medicine.") Thus defined, all medicines are drugs, from Epsom salts and baking-soda to heroin and cocaine. Presumably what the questioner really means is whether the drug is one that causes addiction; but this problem is not a simple one. Tea and coffee are drinks containing "drugs" such as caffeine to which many people are addicted in the sense that they would feel uncomfortable without them. In fact, at least four-fifths of the human race is addicted to some drug or another, and those who take strong purgatives every night are certainly addicts, even if they describe their abominations as "medicine." As Dr. Bergen Evans points out, it is probably a bad thing to take drugs, but it is unquestionably a bad thing to talk nonsense.

Let us be clear, then, about some basic facts. First, in many cases drug addiction is the *result* of being mentally unbalanced and not the *cause* of it; secondly, the drug addict as seen in the psychiatrist's consulting-room or the police court is a specially selected type, in that he is the one who is so obviously unbalanced as to be found out; thirdly, and as a corollary to the second point, the majority of drug-takers are apparently ordinary people who are never found out. For example, Coleridge and De Quincey, two of our greatest writers, took huge amounts of opium, and were both creative in their profession and lived to a ripe old age. Indeed, not much more than a century ago, opium was in fairly general use amongst the working-classes of this country both as a medicine and to add to their beer or tobacco. These people took opium as today we take cocktails, and did not necessarily become addicts, nor crave for more. In point of fact, alcohol is more dangerous than opium or morphine when taken in large amounts by unstable individuals, and one authority goes so far as to say that alcohol causes infinitely more murders, rapes, and crimes of violence than do morphine, heroin, cocaine, marijuana, and all other drugs combined. In the graphic words of Dr. J. D. Reichard, who is an authority on narcotics: "An alcoholic gets drunk, goes home and beats his wife; an addict to morphine gets 'high,' goes home, and his wife beats him." The narcotic drugs decrease rather than increase (as alcohol does) the sexual and aggressive impulses.

Taking narcotic drugs, except under medical advice, is both dangerous and a crime. But, morally, the crime belongs as much to society as to the individual. The drug addict, like the homosexual, is in two senses the result of social influences: in the first place, he is likely to be an over-sensitive and insecure individual who cannot stand up to the demands of our high-pressured competitive society. In the second place, when society (rightly or wrongly, since we are discussing facts, not morals) makes his behaviour illegal, he is forced into all sorts of subterfuges in order to carry on what to him is really a compulsive need. Hence, drug addicts are often the victims of blackmailers or steal in order to get supplies of the drug, just as homosexuals may be blackmailed or otherwise get into trouble with the law. Others may get supplies of their drugs easily or carry on their sexual peculiarities at home and never be found out.

Ordinarily well-balanced people need not fear becoming addicted to a drug prescribed them by

their doctor. The treatment for those who do become addicts will not be discussed here, since the only hope for cure is in a hospital dealing with such cases.

Alcoholism.

This is a problem on its own in that its use is so widespread and, by and large, socially accepted. But what makes a person an alcoholic is not only the amount he takes but the underlying emotional tensions which make alcohol an absolute necessity to him. It is possible for some people to drink a great deal but yet to be able to "take it or leave it," which is what the alcoholic cannot do.

This is a subject about which most of us hold such strong opinions (not always based on fact), that we had better look at the medical evidence. To begin with, it used to be taught that alcohol caused the following conditions: alcoholic neuritis, chronic gastritis, cirrhosis of the liver, and certain forms of insanity, such as delirium tremens ("D.T.s"), and the so-called Korsakow's psychosis, in which there is loss of memory and finally dementia. These statements are not untrue, but have to be modified by others: cirrhosis of the liver is found in many people who have never drunk anything stronger than tea, and, although it may be found in alcoholics, is not very common; alcoholic neuritis (which is due to lack of vitamin B1) is common in heavy spirit drinkers, but not in beer drinkers—since beer contains the vitamin; gastritis can be caused by any over-indulgence in piquant foods or drinks, such as curries, strong tea which is constantly "stewed," or alcohol.

It seems that the basic cause of physical disease due to alcohol is the same in all cases: the alcoholic tends to neglect his food and to get gastritis from taking strong liquors on an empty stomach. This leads both to insufficient vitamin B1 (which is necessary to the nervous system) being taken in, and insufficient of what is taken in being absorbed owing to the inflamed condition of the stomach lining. Hence there is neuritis and, in bad cases, damage to the brain cells. But perhaps the main damage is the social one; for, as Clark-Kennedy points out in his book *Human Disease*, "More damage is probably done by (alcohol) in weakening self-control and absorbing income, better spent in other ways, than by any permanent damage to a man's nervous system." As in narcotic addiction, the hunger for alcohol may lead to persistent lying in order to keep up appearances, disregard for family, loss of memory, lack of self-respect and control, loss of work, income, and the rest, in a life where the sole interest is more of the tipple—these are psychological effects imposed on an already unstable personality.

Treatment must ordinarily be carried out in a hospital, and various treatments, such as "Antabuse" or apomorphine, can be given—drugs which make the alcoholic violently sick if he partakes. Other physicians rely mainly on psychotherapy, and some patients are helped by the body known as Alcoholics Anonymous (you will find the address of the local body in your telephone directory). Since the condition is a disease, "will-power" in the case of either alcohol or narcotics rarely has any effect.

The effects of some other drugs are, very briefly:

Morphine leads to detachment from reality, freedom from worry and fear.

Opium. The effects are similar, and results probably least harmful.

Heroin is less likely to make the patient sleepy and more likely to lead to serious addiction—hence the recent move to ban its use altogether, even in medicine.

Cocaine ("Snow"), usually taken in the form of snuff or by injection, relieves temporarily depression, and gives an impression of heightening all physical pleasures. It produces cheerfulness, leads to rapid moral deterioration, and is the most difficult form of addiction to cure.

Marijuana allegedly stimulates sexual fantasies, but certainly decreases sexual ability. It is usually taken in cigarettes, and much nonsense has been talked about it. An official committee promoted by the Mayor of New York found that in large doses marijuana impairs intellectual functioning, causes giggling and laughing (with an inability to do any harm whatever), does not affect the basic personality, and leads to no permanent deterioration. The doped cigarettes are known as "reefers," and the desire of those who use them to be thought "bad boys" leads them to exaggerate the effects of the drug. Thus a well-known jazz conductor announced that "tea (*i.e.*, marijuana) puts a musician in a real masterly sphere. Nothing can mess you up. You hear everything and you hear it right." This belief that reefers help the jazz musician is nonsense; for, regrettably, the truth is that it may *seem* to make the music sound better, but only to the musician; actually, the music is worse.

Barbiturates. Drugs such as phenobarbitone, medinal, veronal, are used in treating nervous illness. Except in excessive doses, there is no evidence that they do any harm at all, and some people take them for most of their lives. Death can result from overdose, but the probability is that those who commit suicide with barbiturates would do so anyhow. One danger, however, is that, after taking the original dose there may be forgetfulness, and an overdose taken which may lead to accidental death. All sedatives and sleeping tablets are best kept in the custody of someone other than the person who takes them, unless the amount is small.

Benzedrene or Amphetamine is a stimulant drug used in the treatment of depression; it is also used to reduce appetite in those who are slimming. In the form of inhalers, amphetamine reduces congestion in the nose. Wrongly used, the drug is taken by those who ought to have more sense in order to give them a "lift." In some people, amphetamine has little or no effect, but those who are worried or tense may well become more agitated with the drug, and large doses can cause complete inability to sleep and great excitement. It is, of course, also used by students before an examination in the belief that it gives confidence and clears the mind; but not even amphetamine can put into, or bring out of, the mind what is not already there.

DISEASES OF THE BLOOD

INTRODUCTION.

The blood-stream is the canal system of the body which carries from one part to the other various substances essential to life. Thus it carries, partly in the red blood cells and partly in solution in the liquid part of the blood, the oxygen breathed into the lungs, and returns to the lungs to be breathed out the waste product known as carbon dioxide. From the intestines it carries the digested foodstuffs through a large system of veins (the portal system) to the liver, where they are changed in many ways to make them suitable for absorption by the cells of the body. The foodstuffs—fats, proteins, and carbohydrates—after change in the liver are discharged into the general circulation and excess amounts are stored for future use. *The liver* is the largest organ in the body, and lies just under the ribs on the right side. In addition to storing food, it also stores unneeded blood, to be given out when emergency calls; it destroys poisonous substances circulating in the blood (not always successfully, of course); it manufactures bile, which passes down the bile duct into the intestines to aid in the digestion of fats; lastly, it manufactures prothrombin, which is necessary to normal blood clotting. More will be said of the liver under the heading of Gastric and Intestinal Diseases.

As we have seen, the blood also carries those defence materials which help to destroy infection in any part of the body: the antitoxins and antibodies, and, of course, the white cells, some of which actively attack germs. Just as the blood

transports food around the body, so it transports the liquid waste matter not needed by the cells to the kidneys, which excrete it in the form of urine.

Blood consists of a liquid part, known as plasma, and floating in this are the red and white cells. A cubic millimetre—that is, an area about the size of a pin's head—of this contains about 5 million red cells, mainly concerned with the transport of oxygen, and about 5,000 white cells, concerned with resistance to infection. There are different types of white cells—for example, the lymphocytes, the leucocytes, and the eosinophils (these are all given various names and subdivided in many ways). The red cells are usually known as erythrocytes. From examination of the blood, doctors can tell a great deal about the patient; thus less than the usual number of red cells signifies anæmia, too many, polycythæmia. If the red cells are reduced in number, but too large, pernicious anæmia is possible; when they are reduced in number but too small, simple anæmia is the probable answer. In acute septic conditions or infections there is great increase in leucocytes—up to 30,000 or more—in some chronic infections or certain diseases, such as whooping cough and glandular fever, there may be increase in lymphocytes. Eosinophils are increased in many allergic diseases.

Doctors also consider such factors as the number of platelets (which are very tiny cells connected with clotting), the fragility of the red cells, and the sedimentation rate, which is the length of time it takes the red cells to sink to the bottom of a tube of blood. The time taken to coagulate is also important.

Two other organs also closely connected with the blood are the *bone-marrow* and the *spleen*. The spleen, on the opposite side of the body from the liver, farther back, and smaller, stores iron and blood. During development before birth, the spleen manufactures both red and white blood cells, but after birth the bone-marrow manufactures all the red cells and most of the white ones. However, all through life the spleen still makes certain types of white cell and has the further function of destroying the old red or white cells and retaining the iron for use in making new red cells. It also kills bacteria which have not been dealt with in other ways. Unlike the liver, the spleen can be removed without danger to life; the liver cannot be removed, and even slight operations on it are dangerous.

Lymph Vessels and Glands.

These have already been mentioned. They carry a milky or clear liquid known as lymph throughout the body. Lymph comes from blood plasma and passes through the glands, which are situated at strategic points. The glands act as a filter for germs, and red lines above an infected area or swollen glands indicate infection which has got beyond the point of entry. The main groups of glands, other than those inside the chest and abdomen, are at the back and sides of the neck, in the armpit, and in the groin. All the lymph vessels meet in the chest, and the main vessel pours the lymph into the blood-stream just above the heart.

The Heart and Blood-vessels.

These will be described elsewhere, and here all that need be said is that blood is oxygenated in the lungs, passes into the heart, and is pumped around the body through the arteries. As they become smaller towards the end of their destination, the arteries are called arterioles, which ultimately become smaller still—the capillaries, which pass into the venules or small veins, thence into the larger veins, and back to the heart with the used blood. In fact, there is more than 100,000 miles of the circulatory system in the body.

Blood diseases can be divided into various general groups: (1) those due to nutritional defects, such as pernicious anæmia, which is caused by lack of the anti-anæmic factor to be discussed later, or the simple anæmia caused by lack of iron and other substances in the food; (2) anæmia due to hæmorrhage or loss of blood in any form; (3) anæmia due to breaking-up of the red cells, as in blackwater fever following malaria; (4) anæmia caused by such damage to the bone-marrow that new blood cells are not produced; (5) a final group of little-understood diseases of the blood cells or lymphatic system. We shall consider these in turn.

NUTRITIONAL DEFICIENCY ANÆMIAS.

Pernicious anaemia is due to lack of something within the body, known as the "intrinsic factor," which is normally secreted by certain glands in the duodenum and at the lower end of the stomach. Together with the "extrinsic factor," taken into the body in protein foods, the two form a substance stored in the liver without which blood formation does not occur. No matter how much of the extrinsic factor is taken in, it is of no avail if the intrinsic factor is not secreted. Why the glands should stop working is not known, but anæmias similar to pernicious anæmia sometimes occur after the stomach has been removed by surgical operation, or during diseases, such as sprue, which damage stomach or intestinal function. However, most cases of pernicious anæmia are not due to these causes—they simply happen. The patient is usually an adult, over the age of thirty-six, who complains of weakness, pallor (of a typically lemon-yellow type), shortness of breath, soreness of the tongue, and swellings of the ankles. The red blood cells are greatly reduced in number, but each cell is larger than normal, and the size of the spleen and liver may be increased. In this disease the stomach does not secrete hydrochloric acid. Formerly this type of anæmia was invariably fatal in a period varying from a few months to one or two years, but in 1924 Dr. Minot of Boston in America began to give raw liver to some seriously ill patients, and found that they recovered. The raw liver supplied the intrinsic factor, and, so, it was found, did dried stomach extract. Nowadays, nobody need die of pernicious anæmia, which is treated with concentrated liver extracts and vitamin B12. If, however, the anæmia has gone on for a long time without treatment, there may be signs of damage to the spinal cord with weakness of the legs and areas of loss of feeling.

Simple Anaemia is due to inadequate diet so far as iron, vitamin C, and other substances are concerned. The red cells are reduced in number, but they are not, as in pernicious anæmia, enlarged. This is the commonest type of anæmia in this country, and is what is usually described as "bloodlessness." Unlike pernicious anæmia, ordinary anæmia is *not* helped by liver extract, and *is* cured by iron tablets. It is important to realise that the fact that people look pale does not prove that they are anæmic. One can tell more effectively by finding pallor on the inner side of the lower eyelid, or by having a blood test taken, but, ordinarily, paleness, breathlessness, and swelling of the ankles denote anæmia. There are so many medicines containing iron on sale that you had better ask your doctor's advice before taking them.

Anaemia after Haemorrhage might seem to refer only to loss of blood after an injury, and so it often is. But in this case unless the blood loss is great it will soon be replaced by the bone-marrow. Perhaps more important, because less obvious, is the simple sort of anæmia caused in women by excessive menstrual loss. This demands treatment of the basic cause by a doctor. Usually in bad wounds blood transfusion is necessary; in chronic loss in women giving iron and preventing the loss is the correct treatment.

Anaemia Due to Breaking-up of the Red Cells is found in many conditions, most of them unknown in Britain. The best-known is blackwater fever, already described, in which the red cells are damaged in malaria and dark blood pigment appears in the urine—hence the name "blackwater." None of them has any importance here, and, in any case, medical advice is necessary.

OTHER DISEASES OF THE BLOOD.

Some blood diseases are due to the inability of the bone-marrow to produce more blood cells. Two important ones are *aplastic anaemia* and *agranulocytosis*. The first may happen without apparent cause, or be produced by X-rays, radium, some antibiotics, and some sulpha drugs—indeed by many drugs; in the long run, it is fatal. Agranulocytosis, if discovered in time, can be cured. The main obvious distinction between the two is the severe ulceration of the throat found in agranulocytosis and not in aplastic anæmia, and, although agranulocytosis can be caused by over-indulgence in certain drugs, it is more usually a sequel to such severe infections as tonsillitis, pneumonia, or septicæmia. Other diseases are due to something which has gone wrong with the production of white blood cells, and chief ones being the leucocytes, which are manufactured in the bone-marrow, and the lymphocytes, made in the bone-marrow and partially in the lymph glands. Disease of these cells, in which they increase vastly in number at the expense of the red cells, is called *leukaemia*, and there are three types.

(1) *Chronic Myeloid Leukaemia*, where disease of the bone-marrow causes decrease in the number of red cells and increase in the number of leucocytes—perhaps to half a million per cubic millimetre (you will recall the normal figure is about 5,000–6,000). The spleen is much enlarged and the patient, commonly a man between twenty-five and forty years, suffers from weakness, swelling of the legs, and bleeding from the nose.

(2) *Chronic Lymphatic Leukaemia* is a similar state of affairs in which the number of red cells is reduced, although less so than in the first case. The spleen is also not so much enlarged, but the lymph glands are, and the number of lymphocytes in the blood is enormously increased. In this disease the patient is usually over middle age, but otherwise the symptoms are much the same as in chronic myeloid leukæmia.

Both diseases are treated by X-rays, and although the ultimate outlook is not good, the patient may have many years of reasonably fair health to look forward to.

Acute Leukaemia is found in younger people, and is usually due to increase—very rapid in this case—in the number of the leucocytes. It is quickly fatal.

A similar condition, in which the *red* blood cells increase in number, is *polycythaemia*. The increase may be from the normal 5 million per cubic millimetre to something like 8 million. The patient has an enlarged liver and spleen, looks blue and congested, and his fingers may become clubbed at the tips. He can lead a fairly normal life for many years with the help of drugs which reduce the production of red cells. However, thrombosis (clotting) may happen at any time, or the bone-marrow may suddenly give out through overwork, so that death is caused by aplastic anæmia.

All these diseases have this in common, that the blood cells of one type or another are produced in excess; they are, in effect, a form of cancer of the blood. Their recent increase may bear some relation to increased radioactivity.

Hodgkin's Disease is another curious condition, very similar in appearance to chronic lymphatic leukæmia. Here, however, most cases appear in young people, and, although the lymph glands enlarge, there is relatively little change in the blood. There is, too, likely to be an intermittent temperature which goes up and down at intervals of about ten days. Finally, all the glands of the body (within the chest and abdomen, as well as in the more superficial areas) become enlarged and may interfere with eating, speaking, or breathing. In the later stages severe anæmia develops, but, as we have already seen, there is little to note in this respect to begin with. Hodgkin's disease is, in fact, a disease of the lymph glands rather than of the blood. The outlook is always serious, but X-rays and certain drugs are helpful in slowing down the process.

Purpura is one of quite a number of conditions in which there are hæmorrhages under the skin, usually resembling small purple spots. Often such spots are not a disease in themselves, but simply the result of some other condition. For example, many of the ordinary fevers, septic conditions, leukæmia, jaundice, and the later stages of cancer or kidney disease may bring about this type of purpura, known as secondary because of the reason given above. Purpura may also occur after epileptic fits or bouts of whooping cough due to the strain of the spasms, and following the use of certain drugs.

Primary purpura, which is the genuine article, includes a group of diseases, some serious, others mild, and the main members of this group are:

Purpura Simplex, a mild condition in children associated with small hæmorrhages into the skin of the shins, sometimes diarrhœa, fever, general "run-down" feeling, and muscle pains. It may sometimes be connected with deficiency of vitamin P, but clears up in two to three weeks.

Purpura Haemorrhagica or Thrombocytopenic Purpura is much more serious, although in some respects its symptoms are merely an exaggeration of the above. It is found in children and young women; the hæmorrhages are severe and occur not only under the skin but also from the gums, nose, and bowels, so that anæmia soon develops. There is high fever, often with delirium. Unlike purpura simplex, in which the blood is unchanged, this disease is caused by some defect in the spleen which continues to destroy the blood platelets which play a part in clotting. Blood transfusions are given, but if the condition becomes serious the spleen may have to be removed.

Henoch's Purpura: this is a disease usually associated with infants and children. Blood and mucus are secreted into the intestine, there is colic, vomiting and diarrhœa containing blood. The main importance of this disease is that it so closely resembles a number of abdominal conditions for which surgery is necessary that it may be referred to a surgeon. The fact that it is a form of purpura becomes evident when the tell-tale spots appear on the skin. An attack clears up in about two days, but may recur and become dangerous.

Haemophilia—Bleeding and Clotting. As is well known, there are some people whose blood fails to clot in the normal time when a wound occurs. When this is so, even a small wound may cause the patient to bleed to death—a tooth extraction, a slight cut, a bruise, all become major emergencies. Since these minor injuries are happening to most of us many times each year, the life of a hæmophiliac is a risky one. Many hæmophiliacs, indeed, in their early twenties, have been given as many as two hundred blood transfusions to save their lives in injuries which would have been unimportant to anyone else.

Hæmophilia is hereditary, and is passed on to the male members of a family by the mother who is not a "bleeder," but whose father was. The mother is the carrier who hands on the disease to her sons. Perhaps the most famous example was Queen Victoria, who had four sons and five daughters; one son (Prince Leopold) died of the disease, and two daughters (Princess Alice and Princess Beatrice) became carriers. Princess Beatrice married and produced two sons with hæmophilia and one carrier daughter—a daughter who married King Alfonso of Spain, and out of four sons two had hæmophilia. Prince Alice married Prince Louis of Hesse, and had one son, who died of bleeding in his fourth year, and two carrier daughters, one of whom became the Czarina of Russia. Her only son was the unfortunate little boy who, by reason of his hæmophilia, was the main reason for the introduction of the self-styled "healer" Rasputin into the family and the source of his malign influence over the royal house.

Hæmophilia is only one disease in which there is a tendency to bleed, in this case caused by delayed clotting. But a similar tendency may be caused by inadequate clotting, when the clot formed over a wound is soft, jelly-like, and fails to harden, or, as in the case of some types of purpura, when the capillaries are so fragile that they are easily broken by a relatively slight injury. What

are the factors which bring about clotting? When bleeding occurs, the platelets in the blood-stream move to the area, disintegrate, and release a substance known as thromboplastin, which, together with two other substances in the blood—calcium and prothrombin—form thrombin. (The prothrombin is manufactured in the liver, and vitamin K is an essential in its formation.) Thrombin, however, is not the final product; for it interacts with something else in the blood, known as fibrinogen, to form *fibrin*, the actual clot, and, as we have seen, the fibrin forms long, thread-like fibres which fill in the gap and ultimately draw the edges of the wound together. Clearly, then, the tendency to bleeding may result from lack of any one of these substances; most often from lack of prothrombin (due to liver disease, blocking of the bile-duct, or lack of vitamin K) and very rarely from calcium deficiency. Almost equally rare is deficiency of fibrinogen, so the remaining types are caused by lack of thromboplastin, either because the number of platelets is reduced, the amount of thromboplastin in the platelets is insufficient, or, most commonly, because the platelets are so tough that they fail to break up at the site of the bleeding.

There are many different treatments used in bleeding diseases, and obviously the treatment will depend on what specifically is missing. But, in any case, the outlook is much better than it once was.

BLOOD TRANSFUSION.

When, in the early seventeenth century, William Harvey discovered the fact of the circulation of the blood, he became the predecessor of many great men in the England of his time; England was in the process of a scientific renaissance, one expression of which was the formation of the Royal Society under the patronage of Charles II—a society with such members as Sir Christopher Wren, Robert Hooke, the greatest microscopist of his time, Boyle the physicist, Sir Isaac Newton, Pepys, and others. All these men had an insatiable curiosity which extended far beyond the bounds of their particular subject, and thus it was Wren the architect who first suggested the possibility of intravenous injection of drugs (*i.e.*, injecting them directly through a syringe into a vein), and who carried out with other members the first experiments on blood transfusion. They transfused blood from one dog to another, from a sheep to a man, and from a young man to an old man—the fact that no human fatalities seem to have occurred points more to luck than good guidance, since, as we now know, there are four well-defined types of human blood, and some types are so incompatible that mixing will cause acute distress and possibly death. Before transfusion, therefore, it is necessary to know that the blood types of both donor and recipient are compatible.

Blood transfusion is much more frequently used now than formerly, as knowledge of the technique has increased. Whereas it was at one time regarded almost as a last resort, it is now used before, during, and after surgical operations if necessary. Blood transfusion, in fact, has become the most important weapon in the prevention and treatment of shock and has saved millions of lives. The blood taken from donors is stored in "banks" according to type, but when whole blood is not available plasma (usually in the form of dried powder which, like powdered soups, can be "reconstituted" with sterile water) or intravenous saline is also useful.

DISEASES OF THE HEART AND BLOOD-VESSELS

DISEASES OF THE HEART.

The heart lies in the centre of the chest and slightly to the left side between the lungs. Its shape is familiar from the hearts seen in butcher's shops, or, if you are a vegetarian, from the hearts on playing-cards (which are, however, a somewhat idealised version). There are four chambers in the heart, the right and left auricles and the right and left ventricles, the auricles being the ones at the upper part, the ventricles the ones below. The chambers are separated by valves which permit only a one-way flow of blood.

Circulation of the blood is, of course, continuous, and does not begin anywhere, but for purposes of description we may conveniently begin at the left ventricle, which pumps the blood through the aortic valve into the aorta, the largest artery in the body, and thence throughout all the other arteries. After passing to the arterioles (the smallest arteries), and to the capillaries, where the blood does its work of supplying oxygen and food to the tissues, it passes into the small veins or venules and then to larger and larger veins until, having given up its oxygen and food and absorbed waste products such as carbon dioxide (breathed out in the lungs) and soluble food wastes which are filtered out by the kidneys, it passes into the largest vein, the *vena cava*. The *vena cava* enters the right auricle, which pumps the blood through the tricuspid valve into the right ventricle, from which it passes through the lungs to get rid of its carbon dioxide and take in more oxygen. From the lungs, the blood goes to the left auricle, and thence, through the mitral valve, to the left ventricle to begin the cycle once more. The tricuspid valve, as the name implies, has three cusps or flaps; the mitral valve, shaped like a bishop's mitre, has only two.

Like other internal organs, the heart is covered in a thin, double, transparent covering or sac, rather like the plastic bags in which food is sold, and this contains a layer of fluid to prevent friction as the pumping motion is carried on; it is known as the pericardium.

There are three different tissues in the heart: the pericardium, which has just been described; the myocardium, or muscle, which forms the main bulk; and the endocardium or lining of the chambers, including the valves. Any one of these tissues may be attacked by disease, as also may the small blood-vessels, known as the coronary vessels, which supply blood to the heart muscle (for the heart, no less than any other part of the body, has to have a blood supply).

In general, heart disease belongs to one or other of three types: *congenital*, due to defects of the heart at birth; *infective*, due either to actual infection or its after-effects; *degenerative*, due to the changes of old age—which come on at different ages, depending on the individual. Now, strictly speaking, heart diseases are not curable in the sense that in most cases we cannot say that the heart has returned to its previous condition. What we can say is that the heart has a great ability to compensate for its defects, both by natural processes and with the aid of modern medicine and surgery. Only a score of years ago people were turned down for Life Insurance because they had a "murmur" in the heart (*i.e.*, the sound a doctor hears with his stethoscope if a valve is defective). But today judgement is based on much wider information; for it is realised that what is heard through a stethoscope is not in itself justification for making a hard-and-fast diagnosis. We must consider also the results given by electrocardiograms and, above all, by the individual patient's performance and symptoms.

The electrocardiograph is an instrument which measures the electrical currents passing through the heart muscle as it beats and shows them up on a chart. It gives in this way a pretty accurate estimate of the heart's efficiency. But, important as these results are, we are much more interested in the actual observation of what the heart can *do*, how it in fact *works*.

The following story—which is true—gives an indication of the modern medical attitude towards heart disease: A wealthy patient, who believed something to be wrong with his heart, made an appointment with a famous heart specialist. On reaching the hospital, he found that the doctor's office was on the third floor, and that the lift was not working. He was therefore compelled to walk up three flights of stairs, and finally knocked on the door of the specialist's office. When the door was opened the doctor looked at him and asked: "You walked up the stairs because the lift is broken?" "Yes," replied the patient. "Then your heart is perfectly normal. Good afternoon!" said the doctor.

What this story illustrates is that, generally speaking, the basic criterion of the heart's efficiency is whether it works satisfactorily. It is rarely possible to have heart disease in the presence of the ability to lead a normal life, except in the case of such conditions as coronary thrombosis or angina pectoris, which may remain undiscovered even by the most refined methods of investigation until they are upon us. In conclusion, it should be noted that symptoms related to the heart in an obvious manner, such as pain, discomfort, or palpitation, are rarely signs of heart disease, and are more likely to be nervous in origin or due to indigestion, fibrositis, pleurisy, or other causes.

Pericarditis is to the heart what pleurisy is to the lungs—an inflammation of the covering layer. The vast majority of cases result from acute rheumatism, but they can also be associated with other fevers, septicæmia, and generalised tuberculosis. Pericarditis may be an extension from local disease, such as pneumonia, pleurisy, or chest wounds.

When this happens inflammation develops between the two layers of the pericardium, so that instead of moving smoothly against each other when the heart beats they "scrape." If acute rheumatism is already present the temperature increases, there is pain over the heart, difficulty in breathing and restlessness, and the pulse rate goes up. This condition is known as "dry" pericarditis, but may develop into pericarditis with effusion in which fluid is secreted between the layers; when this happens, the pain disappears but breathlessness increases. The treatment of both types is that of the condition causing them (*e.g.*, rheumatic or scarlet fever), rest, and, if fluid is formed, it may have to be drawn off. Ordinarily the outlook is good, but adhesions between the pericardium and surrounding structures may occasionally give trouble.

Myocarditis, or disease of the heart muscle, results from a number of causes: first of all there is the great enemy rheumatic fever, and in a lesser degree diphtheria, typhoid, and chronic syphilis—all these infections poison and weaken the heart in varying degrees. Or the muscle may degenerate in pernicious anæmia, hyperthyroidism poisoning from phosphorus and other substances, or when the blood supply is affected, as in coronary thrombosis. In some cases of myocarditis damage is slight and gradual in onset, in others—such as after coronary thrombosis—it may be sudden and severe. The result in mild cases will be *compensation* when the heart is able to overcome its defects, but in severe cases *heart failure* may develop. This applies, too, to the later results of valvular disease of the heart, in which, again, there may be compensation or failure.

The condition of the heart muscle is the main factor in determining the ability of the heart to overcome any sort of damage; for it is the muscle which does the compensating. Thus, when one of the valves becomes narrowed by disease the muscle in the chamber below increases in size and thickness to force the blood through, but when the myocardium itself is degenerated this cannot take place, and sooner or later heart failure of varying degrees occurs. By and large, the symptoms of heart failure are those of most heart diseases: breathlessness (at first on mild exertion, later even when lying down), occasional coughing up of small amounts of blood, swelling of the feet (which in the later stages may extend upwards), and cyanosis—blueness of the skin. Obviously, the treatment is a matter for the doctor, who will prescribe drugs suitable to the exact condition, rest in bed, and other measures.

One of the main causes of myocarditis, as we have seen, is coronary artery thrombosis—that is to say, clotting of blood in one of the small arteries supplying the heart muscle.

Coronary Thrombosis is interesting in that: (*a*) it occurs mostly in men over forty-five; (*b*) it is more frequent in industrialised countries; and (*c*) it is more frequent in the wealthier classes. These facts have been used to support two separate theories as to its cause: first, that it is due to long periods of emotional stress in the ambitious, striving type of personality, and secondly, that it is due to over-indulgence in animal fats (not vegetable or fish oils), which causes the laying down of a substance known as cholesterol in the coronary vessels and their ultimate closure. Coronary thrombosis, then, is regarded according to one's viewpoint as an emotional or a dietary problem, but both schools of thought realise that some predisposition lies behind whatever the immediate cause may happen to be.

There is certainly some support for the view that animal fats, including milk, may play some part in predisposed individuals in bringing about coronary thrombosis. For example, the incidence of the disease went down during the War in Norway when meat was rationed; it is uncommon amongst fish-eating people, such as the Eskimos, or those who eat little meat—because they cannot afford it—such as the peasants of Southern Italy. But, of course, the "stress" school of thought can point out that these peoples are not, on the whole, subjected to the strains of a highly competitive society. High living and a tense emotional life often (if not always) tend to go together, and it is quite possible that both theories of the causation of coronary thrombosis are true: that emotional stress is the predisposing factor which disturbs the workings of the body and makes animal fats dangerous to the individual.

Thrombosis occurs when the building-up of cholesterol derived from such fats suddenly leads to clotting in one or other of the coronary arteries so that the blood cannot get through. The result is immediate and severe pain over the heart, which lasts for several days; there is breathlessness and shock, sweating, rapid and weak pulse, and later low fever. In about half the number of cases death occurs immediately, but in those who recover from the attack the outlook is reasonably good. The treatment is, naturally, a matter for the doctor, but will include rest in bed for six to eight weeks, a gradual resumption of work, depending on the state of the heart, reducing if overweight, and possibly dietary restrictions. Drugs are used to strengthen the heart.

Thrombosis in other parts of the body will be discussed later, but here it may be of interest to mention the anti-coagulant drugs which have the effect of preventing clotting. They are chemicals which have been known in Nature for a long time. Thus a leech, in order to liquefy the blood it sucks from its victim, secretes "hirudin," which prevents clotting, and the livers of dogs and oxen contain "heparin," which has a similar effect. But the greatest advance in this field came from the study of a bleeding disease in cattle, often ending fatally, which had long been familiar to veterinary surgeons. In 1921 Schofield of Canada found that the cause of this disease was the eating of spoiled sweet-clover, and in 1941 the chemical responsible for the bleeding was isolated from clover by Link in America. It is found in sweet-clover which has been spoiled by storage as hay, and is known as "dicoumarin." If given in large amounts dicoumarin produces symptoms identical with those of the bleeding diseases: purpuric spots and hæmorrhage from the gums and internal organs. It is obviously the ideal drug for dealing with diseases in which clotting takes place too readily—coronary thrombosis, phlebitis, and pulmonary embolism. Dicoumarin, however, has to be used with care and under medical supervision.

Angina Pectoris. A disease which is in many respects similar to coronary thrombosis is *angina pectoris*, but here, although the arteries may be narrowed, the immediate cause of an attack is spasm of the blood-vessels, which are therefore only temporarily closed. The symptoms are the same as in coronary disease except that the pain over the heart (which frequently passes up the neck or down the inner side of the left arm) is: (*a*) brought on by exercise, whereas thrombosis can occur whilst resting; and (*b*) wears off in a comparatively short time—usually after the exertion ceases. Death may occur during an attack, but medical care can do a great deal when the condition is discovered in time. Drugs are given which prevent spasm (usually nitroglycerine, known in a more sinister sphere as T.N.T. the explosive). During an attack, relief is obtained from amyl nitrite, which is inhaled

from a capsule. Otherwise, the treatment is as for coronary thrombosis.

Valvular Disease of the Heart, or endocarditis, has a rather frightening sound which is not always justified in view of the heart's ability to compensate. The main enemy of the heart is acute rheumatism and streptococcal infections generally (scarlet fever, tonsillitis), and other conditions predisposing to endocarditis have been mentioned. Curiously enough, rheumatic fever is now a rather rare disease, although this may not be so strange when we consider the statement in a pre-war text-book that it is "relatively an uncommon disease amongst the well-to-do, and evidence is being brought forward that overcrowding in damp houses is the biggest factor of all." Higher standards of living and the much-abused Welfare State have, there can be little doubt, brought about this result.

The valves of the heart are the pulmonary, the tricuspid, the mitral, and the aortic, and each valve may be damaged in one of two ways—by narrowing, so that the blood cannot easily be forced through, or by leaking, so that the blood pumped through slips back again. The first is known as stenosis, the second as regurgitation, and when one or more of the valves are damaged in either way the heart, as we have seen, first tries to compensate. For example, in incompetence of the aortic valve between the left ventricle and the aorta, the blood is pumped out, but since the valve cannot close properly, some of it slips back into the ventricle. In order to deal with this problem, the ventricle becomes greatly enlarged, but, if this action fails, the increased pressure in a chamber which is unable to empty itself completely is passed back through the rest of the circulation. The left auricle overfills, the lungs become congested, and finally the right side of the heart is affected, ultimately leading to varying degrees of heart failure.

Since rheumatic fever is no longer so common as it once was, and diphtheria and chronic syphilis are equally rare, the most usual sequence of events today is as follows: a child or young adult develops a streptococcal sore throat, which may simply clear up without more ado, as it does in the vast majority of cases. But sometimes the infection is followed within about ten days by pains moving from one joint to another, and this, too, clears up shortly. A similar episode may follow at a later date, and, still later, it may be found that these apparently unimportant events have damaged the heart; the damage may be discovered accidentally at a routine medical examination or because the patient complains of breathlessness or some other symptom.

This, rather than the more dramatic form which was once so common, is the way that, in these times, rheumatic disease manifests itself. It has long been known that rheumatic fever was associated with streptococcal sore throat, but it is now clear that acute rheumatism is not a simple infection; for streptococci are never found in the heart or in the joints. Apparently, it is a condition in which the individual has become allergic to the toxins of the streptococcus, which then damage the joints, the heart muscle, and the valves.

Irregularities of the Heart-beat.

Like other muscles in the body, the heart cannot move without messages being passed to it from the nerves, but the nerves supplying it belong to the automatic nervous system. The vagus nerve, belonging to the parasympathetic system, slows the beats, and the sympathetic nerves quicken them. Both these groups of nerves meet at the point where the great veins enter the heart at the right auricle, and this point is known as the pacemaker; from there, they send impulses around the auricles and meet again at the auriculo-ventricular bundle at the junction of auricles and ventricles; lastly, they pass down between the ventricles, dividing into two bundles to supply both sides. Obviously, any sort of irregularity can arise: (*a*) in the lower centres of the brain, where the impulses originate; (*b*) at the pacemaker; (*c*) at the junction of auricles and ventricles.

Tachycardia means that the heart beats too rapidly, and this it does in many circumstances: after exercise, when emotionally excited, in fever when the temperature is raised, in chronic infections, or in anæmia. Rapid heart-beat is also found in thyroid disease. However, there can be little doubt that attacks of palpitation, as contrasted with prolonged rapid pulse, are nearly always due to emotional causes. Palpitation *can* be a symptom of heart disease, but most usually it is a sign of "nerves"; in the absence of other signs of heart disease such attacks can be assumed to be due to over-stimulation of the nervous centres in the brain which are concerned both with the emotions and control of the heart. An example of emotionally caused illness in a normal enough heart is what used to be called "*D.A.H.*" (*i.e.*, "disordered action of the heart") during the First World War and "*Effort syndrome*" during the Second. The commonest symptoms are breathlessness, palpitation, nervousness, dizziness, and pain over the heart—all the symptoms that would suggest heart disease to the layman. It is, in fact, a neurosis, pure and simple, and the abnormal impulses which cause the symptoms arise in the lower centres of the brain as the result of emotional tension.

When the irregularity arises at the pacemaker or in the auricles there may occur the not uncommon phenomenon of feeling the heart stop for a moment which is described medically as an *extra-systole*. They are commonly associated with disease of the myocardium in middle age, or, less frequently, in young adults, when they are (rather dubiously) asserted to be due to over-smoking. However, the most serious disease of this type is *auricular fibrillation*, in which so many impulses pass down through the auricles that they beat rapidly and irregularly and the ventricles respond to the shower of messages as best they may. Auricular fibrillation is usually a sequel to mitral stenosis, but can also result from hyperthyroidism and myocarditis. There is palpitation, rapid and completely irregular pulse (140–180 to the minute), and, ultimately, signs of heart failure. The treatment is with such drugs as digitalis and its derivatives or quinidine, which is a derivative of quinine. *Digitalis* is a drug, known for many years, obtained from the purple foxglove when the leaves are dried and powdered; it has the double effect of slowing the heart beat by acting on the brain centres, and strengthening the contraction of the muscle by direct action. *Stropanthin* acts in a similar way. Although digitalis and stropanthin are the main drugs used in heart disease, doctors are nowadays much more selective in using them; for it is evident that they are not helpful in all heart conditions. In fact, their main use is in auricular fibillation and congestive heart failure—in other conditions they do little good.

In *heart block* the trouble arises at the junction of the auricles and ventricles because the nerves which pass on the impulse have been damaged by one or other of the conditions described under the heading of myocarditis. When the block is complete the ventricles beat entirely independently of the auricles at a rate of about 30–40, and occasionally there are attacks in which the ventricles either cease beating for a few seconds or beat very slowly. This may be associated with attacks somewhat resembling epilepsy, known as the Stokes–Adams' syndrome. In partial heart block the ventricle misses a beat entirely—often every third or fourth beat. The treatment for both conditions is a matter for the specialist: digitalis is *not* used.

The Blood-pressure.

There are two types of raised blood-pressure, the type known as secondary hypertension (hyperpiesis), which is due to a number of diseases such as kidney disease and diseases of the glands, blood disorders such as polycythæmia, and hardening of the arteries, and the type known as primary or essential hypertension (hyperpiesia), which is not the result of illness elsewhere. In the treatment of secondary hypertension the doctor's attention will naturally be directed to the disease causing the raised

pressure, but essential hypertension, although it is extremely common, is not so easily dealt with. Its immediate cause appears to be a spasm of the arterioles, or small arteries, throughout the body. At first this is periodic, but later becomes permanent, with the result that the pressure remains raised. At one time it was supposed that such factors as septic areas in the body, tobacco, and a too rich diet played some part, but now it is fairly clear that essential hypertension is the result of two main factors: heredity and stress. What part each of the factors plays is unknown; for, although it is often found that relatives of the patient have suffered from the condition, this by no means proves that heredity is the cause. Obviously, someone brought up in a certain kind of mental environment will tend to adopt similar attitudes to those of his relatives, heredity or no heredity. Stress, then, is the most important factor in the sort of high blood-pressure which is not the result of another disease, but "stress" does not simply mean anxiety or fear (which, after all, have been common to most human beings throughout the centuries), and if anxiety in itself had the power to cause illness we should be in an even worse state than we are now. It seems that what matters is "bottled-up" emotional tension—worrying inwardly, which is quite consistent with not being at all consciously upset. In short, heredity may supply the sort of temperament which is prone to worry, but events cause the worry itself. The treatment of essential hypertension depends on its severity; in some cases drugs will help (for example, rauwolfia or "Serpasil" and some more powerful agents), but in others an operation which divides the nerves causing the spasm is necessary. Sedatives may also be used, but there is little evidence that dietary or other factors play any important part in essential hypertension.

Most people seem to believe that certain symptoms almost infallibly suggest the existence of high-blood pressure, but in point of fact there is no reason to suppose that any of these symptoms—headaches, giddiness, noises in the ears, lack of concentration or poor memory—indicate any specific condition, least of all high blood-pressure. Nor is it true that patients tend to be the broad, muscular, red-faced type they are so often imagined to be. By and large, hypertension is discovered largely by accident, and the sufferers are just as likely to be small, thin, and pale, as large, fat, and ruby-complexioned.

Low blood-pressure is not a disease at all, although like normal or high blood-pressure it may be found in association with other diseases. No treatment for low blood-pressure in itself is necessary.

DISEASES OF THE BLOOD-VESSELS.

Arteriosclerosis or "hardening of the arteries" is one of the commonest diseases. The aorta and the main blood-vessels become narrowed by the deposition of cholesterin, and the result is most evident in the coronary arteries supplying the heart muscle or in the arteries supplying the brain. The first may lead to degeneration of the heart muscle, the second to such symptoms as forgetfulness, confusion, and dizziness. Arteriosclerosis, like coronary thrombosis, may be due to stress, or, more probably, to a diet over-rich in cholesterol in those already predisposed by heredity. Arteriosclerotic changes happen to most people as they grow older, but not necessarily to a degree that makes them noticeable. The treatment is to regulate the diet, and lead a quiet, steady life.

Thromboangeitis Obliterans, or Bürger's disease, is a rather uncommon disease in which there is spasm of the blood-vessels and perhaps clotting which may lead to gangrene. It begins with cramp in the legs brought on by exercise, ceasing when the legs are rested, but afterwards there develops redness and a shiny appearance of the feet as the vessels become entirely blocked. The pain becomes severe and continuous, and may prevent sleep.

The disease appears to be due to an allergy to tobacco, and the patients are always heavy cigarette smokers. Treatment is rest in bed, and smoking should be given up; in severe cases it may be necessary to operate on the nerves causing the spasm, or, if gangrene has supervened, to amputate the affected part.

Extreme cold, as we have seen, can affect the tissues in the form of frostbite. But some people are particularly sensitive to even mild degrees of cold and suffer in winter from *chilblains*, which, although often described under the heading of skin diseases, are really connected with the circulation. People with chilblains should take plenty of nourishing food and wear woollen socks and woollen gloves in cold weather. Sometimes vitamin K, "Pernivite," or nicotinic acid have proved helpful.

In *Raynaud's disease* the response to cold is more dramatic, and the hands or feet become dead white during attacks. In a severe case the fingers, particularly, may later become blue or black, with severe pain or even gangrene. Occasionally the ears and nose are affected. Drugs may help, or it may be necessary, as in thromboangeitis obliterans, to cut the nerves producing the spasm. Persistent exposure to cold and damp leads to circulatory trouble in anyone, and *trench foot* was common during the First World War; its counterpart in the Second World War was "*immersion foot*" in men who had been drifting for weeks in open boats with their feet in bilge-water. Frostbite, trench foot, and immersion foot are more or less normal reactions to extreme cold; chilblains and Raynaud's disease occur only in those who are specially sensitive to cold, whose blood-vessels under its influence readily go into spasm.

Aneurism happens when the muscular lining of an artery becomes weakened and then the outer lining "blows out" like a balloon, forming a large swelling on the side of the vessel. This may be caused by injury, or strain, or arteriosclerosis, but in 95 per cent. of cases is due to syphilitic disease. Aneurism used to be very common, but is now rather unusual. It is treated by drugs or by operation.

Embolism and Thrombosis are closely associated with each other; for a thrombosis occurs when the blood in a vessel clots, and, if the clot is set free to pass through the system until it finally blocks some part of it, it is described as an embolus. This clotting ordinarily occurs when the blood flows over injured tissues, but may also occur when the inside lining of the blood-vessels have degenerated, or after an operation when the patient is lying in bed for a long period and the circulation is abnormally slow. It can also occur in cases of infection in a vein, which is known as *phlebitis*. If the clot stays in the original position, the blood-vessel is closed, and in the limbs there will be swelling due to the pressure in the vein beyond (obviously the degree of upset will depend upon the size and importance of the blocked vein—in the brain it may have serious effects in even quite a small vessel, in the leg, the blocking of a small vessel might not cause much trouble). However, if the blood clots in one of the large veins of the leg after an operation the result may be a *pulmonary embolism*, when the clot separates itself and passes through the blood-stream to the right auricle, and thence to the pulmonary artery, which it blocks, causing sudden death in someone who appeared to be getting on quite well. Nowadays this danger is much reduced by getting patients out of bed as soon as possible after a major operation.

When you think about it, you will realise that, although the heart can fairly easily pump blood down to the legs, it is not so simple for the blood to return. Having passed through the capillaries it is not just pushed back up the veins by the pressure from the heart—on the contrary, it has to be *massaged* upwards by the leg muscles during exercise. To avoid the blood falling back, the veins are provided with valves somewhat like those in the heart, which prevent the backward flow. Now, especially in people who have jobs involving long hours of standing or in women who have had a number of pregnancies, the congestion produced makes it even more difficult for the valves to operate effectively, especially if they are already not too competent, and *varicose veins* may develop.

In the early stages an elastic bandage or stocking may help, but, later, injections to produce clotting in the superficial veins, or an operation involving tying the main superficial vein at the inside of the thigh, may be necessary. *Varicose ulcer* is prone to develop just above the ankle because of the failure of the tissues to get a proper blood-supply. Apart from the measures already mentioned, it is important that people with varicose veins should stand as little as possible and should rest with their feet raised; this is much more important than ointments and bandages.

HEART SURGERY.

Only about sixty years ago an eminent British surgeon stated that "surgery of the heart has probably reached the limits set by Nature to all surgery; no new method and no new discovery can overcome the natural difficulties that attend a wound of the heart." He was, however, wrong; for new methods have made it possible to operate even within the chambers of the heart. Here it is only possible to describe briefly some of the processes which can be carried out. In stenosis, or narrowing of a valve, the heart can be opened and the valve stretched, or, if the valve is leaky, it can be replaced by an additional valve, a plastic ball covered with silicone rubber which stops the back-flow when the heart relaxes. Coronary thrombosis, too, can be dealt with either by scraping out the diseased lining of the arteries or by restoring the blood-flow from somewhere else by attaching to the heart a piece of tissue from the chest wall.

Of course, some of these operations are only in the experimental state, but they are perhaps of greatest interest in the case of blue babies—those children born with heart defects which, because the blood does not get properly oxygenated, cause them to appear blue or cyanosed, as a doctor would say. Such a child may be born with the main blood-vessels turned the wrong way round, with a hole connecting the two auricles or the two ventricles, with a narrowed pulmonary valve, or with other defects which greatly shorten the expectation of life. It is in such disease that surgery has proved most successful.

Some operations can be done without opening up the heart itself, but if this becomes necessary a serious problem arises; for if the circulation is interfered with for more than four minutes the brain (which is the most delicate organ of the body) suffers irreparable damage. The problem was partially solved by C. H. Bailey in the United States, when, knowing that if the body temperature is lowered the tissues need less blood, he conceived the idea of freezing the patient in a bath packed with ice. In this way the normal body temperature of 98·4° was reduced to 75°, which gave him exactly double the time—eight minutes—to carry out his operation. But eight minutes is not enough for all heart surgery, and other techniques have had to be devised to solve the problem of how to make the blood circulate whilst the heart is not working.

One method used with blue babies was the rather dangerous method of connecting the child's circulatory system with that of someone else (usually the father), so that whilst the child's heart was out of action the donor's heart and lungs took over. But such solutions are no longer necessary because, largely in America, machines have been devised which draw the blood from the heart, pass it through an artificial lung so that it becomes oxygenated, and return it to the body whilst an operation on the heart is carried out. The difficulty of devising such a machine was primarily that the blood must be oxygenated without any bubbles getting into it; for if this occurs one of the bubbles may get into the circulation and, passing to the brain, act as an embolus causing death or paralysis in the same way as a blood-clot. So the earliest type of machine drew the blood from the heart and passed it over a series of thin plates in chambers containing oxygen, but it has since been found that oxygen can be bubbled through the blood in the machine, the mixture allowed to settle, and any excess bubbles removed by passing through a reservoir coated with a substance long used by brewers for removing froth in the manufacture of beer.

Here is a summary of some facts people may wish to know about heart surgery.

The operations are dangerous, but new methods are making them safer. They are not carried out unless the existing condition creates more risk than the operation, and the death-rates of the more important operations are as follows: blue-baby operations, 20–25 per cent.; coronary artery disease, 10–15 per cent.; narrowing of valve, 5–10 per cent.

Needless to say, only a small number of patients with heart disease ever need surgical treatment, and in fact there are not many people of over forty who do not have "heart trouble" in some degree or another. Those who are operated on successfully are improved to a considerable extent, but this does not mean to say that they can afterwards lead a perfectly normal life; they will live longer if they take reasonable precautions. Operations on blue babies are ordinarily carried out because the patient would not survive without the operation, but surgical treatment of coronary disease, and valvular stenosis or incompetence, is still in the experimental stage; it is only carried out in fairly exceptional cases.

DISEASES OF THE RESPIRATORY SYSTEM

INTRODUCTION.

The respiratory system is concerned with taking into the body the oxygen which is necessary to life and getting rid of the carbon dioxide which is a waste product. It begins at the nose, which is intended (although not always used, since there are many mouth-breathers) as a filter and air-conditioner. The hairs in the nose keep—or are intended to keep—dust particles from the throat, and its sticky lining, warmed by the blood-vessels in which it is so rich, has the double function of removing the finer dust and germs and warming the air taken in.

After this process, the air passes down from the back of the nose to the space behind the mouth and then down the windpipe or trachea into the lungs. On the way it goes through the larynx or voice-box (above the trachea), which makes speech possible with its mechanism of vocal cords; the vocal cords separate during breathing in order to let the air through. Lastly, in the chest the windpipe divides to right and left and goes into the lungs; these main divisions are the bronchi, and within the lungs they subdivide, rather like the arterial system, into smaller and smaller tubes, known as bronchioles, which end up by entering the air-spaces of the lung tissue. There, in the thin, spongy spaces lined with blood-vessels, the breathed-in air gives up its oxygen to the blood.

The two lungs, right and left, lie within the chest attached to the bronchial tubes and the large blood-vessels. These are their "roots." They are, like the heart, covered with a double layer of thin, plastic-like material, the pleura (the part which is affected in pleurisy), and they contract and expand with the movements of breathing. But breathing is not carried out by the lungs themselves—it happens when the muscles between the ribs draw the ribs up and so expand the space within the chest that air is sucked in. Normally the pressure within the chest is less than that of the air outside, so that if the chest is punctured the lung collapses. This is important both in chest surgery and in certain conditions where, as we shall see later, it is desirable to collapse the lung in order to rest it. The left lung is divided into two portions or lobes, the right into three.

When one thinks of the nose, certainly if one thinks of it in medical terms, the first disease that comes to mind is the *common cold*, about which we know so much and yet so little. Colds are a virus infection which, even if trivial, cause considerable discomfort and much wasted time; but research seems to show that a great deal depends upon the type of person in whom the virus arrives. Thus people sent out in thin sports clothes to run for long distances in the rain and then made to rest in their wet apparel showed no special liability to catch cold, but it seems possible

that sudden changes of temperature may have some effect. For example, in America, where central heating in some areas is very hot and the weather outside may be very cold, nose infections are common.

Even more perplexing, however, is the fact that, like the judges we read of in the daily papers, we often have to ask: "What *is* a cold?" Everyone who has a running nose or even a temperature is not necessarily suffering from coryza, the scientific name for the common cold; they may have *allergic rhinitis*, similar to hay fever, which has no connection at all with infection. In this case the symptoms are produced by dust, pollen, or some other material to which the person is sensitive. Nasal discharge and temperature may also be brought about by *sinusitis*—that is to say, an infection of the spaces within the bone of the skull which communicate by small openings with the inside of the nose. These are the frontal sinuses just behind the eyebrows, the maxillary sinuses below the eyes, the ethmoid sinuses in the corner of the eyes on either side of the nose, and the more deep-seated sphenoid sinus right at the back of the nose. When these cavities are infected pus forms and naturally discharges into the nose, but if the lining of the nose swells up (as it does, for example, in a hot room) the openings into the nose may be blocked, the pus accumulates, and there is severe pain over the site of the sinus. Sinusitis may respond to the sulpha drugs or to antibiotics, but it is sometimes necessary to make a new opening into the nose and wash them out or to operate.

Whenever anything goes wrong with the nose, whether it be a virus infection an allergic irritation, or discharge from the sinuses, there is always a secondary invasion by germs which are the result rather than the cause of the trouble; the thick pus which comes from the nose in the later stages of a "cold" is largely due to them. There are no injections or inoculations against colds, but conceivably *some* of the many available may prevent colds getting worse by dealing with the secondary invaders; they certainly do not deal with the original cause, the virus. Capsules taken by mouth are, there is every reason to think, completely valueless, and, so far, the treatment of a cold is simply the treatment of the symptoms: aspirin relieves pain when it exists, it reduces the fever, and it does nothing else. Nor has whisky any special effect, although it is so often prescribed as a cure, but it probably has some effect on devotees in making a cold more bearable.

Hay Fever is an allergic condition due to hypersensitiveness to the pollens of certain grasses. Its symptoms have already been described so far as the nose is concerned (see allergic rhinitis), but there may be other signs of allergy, such as redness of the eyes and itching of the skin. Hay fever is helped by desensitisation with increasing strengths of the substance responsible; since cases occur mainly in May or June, the course of injections should be given early in the year. It usually has to be repeated each year. An alternative is the use of one of the antihistamine drugs, which seem to afford relief—but not cure—to many people.

Epistaxis. Another condition which is not really a disease in itself but may be a symptom of one is *epistaxis* or nose-bleeding. Bleeding may be caused by injury, by nose-picking in children (who frequently put beads or other small objects in their noses), by polypi (similar to varicose veins), and by a number of general illnesses, such as high blood-pressure, blood diseases, and fevers. It sometimes occurs in women during their periods and in people at high altitudes, flying or mountaineering. Usually no special treatment is necessary, but if the bleeding becomes troublesome a doctor will probably pack the nostrils with gauze soaked in adrenalin. In ordinary cases cold compresses and lying down should suffice.

Tonsils and Adenoids. The commonest operation in the whole field of surgery is the removal of tonsils and adenoids. Indeed, in some places, and notably in America, it was formerly almost a routine to advocate the operation when children reached the age of three to five. The tonsils, one on each side, lie at the back of the throat, and are easily visible when the mouth is opened wide; the adenoids cannot be seen, since they lie at the back of the throat behind the nose. *Acute tonsillitis* is usually, but not always, caused by the streptococcus, and it results in sore throat, high fever, and difficulty in swallowing. But, as we saw elsewhere, its main danger is that it may become chronic and cause damage to the heart and other organs. Tonsillitis responds to antibiotics and the sulpha drugs. Adenoids, when they become infected, swell to an extent which may cause difficulty in breathing and block the air passage between the nose and throat—the Eustachian tube—leading to ear infection or loss of hearing. This produces a typical facial expression: the child looks dull and listless, breathes through its mouth, which is therefore constantly open, and talks in the manner of someone with a cold. It must be remembered that this occurs only in severe cases, that most children have some trouble with their tonsils and adenoids in early life, and that after the tenth year the tissues tend to shrink, so that difficulties after that time are much less frequent.

Although the operation is still common, it is probably true to say that it is less commonly advocated than before. In part this is due to the new drugs, which can nip infection in the bud, but it is also due to the realisation that the tonsils and adenoids are there for a purpose, that they act as a barrier to infection from germs entering the nose and throat. However, when they are badly infected there can be no useful purpose in keeping them and many good reasons why one should not.

Laryngitis, Pharyngitis, and Bronchitis. One of the difficulties created by infections in the upper part of the respiratory tract—the nose and throat—is that they can extend downwards, causing laryngitis, pharyngitis, or bronchitis. In laryngitis the voice-box is infected, there is a tickling cough and difficulty in speaking; the vocal cords are swollen and red. (It should be added that the same symptoms may also be due to too much talking, to neurosis, and, so non-smokers say, to too much smoking.) In simple cases it may help to inhale the vapour of Friar's Balsam, a half teaspoonful to a pint of water, but in more persistent cases a doctor should be called. Chronic laryngitis is a matter for an ear, nose, and throat specialist.

In pharyngitis there is pain on swallowing, the lymph glands in the neck may be swollen, and there is a rise in temperature; ordinary cases will respond to aspirin and gargles.

Bronchitis, however, is another matter, although it is perhaps less common than is often supposed. Every cough does not signify bronchitis; for it may be laryngitis, *tracheitis* (*i.e.*, inflammation of the windpipe), or the result of what is popularly known as "catarrh," when discharge from the back of the nose trickles down the throat. Some coughs may even have nothing to do with the breathing system at all, for example, wax in the ear may stimulate the coughing centre in the brain and produce a cough which is stopped when the wax is washed out. Bronchitis is ordinarily found only in the very young, the very old, or as a complication of other diseases, such as measles and influenza; it is not caused by any one germ, and the bacteria found may be streptococci, staphylococci, and others—or more usually a mixture. Acute bronchitis is rarely dangerous in itself, but it can spread (if you recall the anatomy of the respiratory system) down the larger tubes into the smaller ones, and thence into the lungs, causing *broncho-pneumonia*. In broncho-pneumonia the parts of the lungs affected are those near the ends of the bronchi, so there are patches of infection scattered throughout the lungs, and this is quite unlike *lobar pneumonia*, which: (*a*) is caused by one kind of germ, the pneumococcus; (*b*) affects a whole lobe of a lung at one time; and (*c*) can happen to anyone, of any age, at any time. In any kind of pneumonia there is fever, breathlessness, and ordinarily the disease responds to penicillin or the sulpha drugs. Lobar pneumonia, when untreated by the new drugs, used to show a "crisis" in seven to ten days—the temperature suddenly went down; in broncho-pneumonia

there is no crisis, but it is equally responsive to the new drugs.

Chronic Bronchitis is typically a disease of the old, or at any rate of those in later life. It is something which is always " there," but becomes worse in winter, in cities where there are fogs, in children with adenoids, and in older people who work in occupations where they are exposed to dust. Chronic bronchitis develops gradually as the result of many previous attacks and, since the lung tissues sooner or later become involved, are no longer elastic, and show *emphysema* or degeneration of the spongy substances which absorb oxygen, it would be wrong to pretend that there is any cure. People with chronic bronchitis may be helped by certain drugs, but they are not cured when irreversible changes have occurred. In this case, a large part will be played by cough mixtures, and it is important to realise that these are of two types: sedative and expectorant. A sedative mixture is intended to stop irritation which is useless, and does not perform the function of a cough in bringing up secretion. For instance, in laryngitis there is an irritating cough which is simply caused by stimulation of the tissues when there is no secretion to get rid of, and in this case it would be reasonable to give medicine which stops the cough, but when secretion is present it has to be removed, and here one has to take some drug which will make one cough more effectively. A stimulant mixture is one designed to liquefy the sputum and help to get it out of the system. (Incidentally, one of the best—even in these days of " wonder drugs "—is the solution of common salt used in Brompton Chest Hospital.) There are numerous good means of suppressing coughs, but probably very few good expectorants, although each patient swears by his own special mixture; and he may be right.

If lung or bronchial disease has been present for some time there may develop certain degenerative changes, such as *bronchiectasis* or *emphysema*. In bronchiectasis the bronchial tubes become dilated, first of all in a single lobe of one lung and then elsewhere, with the result that the stagnant and infected secretions are retained very largely within the chest, damage further the bronchial linings and the lung tissue, and end up in a vicious circle: pus accumulating, bronchitis, more pus, and more bronchitis. All the signs of chronic bronchitis are present, but what is typical is the large amounts of foul-smelling pus which are brought up. Bronchiectasis is a serious disease, but the antibiotics and the sulpha drugs have improved the outlook, and lung surgery (lobectomy or removal of a lobe and pneumothorax or collapsing of the lung) is also used in suitable cases. In emphysema the deterioration takes place in the lung tissue, and if you recall that the lung is the place where the oxygen of the air taken in meets the blood within the internal surfaces, you will see that the amount of surface available is of great importance. In fact, the normal lung internal surfaces are about the size—if they were spread out—of a tennis-court. But in emphysema the elastic tissue between the cells begins to give way, the surface available for oxygenising becomes smaller, and, as the walls of the cells collapse, so do the number of capillaries. In order to get the same amount of oxygen into the blood, the heart has to work much harder. So emphysema, like most chronic lung disease, leads to heart trouble—the heart has to work harder to get the blood through.

LUNG SURGERY.

Like heart surgery, lung surgery has greatly developed in recent years and is used in four main categories of disease: infections, cysts, tumours, and in wounds. Infection is mainly due to bronchiectasis and tuberculosis—although other infections may arise; cysts are not very common, and need not necessarily give trouble unless they become infected; tumours, if malignant, obviously have to be removed; and how a wound is treated depends on its severity. Generally speaking, the operations performed are: (1) drainage; (2) removal of part of the lung; or (3) collapse of the lung. *Drainage* is carried out when—as in the case of an abscess or infected cyst—there is an area containing pus, and the purpose of the procedure is to let the pus out. *Removal of part of the lung*, or in some cases a whole lung, is carried out where there exists bronchiectasis or tuberculosis or cancer limited to a particular area; clearly such an operation is serious, but the results today are good, although, of course, this depends in part upon the initial condition from which the patient was suffering. *Lung collapse* is carried out when infection is present, but it is thought that recovery might occur after a " rest "; for collapse means that the affected lung is put out of action and is not used for breathing. Collapse is carried out in various ways. In *pneumothorax* air is injected into the chest by a simple procedure, causing collapse; in *pneumoperitoneum* air is injected into the abdomen, with the same result, since by pushing up the diaphragm it causes collapse; in *phrenic nerve crush* the nerve supplying the diaphragm is crushed under a local anæsthetic where it passes through the neck. In more serious cases *thoracoplasty*—the removal of all or portions of the upper ribs—may be performed under a general anæsthetic.

Lung Cancer is one of the most obvious reasons for surgery, and as most people know by now, it has been established that there is some connection between lung cancer and tobacco-smoking. The facts, as known, are complicated, but some of the more important are these:

(*a*) Between the ages of fifty and sixty-four those who smoke more than twenty cigarettes a day have a death-rate more than twice as high as non-smokers (although not necessarily from lung cancer).

(*b*) Five moderate smokers die of lung cancer to every one non-smoker and fifteen or sixteen heavy smokers.

(*c*) It seems certain that other factors are important. For example, the death-rate from lung cancer is very much higher in cities than in the country, the incidence is higher amongst cigarette smokers than amongst pipe or cigar smokers. Diesel fumes and smog probably play a quite important part, and the considerable increase in cancer (which is, however, commoner in men than in women) runs parallel both with increased cigarette smoking and increased fumes from car exhausts—particularly Diesel fumes.

(*d*) As in the case of coronary thrombosis, we can see that it is not easy to analyse out the real cause of the trouble in lung cancer. We have to consider the soil—the person affected. Is there, perhaps, something within the individual which predisposes him to cancer, and that smoking merely determines *where* he will get it? We do not know, but it is a possibility.

There are few early symptoms and the condition is usually discovered by accident at a mass X-ray centre. Pain in the chest, loss of weight, and coughing blood are late symptoms. The only treatment, if the disease is found in time, is removal of the whole or part of the affected lung.

Asthma is a chest disease which we will discuss at this point, since it will serve to introduce the general problem of *allergy*, although other allergic diseases will be mentioned elsewhere according to the part of the body affected. The causes of asthma are mainly three: allergy, chronic bronchitis, and emotional disturbances, although in varying degrees they go together in any one person; there is a likelihood that allergy and emotional sensitivity are related and that in cases with bronchitis the patient may be allergic to his own germs. People may be allergic to all sorts of things: to pollens, feathers, and numerous particles present in the form of dust in any house or any city street; to foods such as shellfish, to penicillin, to injections given them at the doctor's, and a case was even reported from America in which a man got a divorce because he was allergic to his wife and developed a skin-rash whenever she embraced him! Asthma is simply one form of allergy, in this case affecting the bronchi, which go into spasm when the person comes into contact with the stuff to which he is sensitive. But allergy can affect the nose and eyes, as in hay fever, the

skin, as in dermatitis, the joints, and the bowels. In an asthma attack the patient finds it more and more difficult to breathe, his chest is widely expanded, and the main trouble is in breathing out. Such attacks often come on at night, and may occur almost daily, or as infrequently as one every few months. Although asthma is an allergic disease, the attacks are very often set off by emotional crises of rage or resentment. In some cases the emotional element is even more obvious, as when a woman allergic to roses developed an attack when shown into a room in which there was a bunch of roses on the table, which were, in fact, artificial! The immediate treatment for an attack is to give something which will relax the tubes, usually adrenalin injections or ephedrene taken as tablets by mouth. The long-term treatment is directed towards finding the substance to which the patient is sensitive and by a course of injections attempting to desensitise him. Unfortunately this does not always work, but in some cases antihistamine drugs may help. However, the trouble with asthma, as with other chronic lung diseases, is that when it has existed for some time changes occur which are irreversible, such as chronic bronchitis or emphysema. When this stage is reached the best that can be done (and it is a great deal) is nevertheless palliation.

Allergy is to be understood as a perversion of the normal body reactions towards certain substances—mainly, but not always, proteins. Such substances act, just as do the toxins of germs, as antigens: that is to say they cause the formation of counter-substances designed to neutralise their influence, and these counter-substances are known as antibodies. Normally, this takes place successfully within the blood, and when a second dose of the foreign protein gets into the body its effect is neutralised. But when, due to some unknown cause, this does not happen, the antigen, or foreign substance, gets into the body cells and causes the liberation of a poisonous chemical known as histamine. It is this which causes the symptoms in allergic diseases, and which is sometimes countered by the antihistamine drugs. In extreme and rather rare cases a person with this sort of disability may get an injection, and if there has not been sufficient time for antibodies to form, a second injection of a completely harmless stuff, such as a serum, may lead to sudden death. This is known as *anaphylactic shock.*

Allergy, then, is due to an inability to produce antibodies, and this, in turn, is the result of: (*a*) heredity—for such diseases run in families; (*b*) to the person's physical condition at the time; and (*c*) to emotional causes which can interfere with antibody formation.

DISEASES OF THE DIGESTIVE TRACT

INTRODUCTION.

The digestive tract begins at the mouth and ends at the rectum, where the waste products are excreted. The food taken in at the mouth is moistened with saliva secreted by the salivary glands, of which the largest are the parotid glands —they are the ones which become swollen in mumps. The smaller glands are the submaxillary (under the jaw) and the sublingual (under the tongue). The act of chewing breaks the food down and helps to mix it with the saliva. Saliva contains an enzyme called ptyalin, which starts the digestion of starchy foods, and the food thus reduced to a pulp passes down the œsophagus, a tube about 2 ft. long leading through the chest down to the stomach, where the main part of digestion begins. The gastric juice, as everyone knows, contains hydrochloric acid, which in concentrated form is a dangerous caustic and will burn holes in carpets or anything else if allowed to —as certain advertisers at one time were not slow to point out. Advertisements used to show the dreadful effect of the acid on a carpet, and invite the gullible to consider what would be the effect on the much more delicate stomach; the effect could, of course, be neutralised by "Biffo" or whatever was the name of the stomach powder. This, needless to say, is a piece of nonsense; hydrochloric acid in the stomach is important for digestion (although some seem to manage without it), and it exists in such a diluted state that it could not burn a hole in a piece of tissue paper. However, the details of this will be discussed later when we are talking about ulcers. Suffice it to say that the acid is intended to be there, and causes harm only when something else has gone wrong with the stomach.

Also in the juices secreted by glands in the stomach lining are the substances known as enzymes, which are found not only there but play a large part in all body processes. By bringing about chemical changes they make life possible, and we have already mentioned one, ptyalin, which functions in the saliva to break down starch into sugar. The word enzyme is derived from two Greek words meaning "in yeast," because the first enzyme known to Man was the one in yeast which breaks down starchy foods into sugar and, given time, as brewers and some less-respectable gentlemen know, into alcohol. In the stomach the main enzymes are pepsin, which further digests starches into sugar, and rennin, which curdles milk (essence of rennet obtained from the cow's stomach is the stuff used to make curds and whey). In the small intestine the food comes under the influence of the alkaline juices, secreted partly by the intestine itself and partly by the pancreas; the most important enzymes here are trypsin, which breaks down proteins, amylase, which continues the work of breaking down starches, and lipase, which breaks down fats.

The end result is that by the time it reaches the end of the small intestine all the food we have eaten, however varied, is broken down into very simple chemicals: the proteins into substances known as amino-acids, the fats into glycerine and fatty acids, and the starches and sugars into glucose. The fact that glucose does not have to be digested, and that carbohydrates generally are the fuel of the body give rise to the quaint notion that glucose makes you energetic (hence all the tablets, drinks, and so on containing glucose which, from the remarks made about them by advertisers, one might suppose to be the elixir of life). Unfortunately, although glucose is useful as a temporary food in those who cannot—as after an operation—absorb anything else, there are very few people who need any extra. Most of us don't need more energy; we need more brains to make use of what energy we have. A spoonful of glucose is no better and no worse than a couple of lumps of ordinary sugar or a slice of bread so far as giving energy is concerned, for the simple reason that all end up in the same way; as glucose.

After being thus broken down, the fatty acids and glycerine enter the lymph channels passing from the intestinal walls and so get into the blood and thence to the areas under the skin which give some ladies their "vital statistics" and many men and women their "middle-aged spread," but the amino-acids and glucose pass through a special system of veins, the portal system, to the liver to be stored until they are needed.

The small intestine includes the duodenum, which joins the stomach at the lower end, where there is a sort of valve known as the pylorus. The duodenum is about a foot long and continues into the jejunum and ileum, which together are about 23 ft. long. At the end of the ileum the small intestine joins the large intestine or colon, and this, at the right-hand lower corner of the abdomen, is the site of the appendix. Finally, the 5-ft.-long large intestine passes to the rectum, which is only 6 in. long and leads to the anus, the band of muscle which ends the digestive tract.

Later on we shall deal with problems of diet and nutrition, but at present it is more convenient to wend our way down the length of the alimentary canal and discuss the various diseases which can affect it. Little need be said about the teeth, since most people know about the principles of dental care, although they do not always carry them out with any degree of completeness. Briefly these are: brushing the teeth at least twice a day, but preferably after every meal; avoiding too much sweet food, and especially the kind of nauseous confections which stick to the teeth; and going to the dentist every six months. A *gumboil* is an abscess at the root of a tooth which causes the all-too-familiar swelling of the face.

The only first-aid treatment for this is the old one of heat applied outside, aspirin for pain, and hot mouth-washes. Sooner or later the dentist will have to be consulted.

Elsewhere we have mentioned *tonsillitis* and *pharyngitis*, and so far as this region is concerned the other "ituses" are *stomatitis*, a general infection of the mouth, and *glossitis*, an infection of the tongue. Stomatitis can be due to many causes: to a fungus infection common in babies whose mothers take insufficient care in the hygiene of feeding (this is known as "thrush"); to various other sorts of infection often predisposed to by malnutrition; and to certain drugs, such as mercury.

In thrush, white patches form within the mouth, but the condition can easily be treated by a doctor. The other types are usually characterised by a bad taste in the mouth, bad breath, excessive salivation, and sometimes by a burning sensation. Their treatment depends upon the cause, and they should therefore be referred to the G.P. Glossitis, too, may be the end result of many influences, and shows itself by some unusual appearance of the tongue: redness, soreness, white or black patches, or ulcers. Sometimes the patches are in a form resembling a map, which doctors with their irrepressible sense of humour—not always shared by their patients—describe as "geographical tongue." Sometimes, and paradoxically, the cause may be the use of penicillin, which, by killing some germs, encourages the growth of others; sometimes it is the result of oral sepsis. But all these conditions, if they last any length of time, should be referred to a doctor, especially in older people, and especially if ulcers are present. *Ulcers of the tongue, although they are often of little significance, may be serious, and it is not worth while taking risks.* The œsophagus, too, may be affected by a number of diseases usually characterised by pain or difficulty in swallowing. This is known as *œsophagitis*, and may be due to the passage of burning, hot, or caustic liquids. Or there may be paralysis of the nerves supplying the muscle, which also leads to difficulty in swallowing. But the most important disease which can affect this area is *cancer of the œsophagus*. It is estimated that about 1 per cent. of all cancer deaths are due to this cause, that it affects men more often than women, and ordinarily men between fifty and seventy. The symptoms are difficulty in swallowing and loss of weight. Until recently, the outlook in the condition was absolutely hopeless, and doctors and relatives had to stand helplessly by whilst the patient virtually starved before their eyes. But now advances in chest surgery make it possible for an operation to be carried out in which the diseased area is cut out, the stomach brought up into the chest, and stitched to the remaining part of the œsophagus. Still more recently, almost the whole œsophagus has been removed and replaced with a plastic tube. Of course, this can be done only when the disease is caught in time.

Often difficulty in swallowing or a sensation of choking is due to solely emotional causes. This is known as *globus hystericus*, and requires to be treated psychologically. Lastly, there sometimes develops in the œsophagus what is described as a *diverticulum*, which is to this area what an aneurism is to an artery: *i.e.*, it is a bulging out of the wall which creates a sac. A diverticulum does not necessarily cause trouble, but the larger ones do in three ways: (1) they collect food which every now and then comes back into the mouth; (2) they may become large enough to cause obstruction; and (3) they are likely when their contents become infected to cause lung disease. If they are at this stage the only treatment is surgery, in which the "ballooning" part is tied off at the base. The operation is obviously a major one, but recovery is almost invariable.

Peptic Ulcer is a name covering two separate conditions—*gastric ulcer*, which is an ulcer in the stomach, and *duodenal ulcer* in the duodenum. The immediate cause of ulceration is that the digestive juices have, for some reason or another, digested away a part of the wall of the tract. It appears that ordinarily, although the stomach can digest protein from outside, it does not digest itself, because there are chemicals in the lining—known tentatively as "anti-enzymes"—which neutralise the effect of the hydrochloric acid and the enzymes. Why does this protection break down?

This is an important disease because it is so common, and perhaps we had better have some facts:

(*a*) About 10 per cent. of all adults have had at one time or another an ulcer of the stomach or duodenum.

(*b*) Nearly 90 per cent. of these ulcers clear up by purely medical attention, without surgery.

(*c*) When people say they have "an ulcer in the stomach" they usually mean an ulcer in the duodenum. Only one out of twelve ulcers are in the stomach.

(*d*) The indications for operation are, in general: (1) when the ulcer is chronic and medical treatment has failed; (2) when there is severe bleeding caused by the ulcer eating into a blood-vessel; (3) when, as sometimes happens, the ulcer forms scar tissue which contracts and obstructs the passage of food; (4) when an ulcer perforates.

A perforated ulcer is one which has eaten right through the stomach wall, and in these circumstances an emergency operation is necessary, for the stomach contents pass into the abdominal cavity, causing *peritonitis*—*i.e.*, a septic infection of the peritoneum, the delicate lining which covers the abdominal organs as the pericardium covers the heart and the pleura the lungs.

Typically, ulcer pain is in the upper abdomen, comes on about half an hour to two hours (depending upon its site) after meals, and is relieved to a greater or lesser extent by alkalis or taking more food. The medical treatment consists in dieting on easily digested foods taken "little and often" so that the stomach is never empty but never full. Alkaline powders are usually prescribed by the doctor, and sometimes muscle relaxants such as atropine are used to relieve the spasm which is the immediate cause of pain. It cannot be too strongly emphasised that symptoms such as those described above if they persist for any length of time should be referred to a doctor. Self-treatment is very risky.

Operative treatment is designed to reduce the hyperacidity which causes the trouble. The two main operations performed are *gastrojejunostomy*, in which part of the jejunum is stitched to the stomach so that the alkaline juices of the small intestine can enter the stomach and partially neutralise the excess acid, and, much more frequent nowadays, *partial gastrectomy*. In this operation the part of the stomach which contains the acid-secreting glands—the lower three-quarters—is removed, the duodenum is closed, and the remaining quarter of the stomach is stitched to the small intestine. This operation is very successful, and only about 1 per cent. of cases have any further symptoms. Finally, *vagotomy* is sometimes performed—*i.e.*, cutting of the vagus nerve, which passes down from the brain through the neck and chest to the stomach; for it is the impulses passing down this nerve which are responsible for the over-secretion of acid.

Why is peptic ulcer becoming so common? Most doctors would agree that it is one of the diseases caused by stress and the problems facing us in an age of anxiety. It is more common in industrial communities than in peasant ones and in people whose work is a source of worry—who are continually tense. There is no reason at all to suppose that irregular meals and the other dietary reasons often given have any influence in producing an ulcer, although one must, naturally, be careful about these when an ulcer is present. Duodenal ulcer is common in the fairly young and fit, stomach ulcer in the old and poorly. For some reason, although duodenal ulcers almost never become malignant, about 10 per cent. of stomach ulcers do so, even although there may have been no previous history of dyspepsia.

Cancer of the Stomach is found most frequently in men between forty-five and sixty. The pain of cancer tends to be constant rather than periodic, and there is increasing loss of weight and

anæmia. Operation is necessary, but the outlook is good if the condition is discovered in time. There would be much less risk of cancer getting beyond the stage where operation can help if people with "indigestion" lasting any length of time would put themselves immediately under medical care with periodic check-ups. A curious feature of cancer of the stomach is that hydrochloric acid is completely absent.

Gastritis means inflammation of the stomach lining: it may be acute or chronic. In acute gastritis eating too much food or eating unsuitable food in a person with a sensitive stomach may lead to symptoms, but the most frequent cause is too much alcohol. The symptoms, in general, are those of a "hangover": headache, depression, loss of appetite, and, as P. G. Wodehouse puts it, "a feeling that you're going to die in about five minutes." In more severe cases there may be a raised temperature and diarrhœa. The treatment is to avoid irritating the stomach further, to eat only as much bland food as one feels inclined to, and to take some alkaline medicine—"fizzy" salts are suitable for this. Since "gastritis," strictly speaking, refers to any form of irritation of the stomach lining, it can also be applied to serious conditions, as when poisons such as strong acids or other corrosives are swallowed, intentionally or otherwise. Here we are discussing only the condition which is ordinarily understood when the word is used.

Chronic gastritis, although it may be associated with kidney, lung, heart, or blood diseases, and with diabetes, is usually the sequel to frequent attacks of acute gastritis. Here, again, the appetite is poor, there is depression and a feeling of discomfort rather than pain after taking food. Headache, flatulence, and vomiting or nausea in the morning are common features. Although one is inclined to picture the case of chronic gastritis as typically a retired colonel from India or some other tropical spot who has subsisted for years on curries and alcohol, there is no reason to suppose that curries have anything to do with it. Even alcohol can be taken in large amounts without doing any harm (except to one's pocket!) provided it is taken diluted and with meals. In fact, many elderly ladies of irreproachable character suffer from chronic gastritis, and it is well to remember that strong tea taken too frequently causes red noses more frequently than strong drink. Chronic gastritis requires special medical attention.

Nervous or Functional Dyspepsia is a term used by doctors which means, first, that the condition is basically a sign of general neurosis and, as such, needs a psychological rather than a physical approach, and secondly, that no signs of organic disease of the stomach have been found on examination. This, of course, does not make the discomfort any easier to bear from the point of view of the patient. The symptoms tend to be different from the more or less cut-and-dried ones of ulcer: for example, flatulence and nervous vomiting are frequent. *Flatulence* is a gastric neurosis due to the habit of swallowing air; for no "gas" is formed in the stomach, and all that is brought up has previously been unconsciously, swallowed. Trying to "bring it up" as many people do to the distress of those near by, only results in more air being swallowed, so the desire should be resisted. *Anorexia nervosa* is another gastric neurosis in which the patient refuses to take food or vomits it up when it has been taken. In some cases even death may result from self-imposed starvation of this type, for which psychological treatment is necessary.

The end of the stomach where it joins the duodenum is known as the pylorus, a ring of muscle which acts as a valve and allows the partially digested food to pass from the stomach only when it is ready for further digestion by the intestinal juices. In newly born babies the pylorus muscle may be too thick or it may tend to go into spasm easily, with the result that food cannot get out of the stomach and is vomited up. This is known as *pyloric stenosis*, and is quite common in babies of two or three weeks of age—three times more frequently in boys than in girls. Without treatment the continued vomiting, which is very forceful in character, would lead to death through malnutrition and lack of fluids, but fortunately treatment is relatively simple. In some cases, injections of a drug to relax the spasm is sufficient, but more often an operation is necessary. A small incision is made under an anæsthetic, and the pylorus muscle is slit down its entire length (of course, only the muscle fibres are cut, not the inner lining of the stomach). The operation is very safe, and the wound heals within about a week, after which the infant has no further trouble.

The small intestine can be affected by a number of diseases, although much less frequently than the stomach and duodenum. Here we shall mention only two of the more common conditions: regional ileitis and intestinal obstruction.

Regional Ileitis is an inflammation of the small intestine frequently found in young men and women. The cause is unknown, but it leads to ulceration and small perforations which cause adhesions between the affected area and other parts of the small intestine. Such a condition requires surgical treatment, which usually takes the form of short-circuiting the diseased area and joining together the healthy ends of the loop. Sometimes the diseased area is cut away altogether and the healthy end joined to the large intestine. By this means the vast majority of cases can be cured.

Intestinal Obstruction can be caused by a tumour, by a loop of intestine becoming twisted on itself (volvulus), by the bowel being caught in a hernial sac, or by the contraction of old adhesions. Here, too, the surgeon will either by-pass the area or if the intestine has become damaged and gangrene has set in he will remove the whole of the affected part. Acute (*i.e.*, sudden) obstruction is a surgical emergency, and if an operation is not performed death will occur in a few days. The symptoms are severe colic, profuse vomiting, distended abdomen, and collapse; no bowel motions are passed. Chronic obstruction, in which the blockage is gradual, is usually due to a tumour; the symptoms are periodic attacks of vomiting, constipation alternating with diarrhœa, and loss of weight.

In children, *intussusception* is not uncommon, especially in boys under the age of two. Here one part of bowel becomes telescoped into another, leading to colic and the passage of motions consisting of blood and mucus. Later there will be vomiting and collapse. Operation, of course, is necessary.

Constipation. Here, perhaps, we had better mention the question of constipation, about which so many people hold such pronounced views. They believe that constipation is the root of all evil, that it causes a mysterious condition known to them (although, alas, not to doctors) as "auto-intoxication." Sedulously fostered by the manufacturers of patent medicines, their beliefs range from the notion that headaches, spotty skin, muddy skin, and tiredness are caused by constipation, to the more extreme idea that the whole system is being poisoned and that, if the bowels do not work, the individual will shortly die. Of course, all this is the merest rubbish; for, as Professor Samson Wright, whose *Applied Physiology* is one of the most famous of medical text-books, has pointed out, there is no such thing as absorption of poisonous products from the bowel. There is no such thing as "auto-intoxication." "The symptoms of constipation," he writes, "are largely due to distension and mechanical irritation of the rectum." It has been shown that an enema removes these symptoms *immediately*, which would not be the case if they were due to poisons in the blood, and exactly the same symptoms can be produced by packing the rectum with cotton-wool. Wright mentions the case of a man who went for just over a year without a bowel motion, and at the end of that time, although his abdomen was distended and he felt some discomfort, he was not noticeably ill. Needless to say, telling these facts to the purgative addict will only make him annoyed, but it is as well to note that if no known diseases are due to constipation (although constipation may be a symptom of another disease), the regular use of purgatives *can* cause disease.

Constipation should be treated first by diet

containing plenty of roughage—bran and oatmeal are excellent—plenty of stewed and fresh fruits, and at least three pints of fluid should be taken daily. Failing that, one of the best things to take is "Senokot," a proprietary product prepared from senna pods. Never to be taken regularly are liquid paraffin, since there is some evidence that it may cause cancer, castor oil, preparations of aloes, Epsom salts, and all the other dreadful stuff that people swill down.

An extreme form of constipation is *Hirschsprung's disease*, which is found in children, usually males, and leads to constipation over long periods, so that motions may occur only every few months. The condition is probably due to spasm in the intestine, and can be relieved by an operation in which the nerves producing the spasm are divided.

Diarrhœa has already been discussed under the heading of infectious diseases, and the types due to infection will be found there. However, diarrhœa can be the result of other influences: food that "hasn't agreed" with one; certain poisons, such as mercury, arsenic, and purgatives; and to nervous tension. The treatment depends on the cause, but in mild cases a single large dose of castor oil is a good idea. This gets rid of whatever is causing the trouble (provided that it is not a serious infection or nervous diarrhœa we are dealing with), and it has a slightly constipating after-effect. Other mixtures given by doctors are chalk and opium or kaolin and morphia—the opium and morphia are in very small quantities.

DISEASES OF THE LARGE INTESTINE.

The large intestine consists of the colon and the rectum. If you put your hand down in the right-hand lower part of the abdomen, then you are covering the area where the small intestine meets the colon, and also where the appendix, a small, blind tube about 2 in. long, hangs from the beginning of the colon. Now move your hand upwards to the margin of the ribs, then straight across the abdomen at the level of the stomach and down the other side to the corresponding place on the left side from where you began. The path you will have mapped out is that of the colon, which, as the name implies, is much wider than the small intestine.

The colon is just as subject to disease as the stomach. In fact, Dr. Clark Kennedy says that most so-called indigestion "is not due to duodenal or gastric ulceration . . . but to disorder of the mechanics of the large bowel aggravated by introspection and *again and again by the misuse of aperients*" (the writer's italics). Irritation of the colon is known as colitis, and there are two types: ulcerative colitis and mucous colitis. As in the case of stomach and duodenal ulcers, mental factors play a large part, but, since not everyone with anxiety or who is under stress develops colitis, we have to assume that this condition, and indeed the other stress diseases, are caused by an interplay between hereditary disposition, certain physical factors not yet completely understood, and stress.

Ulcerative Colitis is a serious disease in which there is not only inflammation of the intestinal wall but also ulceration. The patient, usually an adult between twenty and forty, and most commonly a woman, develops diarrhœa, with passage of blood, pus, and mucus; there is an irregular fever, although no germs have ever been conclusively found to account for this. Sometimes the disease begins abruptly and ends in quite a short time in death, but more often it runs a course of many months in a milder form. Medical treatment, such as washing out the colon, may be used, and various drugs have been tried, and in about 75 per cent. of cases these prove adequate. But in the remaining 25 per cent. of cases operation is necessary. The operation performed is *ileostomy*, in which the end of the small intestine is brought out on the abdominal wall so that the motions pass out there, the colon is thus put out of action and can be rested. In about 10 per cent. of cases the ulceration heals and the small and large intestines can be joined up again by closing the opening on the abdomen, but more often the opening must be permanent. If, in spite of this, the bleeding and diarrhœa persist, the only possibility is to perform a *colectomy*—*i.e.*, to remove the whole of the colon. Although this is a large-scale operation, the recovery rate is well over 90 per cent.

Mucous Colitis is a less serious disease which appears to be almost entirely nervous in origin. As in the other type, there are attacks of diarrhœa, in which quantities of mucus and membranous material—actually parts of the lining of the bowel—are passed. There is no blood, and the treatment is medical, with sedatives and antispasmodics, drugs which relax the spasm in the colon.

Appendicitis is a disease which mysteriously became popular towards the beginning of this century. Appendicitis begins with pain over the stomach (*i.e.*, in the *upper* part of the abdomen, and not over the site of the appendix). The pain remains there for some hours and then moves to the right lower part of the abdomen; there is usually fever and sometimes vomiting. It is important to realise that in any case of abdominal pain purges should never on any account be given; in appendicitis particularly purges may lead to death from peritonitis. The treatment of appendicitis is nearly always surgical, but in a few cases antibiotics may be used.

Bleeding from the Rectum is a common symptom which may be due to a number of causes: hæmorrhoids, dysentery, typhoid, some blood diseases such as purpura, and tumours. Bleeding from a gastric or duodenal ulcer leads to black motions or *melæna*. The blood in this case is black because it has been changed in its passage through the digestive tract, and although black motions may result from harmless causes—*e.g.*, when iron-containing medicines are being taken—it should always be referred to a doctor. In fact, any bleeding from the rectum should be investigated.

Visceroptosis occurs when the bands of tissue holding up any of the abdominal organs begin to sag so that the organs sink downwards. The symptoms are vague: dyspeptic tendencies, constipation, and a general feeling of being unwell. Although it often occurs in young women who have had too many pregnancies too quickly, there is a large neurotic element involved. Treatment is directed towards the neurotic condition accompanied by exercises and perhaps the use of an abdominal belt to support the sagging muscles.

Cœliac Disease. Some children are born with an innate difficulty in absorbing fats from the small intestine. They suffer from diarrhœa, in which large quantities of partly digested fats are passed from the body. The passage of fats in this way is known as *steatorrhœa*, and the disease is described as *cœliac disease* (Gee's disease), or, if it occurs in the tropics, *tropical sprue*. Adults, too, may suffer from the disease, but in children the important factor is that the disease is also associated with defective absorption of iron and calcium, so they tend to become anæmic and may develop rickets. It is necessary to give a fat-free diet, vitamins and calcium, and plenty of protein. "Sprulac," which is a dried defatted milk powder, is frequently given. The condition may go on for years, but the outlook is quite good. Tropical sprue is not caused by living in the tropics, but tropical conditions may bring out a latent tendency to steatorrhœa.

Diverticulitis. In diverticulitis an inborn weakness of the large intestine leads to weakness of the muscular wall of the large intestine, and through the weakened areas the mucous membrane or lining of the bowel pushes through. Probably at least 5–10 per cent. of all people have some diverticulæ, but they give trouble only when they become inflamed through some of the fæcal contents of the intestine getting trapped within them. There is pain, usually in the left lower part of the abdomen, slight fever, and general abdominal tenderness. Diverticulitis can usually

be treated by dieting, rest, and antibiotics or sulpha drugs. The vast majority of cases can be dealt with in this way; but if they do not respond, it may be necessary to remove the affected area.

Cancer of the Large Intestine. The large intestine is one of the commonest sites for cancer. The symptoms, which usually occur from forty to sixty, are twice as common in men as in women, and, in general (although this depends upon the part of the colon affected), they are: passing of blood from the rectum, loss of weight, anæmia, and increasing constipation. Pain occurs as the obstruction increases, and finally the signs of acute obstruction already described make their appearance. Fortunately, symptoms usually appear early in the disease, so it can frequently be caught in time. Surgery is the only remedy, and in early cases may be done in one stage by removal of the affected part, but if obstruction has begun it is necessary to perform an operation—*colostomy*—in which a part of the intestine, as in ileostomy, is brought out on to the abdominal wall, so that the fæces discharge from the side of the abdomen instead of through the rectum. This operation is followed a few weeks later by removal of the part containing the tumour.

Hernia. The body, unfortunately, is supplied with many weak areas in the abdominal wall and elsewhere through which structures such as the intestines can thrust their way to where they are not supposed to be. This condition is known as hernia. There are numerous different types of hernias; for example, they may occur in the canal below the groin through which the large blood-vessels pass back and forth between the legs and abdomen or in the larger inguinal canal just above. They are also found at the umbilicus, a weak area through which before birth the child was supplied with all its needs from its mother's circulation, or right in the middle of the abdomen below the umbilicus, where the two bands of muscle which form the abdominal wall come together but often leave a weakness in between. There may also be hernias internally, or in the diaphragm, or over the site of an operation scar. In the groin we speak of *inguinal hernia*, in the area where the vessels pass between abdomen and legs slightly below the groin we speak of *femoral hernia*, at the umbilicur, *umbilical hernia*, and between the two abdominal muscles, *ventral hernia*. A *diaphragmatic hernia* is one in which the stomach pushes its way into the chest through a weak part of the diaphragm.

Hernias may occur at any age, and indeed many children are born with them. In later life they are generally caused by a combination of developmental weaknesses in the area concerned, flabby muscles, and sudden strains, such as lifting heavy weights. The main danger from a hernia, apart from its inconvenience, is that it may become *strangulated*—that is, a part of the intestine may become caught in the hernial sac, and becoming filled with intestinal contents, swell up and be unable to escape. This causes all the symptoms of intestinal obstruction and has to be treated as an emergency, or else gangrene of the part which is caught and possibly peritonitis will occur.

Although many people, fearing surgery, wear a truss—that is a belt which by pressing on the part keeps the weak area compressed—there is no doubt that hernias, except in the old and infirm, should be operated on. No matter how comfortable the truss may be, it is a continual nuisance and interferes with many activities, such as swimming; nor are trusses always adequate in performing their function. The operation involves replacing the herniated organs back into the abdominal cavity, removing the sac of peritoneum (*i.e.*, the thin lining of the abdomen which has been pushed out by the organ), and then repairing the muscle wall where it was weakened. The main sign that a hernia exists (at least so far as femoral, inguinal, umbilical, ventral, or scar hernias are concerned) is a soft swelling over the place where the weakness exists. Unless strangulation occurs, there need be no other symptoms. But any bulge in the groin or upper thigh or, indeed, anywhere, should be immediately referred to a doctor.

Cancer of the Rectum. The rectum and anus are afflicted by two common diseases: cancer of the rectum and hæmorrhoids. In cancer of the rectum the symptoms are similar to those described under cancer of the large intestine. Operation is imperative as soon as possible, and it is usual to remove the anus, rectum, and the lower part of the colon, subsequently creating a permanent colostomy.

The anus, the last inch of the intestinal canal, is a sphincter, a band of muscle which controls the exit of fæces from the bowels. In addition to hæmorrhoids, the anus may be the site of fissures (*i.e.*, ulcers of the lining), fistulas (abnormal tracts leading from the lower rectum to the skin), and polyps (non-malignant growths). *Fissures* are elongated ulcers rather like a crack in the mucous lining which cause pain every time the bowels are moved. They tend, if untreated, to get deeper and more inflamed. Treatment is surgical, by cutting the sphincter muscle to allow relaxing and healing. A *fistula*, as has been mentioned, is an abnormal channel between the lower rectum and the skin—*i.e.*, it comes out somewhere around the anus. Nearly always it is the result of a previous infection, such as a boil or abscess, in the region of the anus. The treatment is surgical, as a fistula rarely clears up by itself. The channel is opened and cleared out, then packing is put in to enable it to heal from the bottom up. *Polyps* may vary in size from a pea to a golf ball, and the first sign may be fairly severe hæmorrhage from the rectum. Sometimes there is no bleeding, but the polyp suddenly appears protruding from the anus after a bowel movement. It is painless, and not in itself serious, but should nevertheless always be removed (this can often be done by cauterising without an anæsthetic), since some authorities believe that such growths may become cancerous.

Hæmorrhoids are simply varicose veins in the rectal and anal regions. They are very common, and are caused probably in about equal degrees by inherited weakness of the veins, strain such as heavy lifting, and constipation (this is one of the very few conditions in which constipation may do some damage, due to the mechanical pressure of hardened fæces in the rectum on the veins). Pregnant women are liable to develop hæmorrhoids or "*piles*," as they are commonly called, owing to the pressure of the baby's head in the pelvis. Hæmorrhoids may be external or internal, the former being in the anal region below the sphincter, the latter in the rectum; the two usually go together. There may be no symptoms, but the veins are liable to bleed, to get thrombosed (*i.e.*, a clot forms within) or to become infected. When clotting or infection occurs the piles enlarge and tend to be pushed out through the anus during defæcation, when they form extremely painful external swellings. Treatment in simple cases may be by the use of suppositories—cones of a firm grease containing suitable medicaments which are inserted in the rectum—in other cases the veins may be injected, as with varicose veins of the leg, in order to close them, but when there is much bleeding, thrombosis, infection, or interference with bowel movements they should be removed surgically.

DISEASES OF THE LIVER AND GALL-BLADDER.

The functions and site of the liver have been described elsewhere, so no more need be said about these. Presumably the most common associations of the layman in relation to the liver would be the two words "liverish" and "jaundice." Feeling *liverish*, one gathers, produces a sort of sensation like a hangover (which it frequently is), but there is no medical term corresponding to the word, nor is there any reason at all to suppose that it has anything whatever to do with the liver. Most likely it is an attack of mild gastritis, and should be treated as such.

Jaundice is easily recognised by the yellowish skin, the degree of colouring depending upon the severity of the case. In mild cases it may only be

noticeable in the whites of the eyes. Less well-known symptoms of jaundice are itching of the skin, dark-coloured urine and pale motions, depression, loss of appetite, and tiredness. Jaundice, however, is not in itself a disease; rather it is a symptom of many diseases, amongst which some of the commonest are:

(1) Blockage of the bile ducts, which normally carry the bile and its pigments into the intestines (it is the pigments which produce the yellow coloration). The blockage may be caused by gall-stones, parasites, tumours, or in the liver itself when cirrhosis is present. The bile pigments, unable to get through the duct into the intestine—hence the pale motions—pass backwards into the blood-stream and are filtered into the urine, which therefore becomes stained, and into the skin. This is known as *obstructive jaundice*.

(2) *Infective jaundice*, on the other hand, results from various types of organism such as spirochætes and viruses. Examples are infective hepatitis, spirochætal jaundice, yellow fever, malaria, and some cases of syphilis. Certain poisons, such as chloroform, arsenic, phosphorus, and snake venom, can also cause jaundice, which in this case is due to damage to the liver.

(3) *Haemolytic jaundice* is found in some blood diseases, such as pernicious anæmia, acholuric jaundice, and blackwater fever. Its immediate cause is breaking down of the red cells at a rate too rapid for the liver to absorb the products.

The treatment of jaundice depends entirely upon its cause. The infective and hæmolytic types have already been dealt with under infectious diseases and diseases of the blood respectively, so it only remains to deal with obstructive jaundice, and this leads us to the subject of the gall-bladder and *gall-stones*. Doctors in their perverse way refer to inflammation of the gall-bladder as *cholecystitis* and to the condition of having gall-stones as *cholelithiasis* (just as Americans refer to typists as "stenographers" and lifts as "elevators").

The gall-bladder is pear-shaped and lies below the liver. It ends, at the "stalk" of the pear, in a tube called the cystic duct, which enters the main bile duct passing from the liver into the beginning of the duodenum. Bile is essential to the digestion of fats, and when a meal is eaten a supply of dilute bile moves down the main duct from the liver, whilst more concentrated bile is squeezed into the same duct from the gall-bladder. The bile, both dilute and concentrated, then enters the duodenum to do its work. In cholecystitis, which may be acute or chronic, the walls of the gall-bladder become infected, usually by streptococci or the bacillus coli, and severe pain develops over the liver area, typically spreading back to the right shoulder-blade. If the infection becomes worse and pus is formed there may be a high fever. Gall-stones may, as some physicians believe, be the aftermath of such an infection, although others think that they are formed because of some defect in the ability of the body to deal with fat and cholesterol. In any case, gall-stones are formed in the gall-bladder, and may number anything from one or two to several hundred; their size varies from that of a grain of corn to that of a golf ball. Stones may be present without causing any trouble at all, but usually sooner or later the following symptoms develop: indigestion after eating fatty foods, heartburn, nausea, and attacks of pain. The pain of gall-bladder disease, whether in the case of simple infection or gall-stones, is more or less the same—over the gall-bladder area and passing to the right shoulder-blade. Such pain signifies either infection, which, of course, may occur without stones, or else that a stone formerly lying quietly within the gall-bladder has passed into the bile duct and got stuck.

Typically, gall-bladder disease is found in men and women in middle age, but it is three times commoner in women. As an aid to examinations, students are told (or used to be told) that the typical case is a woman who is "fat, fair, forty, and fertile," for there can be little doubt that pregnancy plays some part in upsetting the secretion of bile in some people. But it is also entirely possible for thin men to develop the disease, so there is no general rule.

When the stone blocks the cystic duct (*i.e.*, the one leading from the gall-bladder to the main duct) there is pain, which may be relieved when the stone either moves back into the bladder or passes into the main duct. The next problem is whether it can negotiate the opening of the main duct into the intestine; for if this duct is blocked *none* of the bile can escape and, passing back into the blood-stream, it produces jaundice.

Operation is necessary when acute inflammation is present, when there are frequent attacks of severe colic and other symptoms causing discomfort, or when jaundice is present. Drugs can cause only temporary relief when a gall-bladder becomes troublesome. There is no such thing as a drug which dissolves gall-stones.

The liver may be the site of cancer, but this is nearly always secondary to cancer elsewhere. Primary cancer, that is cancer originating in the liver, is not common. So, too, the liver may become enlarged, sometimes very considerably so, as a result of events elsewhere in the body: heart failure, leukæmia and other blood diseases, and even rickets can cause enlargement. In the liver itself enlargement may be due to cancer, cirrhosis, abscesses, and cysts (the former usually caused by amœbic dysentery, the latter by parasitic worms; both of which are described elsewhere). Abscesses are usually aspirated—which means that a needle attached to a syringe is passed in and the pus drawn off—cysts have to be surgically removed.

Cirrhosis of the Liver is a condition in which more and more of the liver cells become replaced by fibrous tissue. Now, as we have seen, the whole portal system which carries away the end-products of digestion passes into the liver, so when the liver becomes fibrosed there is serious obstruction to the portal circulation, leading to back-pressure in the veins, and therefore the liquid part of the blood, the plasma, oozes out through the walls into the abdominal cavity. This is known as *ascites*, and it is also found in some cases of heart failure, kidney disease, and chronic peritonitis. Usually the fluid is removed by tapping the abdominal cavity in the same way that one removes pus from a liver abscess.

Cirrhosis is always a serious disease; for, although Nature is so generous as to give us 80 per cent. more liver than we need to preserve life, the common type of cirrhosis extends right through the liver, and the secondary effect of portal obstruction with ascites complicates the matter. The disease is generally associated with alcoholism, especially in those who drink large quantities of spirits (there are other rare types of cirrhosis which need not be mentioned here); but the problem is more complicated than might appear, for everyone who drinks to excess does not develop cirrhosis. In fact, cirrhosis is not at all common, and some seem more liable to it than others. It is believed that another unknown factor is involved and the disease is not due solely to alcohol as such.

Symptoms are: chronic gastritis, morning sickness, constipation. Later, when the portal system has been seriously obstructed, large veins are seen on the abdominal wall, especially around the umbilicus. These develop in an attempt to compensate for the blocked portal circulation. Ascites and slight jaundice are later symptoms. Treatment is a matter for the specialist, but obviously alcohol should be banned. Recently, an operation has been devised in which the portal vein, instead of going to the liver, is sutured to the *vena cava*—the largest vein in the body, which passes up the centre of the abdomen just in front of the backbone on its way to the heart. This operation is known as *porto-caval shunt*.

The Pancreas.

This is a soft, elongated gland lying behind the stomach; it is about 5 in. long and 2 in. wide. Within its tissues lies the duct, which, when it leaves the pancreas, passes into the duodenum near the point of entry of the bile-duct. This

duct transmits the juices containing enzymes which aid in the digestion in the small intestine. The pancreas, however, has two main functions: not only does it manufacture these important digestive juices, but in certain specialised areas, known as the islets of Langerhans, it manufactures insulin. The functions of insulin will be discussed shortly when we are dealing with diabetes.

Like the liver, the pancreas may be the site of cysts or tumours. The only other condition which need be mentioned is *acute pancreatitis*. This is a not very common disease which is caused by a small gall-stone becoming stuck in the opening of the duct. When this occurs, bacteria come in to infect the pancreas, and the blocking of the duct prevents the digestive juices from leaving, with the result that the organ is digested by its own enzymes. There are all the signs of an acute abdominal disturbance: sudden severe pain, vomiting, and fever. Pancreatitis is difficult, even for the expert, to diagnose, and formerly was always treated surgically, but today it is often possible to clear it up with medical treatment and the use of penicillin or other antibiotics.

Diabetes. Although we know so much about diabetes, we still have not the faintest notion as to what causes it. Its immediate cause is a failure in varying degrees of the pancreas to produce insulin, but examination of the pancreas rarely reveals any significant changes. The disease is commonest between thirty and sixty years, but may occur even in children. Now, insulin is the substance which makes it possible for the body to make use of sugar—the glucose which is the end-product of carbohydrate digestion. So in its absence the glucose, although there to be used, is useless to the body and accumulates in the blood, finally passing out in the urine. (The fundamental test for diabetes is the discovery of sugar in the urine by the use of certain simple procedures.) The diabetic, then, is being starved of sugar no matter how much he takes in, and the excess sugar in the blood which cannot be used acts as a poison, which, in extreme cases, sends the patient into coma and may—indeed, in former times, usually did—result in death. The symptoms of diabetes vary, of course, with its severity, but in the main they are: increasing appetite in an attempt on the part of the body to supply the sugar which is there but so tantalisingly unavailable, great thirst, because this useless sugar has to be excreted, and the production of urine demands water, frequency in passing urine, and increasing loss of weight in spite of all that is taken in. In severe and untreated cases boils, itching of the skin, gangrene of the limbs, and finally coma and death may occur.

Although mild cases of diabetes could, and still can, be treated by dieting alone, by reducing the intake of carbohydrate, the diagnosis of diabetes prior to 1922 amounted almost to a death-warrant. In that year, however, the Canadian physicians Banting and Best separated out the secretion of the islets of Langerhans and named it "insulin"; they showed that insulin taken from the pancreas of animals and injected into the diabetic patient was just as effective as the home-made article.

Since a diabetic regime has to be decided on by the doctor according to the severity of the disease, no useful purpose would be served by discussing the details of diet or dosage of insulin, which vary from one person to another. On the whole, diabetes is more severe in young people than in the elderly, but with correct treatment it is possible for all cases to lead a perfectly normal life except in so far as dietary restrictions and insulin injections are concerned. Many famous people are, or have been, diabetics—for example, H. G. Wells—and have lived to a ripe old age. Recently, a drug has been discovered which has the great benefit that, unlike insulin, it can be taken by mouth. Preliminary trials suggest that it can control diabetes; but they are still in the experimental stage.

Whereas the type of diabetes we have been describing, the disease ordinarily known by that name, is properly known as *diabetes mellitus*, there is another disease known as *diabetes insipidus*, which, in fact, has no real relation to the other at all. In this disease there is no sugar in the urine, nor has it anything to do with the pancreas. Diabetes insipidus is a rare disease characterised by the passage of large amounts of dilute urine and appears to be due to deficiency of the secretion of the posterior part of the pituitary gland at the base of the brain. It can be partially controlled by the use of pituitrin.

Peritonitis is an infection of the peritoneum, the thin, transparent lining which covers all the abdominal organs. Acute peritonitis may occur at the end of serious chronic diseases, but more commonly it arises from perforation of some part of the intestines or stomach which allows septic material to flow into the abdominal cavity, or from extension of infection from the Fallopian tubes (the tubes passing between ovaries and womb in women). Wounds of the abdomen are also a possible cause. There is severe pain, vomiting, constipation, fever, and the abdomen is distended. The coils of intestine become matted together by infected lymph, produced by the germs which, while harmless within the intestine, are dangerous to life outside them. Treatment may be by antibiotics or surgery or both.

Chronic peritonitis is usually tuberculous in origin, and is commonest in young children. It is usually caused by the bovine type of bacillus, and usually there is ascites (*i.e.*, free fluid in the abdomen), with slight fever. Matting together of the intestines may threaten to produce obstruction. Unlike acute peritonitis, in which death will occur within two or three days without treatment, chronic peritonitis is a long-drawn-out disease which is usually treated medically.

DIET.

Food is, like alcohol, tobacco, and constipation, one of those subjects which people tend to have a "thing" about. In point of fact, what we know at present about this subject may be summarised as follows: Any diet to be adequate must first of all provide enough energy, and energy is measured in terms of Calories (for definition of a Calorie see **Gen. Inf.**). Thus a ten-stone man leading a moderately active life will require about 3,000 Calories daily; that is the amount of energy he requires in order to carry out his work and avoid living on himself, on his stored-up food. The amount of Calories required varies with age, size, and the amount of work done, from 1,500 Calories for the light-weight sedentary worker to three or more times this amount for the heavy manual worker.

Now, in theory, the adequate amount of Calories could be supplied from carbohydrate and fats alone, since, as we have seen, Calóries are merely a measure of energy and can be supplied by any food. But in this case the individual would not live long, because he needs for body maintenance certain kinds of food in adequate proportions. Just as you cannot run a car for long simply by putting in petrol and ignoring lubricating oil and maintenance of the engine, so you cannot run your body simply by taking in enough Calories. There must be adequate proportions of the three basic foodstuffs: carbohydrates (the fuel), fats (for insulation and other purposes), and proteins (for body-building purposes). Proteins are necessary to replace the parts of the body, which is largely a protein structure, when they become run-down. Fats and sugars can be transformed into each other within the body—this, of course, is why too many sweets make one fat—but proteins cannot be manufactured from these two foodstuffs, since proteins contain nitrogen and the others do not. One could even live on a diet of nothing but protein, but not on a diet of fat or sugar. The ordinary man, or woman, in this country eats a diet which consists of one part of protein, one part of fat, and three of carbohydrate. This is mainly dictated by economic factors, since fats and proteins are dear and carbohydrate foods are relatively cheap.

Here are some foods classified according to the predominating basic foodstuff they contain:

(1) *Carbohydrates*: bread, sugar, and all starchy foods or sweet things such as confectionery, puddings, and cakes.

(2) *Fats*: animal fats, such as dripping, fat meat, fried foods, butter, margarine, and vegetable oils, such as olive oil, or fish oils, which are found more in some fish than others —*e.g.*, herring.

(3) *Proteins*: lean meat, cheese, non-fatty fish, nuts, oatmeal.

In addition to these basic foods, the body must also have adequate supplies of vitamins and certain minerals, such as iron, manganese, calcium, copper, sodium, and potassium.

Obesity. Many people worry because they are overweight, and statistics show that the expectation of life is shorter in fat people than in thin ones. This, however, is a statistical view, and need not apply to any single person. Thus a famous French gourmet who weighed twenty stone died recently at the age of eighty-two—through falling out of a window. When one sees people who are constantly worrying about their health and diet one recalls the statement attributed to Winston Churchill as a recipe for a long life: drink too much, smoke too much, and work hard. He might have added ". . . and stop worrying." There are few people more pathetic than those who, by rigidly adhering to the so-called rules of health, seek to eke out a life which, if it does not actually last longer than that of the more care-free individual, will certainly seem much longer.

Being overweight is due to one cause—eating too much, and especially eating too much of the wrong kinds of food. There are, obviously, some people who can eat to their heart's content without becoming fat, perhaps because their bodies burn up the food more quickly. Their *basal metabolic rate*, which is the measure of the speed at which their body cells work, is higher than normal, and the basal metabolic rate is largely dependent on the functioning of the glands—in particular, the thyroid. Nevertheless, being overweight means that you are eating too much for you; that your intake of Calories is greater than your output.

Reducing is not difficult, but it does require an effort of will. Basically it depends on: (*a*) taking less food, and (*b*) taking food which is not fat-producing. In practice, this means taking a high-protein diet, little fat, and no sugars or starches. Such a diet would be somewhat as follows: coffee or tea with milk, but *no sugar* for breakfast, and if desired some form of crispbread, whether of rye or wheat, but *no white or brown bread.* A small amout of butter or jam may be taken with the crispbread. At lunch, grilled lean steak or an egg dish and salad, followed by jellies or fruit or crispbread and cheese—but *no potatoes.* The evening meal may consist of grilled or steamed fish, clear soup, cheese, fruit, but there must be no fried foods and no sweets at any time. This diet is merely to give an indication of general principles; more interesting ones will be found in the pages of most women's magazines or from time to time in the daily papers. The basic principles are obvious: plenty of lean meat, non-fatty fish, eggs, cheese, fruit, crispbread (or those starch-free rolls which one can buy in some shops), but no fried foods, fat meat or fish, bread, potatoes, sweets, or cakes. However, small amounts of butter and quite a lot of milk are permissible.

Obesity may have a psychological basis, and excessive eating is often a substitute for affection in individuals who have been spoilt as children. But, however this may be, most people find it as difficult to stick to a reducing diet as they do to give up smoking. For such people there are certain drugs which may help. Thyroid tablets, once generally used for reducing, are little used now, and should be used only when the thyroid gland is underactive; otherwise they simply increase appetite, and although they speed up the combustion in the body (the basal metabolic rate), the effect is cancelled out by the increased appetite. Dexedrene, one of the derivatives of benzedrene or amphetamine, acts by reducing the appetite, but in some people of a nervous disposition it may have the effect of causing a feeling of tenseness, and they may even have difficulty in sleeping. Finally, there is a substance obtainable at chemists' shops without prescription either in the form of granules or biscuits which does not exercise any chemical effect on the body; what it does is to swell up into a gelatinous mass within the stomach under the influence of water, which is drunk later, and this gives the impression of a "full stomach" and allays the pangs of hunger.

There are, as has already been mentioned, many fads about food, although one is treading on dangerous ground when one mentions them; for every faddist is a fanatic, and every argument one may put before him is seen as an attack on himself. For example, there was the "Hay diet," now, it appears, largely forgotten; then the "Gaylord Hauser diet" much favoured by Americans, which seems to be based largely on large quantities of molasses and brewer's yeast; and there was not so long ago a gentleman who lived on grass freshly clipped each morning from Hyde Park—it would be interesting to know whether he has survived his self-imposed ordeal. However, few doctors would deny that, although diet in some cases is an adjunct to the cure of disease (for example, peptic ulcer, diabetes, sprue), it is not a cure for disease, and those who make such claims are claiming a great deal too much. It must be repeated that, so long as a diet contains adequate amounts of the basic foodstuffs, adequate amounts of vitamins and the necessary minerals, and so long as it supplies adequate Calories for the build of the individual and the amount of work he does, it matters very little how these needs are supplied.

Vegetarianism.

This can hardly be called a fad, although it cannot be denied that many of its adherents are faddists. It apparently has two main sources. There are those who abstain from animal food for moral reasons because they believe that killing is wrong, even for food; and there are others who believe that vegetable food is more healthy than animal food. Some vegetarians live almost entirely on vegetables and fruits, whilst others allow themselves milk, eggs, and cheese. The moral issue cannot be argued here, although it must be admitted that few people who have visited a slaughter-house for the first time have as much appetite for their steak the day after, so we shall only discuss the health aspects of vegetarianism. On the negative side, it must be said that, in general, vegetable foods are much less rich in protein than animal foods, so one has to eat a great deal more in order to get an adequate amount. If, however, one includes in a vegetarian diet cheese, milk, and nuts or eggs this difficulty is largely obviated. Cows and other animals living on grass or vegetable matter have to spend practically their whole lives eating, precisely because they would not otherwise get sufficient protein. On the positive side we have the recent discoveries that, in predisposed people over forty, excess of animal fats can lead to cholesterol being deposited in the blood-vessels, notably the coronary vessels in the heart, and thus to coronary thrombosis. Vegetable and fish oils do not seem to have this effect, hence the infrequency of thrombosis amongst those peasants in Europe who are too poor to afford much meat, and amongst the Eskimos who eat fish. From the point of view of evolution it would seem that Man is designed to be both carnivorous and vegetarian; for he has sharp, cutting teeth in the front for tearing meat and flat, grinding teeth at the back for dealing with grains. We must conclude that those who are vegetarians for moral reasons should have all our respect; for killing is not a pleasant thing, and we have already too much of it. From the merely medical point of view vegetarianism has both advantages and disadvantages. Nobody will suffer from being vegetarian, but, apart from the exceptions mentioned, there is little reason to suppose that their health will be any better than that of meat-eaters. We are less able to influence our fates than we often suppose, since longevity and good health are much more a matter of heredity than is ordinarily believed.

THE DEFICIENCY AND METABOLIC DISEASES

INTRODUCTION.

If you have read earlier parts of this section you will know that there can be two types of malnutrition; the first, of course, is the type we ordinarily think of when the word is mentioned, and in this case the individual is simply not getting enough food or enough of the right kind of food. The second type might well not be regarded by most people as malnutrition: for here we are referring to diseases such as diabetes and sprue, in which, although there is adequate supply of certain foods, the body, owing to some deficiency, is unable to make use of them. The patient with diabetes cannot make use of sugar, the patient with sprue of fat—they are starving in the midst of plenty, as is shown by the fact that in both cases one of the prominent symptoms is wasting.

We shall deal first with the ordinary type of malnutrition and later with the second. Since diabetes and sprue have already been mentioned, we shall be looking at some other conditions in which something or other is missing or is present in the wrong amounts, as in the diseases of the endocrine glands.

Two-thirds of the population of the entire world are undernourished, and particularly in Asia famines are common—famines like the one in Bengal in 1943, in which 3 million people died of starvation. In Europe such conditions exist only when war dislocates food supplies, but nevertheless individual cases of malnutrition can occur. For example, the lazy or ignorant mother of a large family may feed them largely on bread and margarine, with no fresh fruit or vegetables and only tinned meat because she "can't be bothered" cooking. Or the self-sacrificing mother of a large family may give all the meat and protein food to her working husband (somehow or other many men fail to notice that a housewife works!) and her children. Then old people or people living alone are liable to neglect their food, either because they have lost heart, because they are too frail, or because they cannot afford to buy enough good food. Lastly, those who are addicted to alcohol neglect their food and, drinking on an empty stomach, soon get such a degree of gastritis that they find it difficult to eat even when they need to.

A human being can live about six weeks without food, and a much shorter time—a week or ten days—without water. Naturally, human nature being as it is, there have been many claims to longer periods of starvation, and some of the more enthusiastic claim not to eat at all! Thus, in the sixteenth century Eve Fliegen of Brabant appears to have lived for fourteen years solely on the smell of a rose, and, coming nearer our own time, Mollie Fancher of Brooklyn, who died in 1916, similarly lived for fourteen years without eating, and in 1864 even stopped breathing. However, presumably becoming bored with this, she resumed her respirations after only fourteen weeks.

These people, needless to say, were humbugs, as is revealed by the grim case of Sarah Jacob "the Welsh Fasting Girl," who towards the end of last century allegedly took no nourishment whatever for two years, two months, and one week. The one week, at any rate, is certain; for, at the invitation of the local vicar, who was convinced of her genuineness, a number of doctors from London came to observe her. They put relays of nurses to sit by her bed day and night to note whether she ate, but in a few days she began to decline so alarmingly that the doctors begged the parents to feed her. This they refused to do, and Sarah would not ask for food. She died within a week on December 17th. The most famous non-eater of today is Theresa Neumann, who lives in Bavaria and claims that nothing but the wafer, the Eucharist, at Holy Communion has passed her lips since 1927. The Roman Catholic Church, however, has been careful never officially to recognise her claims as true. So we shall still assert that six weeks, more or less, is the longest period a human being can go without eating.

DEFICIENCY DISEASES

The materials which are necessary to the body have been mentioned elsewhere, and we can now look at some of the diseases (other than those already discussed) which result from their lack.

Lack of iron leads to anæmia, but less well known is the type of deficiency caused by lack of iodine. Iodine is found in large amounts in seaweed, which obtains it from the sea surrounding it and concentrates it in its fronds. But ordinary water contains enough for our needs. In some districts, however, especially where the main rock is limestone—Derbyshire and some valleys in Switzerland and the Himalayas—the water contains very little iodine, and there the inhabitants are prone to develop goitre. There are several types of goitre, but this type is caused by lack of the iodine which is necessary to build up thyroxin, the secretion of the thyroid gland. It is a deficiency goitre known in adults as myxœdema, but in those parts where iodine is lacking in the water supplies the disease develops in childhood and the children become, although perfectly normal when born, dull, gross, and stupid—they become idiots or, as they are more correctly described, cretins. This is one of the commonest types of mental deficiency in children, and, if noted in time, they can become completely normal by the use of thyroxin or thyroid tablets. But prevention is better than cure, and this terrible disease has now been almost eliminated in the districts where it used to be prevalent by adding iodine to the water supply of towns and villages, by giving iodised chocolate at schools, or otherwise supplying the missing element.

In this country cretinism and myxœdema are found in individual cases for reasons other than lack of iodine: in children, cretinism may be due to congenital lack of the thyroid gland or early failure, in adults myxœdema may occur when the gland, usually in the middle period of life, runs down. Both conditions can be treated by thyroid tablets, which, like insulin, have to be taken for the rest of the patient's life.

Lack of calcium is less common in this country than it once was. Calcium is necessary for building the bones: it is calcium, in fact, that makes the bones hard. Actual lack of calcium in the diet is very rare, because calcium is one of the commonest elements in Nature, and what usually happens is that lack of vitamin D or calciferol, without which calcium cannot be utilised or absorbed, causes the deficiency.

The two main diseases caused by calcium, or rather vitamin D, deficiency are rickets and osteomalacia. Vitamin D is found in fats—but only animal fats such as are found in meat, fish, and milk; it is not found in vegetables, plants, or fruit. A second source of the vitamin is sunshine or ultra-violet light, which manufactures it in the skin; hence, in spite of inferior diet, rickets and osteomalacia are perhaps less common in sunny countries. In *rickets*, a child during the period when its bones are developing does not get enough vitamin D and cannot make use of the calcium taken in. Its bones become soft and are liable to bend, producing defects such as bow legs, curvature of the spine, and deformities of the chest (pigeon chest, funnel chest). In bad cases the skull is deformed and assumes a square shape. Rickets is rare today, at least in Britain; it is prevented by taking vitamin-D-rich oils, such as cod- or halibut-liver oil, or the vitamin can be taken in a more or less pure form in capsules.

In these days when diets are adequate, when children get cod-liver oil at home or school, and when they are much more often in the sunshine than used to be the case, it is not always realised that *overdosage* of vitamins, especially vitamin D, is possible. In its extreme form this is a rare condition, but children have died from overdoses which caused calcium to be laid down where it did not belong—in the kidneys and elsewhere. It is possible to have too much of anything.

Rickets is uncommon in adult life because the demand for calcium is less than in the growing child. But in pregnancy the demand increases, and especially in Eastern lands, where famine is frequent and where, although there is plenty of sunshine, the women are veiled from any of the sun's rays, there may occur the disease of *osteomalacia*. In this disease the bones soften and deformities occur which are particularly important in the case of women, in whom the pelvis becomes deformed, with resultant difficulties in child-birth. Osteo-

malacia is a main cause of the high maternal and infant mortality in such countries as India.

In old people who do not get enough food, lack of vitamin D causes no deformity, but leads to the condition known as *osteoporosis*, in which the bones, through lack of available calcium, become brittle and break easily.

Scurvy is another once-common deficiency disease which is now rare except under such unusual conditions (or perhaps not so unusual in these days) as life in concentration camps or amongst prisoners-of-war. It is due to lack of vitamin C, which is found in fruits and vegetables, particularly in lemons, oranges, tomatoes, and turnips. In scurvy the gums swell and bleed, there is increasing anæmia, and spontaneous bruises, due to hæmorrhage under the skin, occur. In former times the disease was the bugbear of sailors and travellers, because on long journeys or voyages before means of preserving food were known other than drying or salting no fresh fruit was available. It was no less a personality than Captain Cook who on his long voyages found that the simple use of lemons or limes would prevent the disease. Hence the almost international description of Englishmen as "Limeys"—a name which is not always used flatteringly, but of which we have every reason to be proud. Minor degrees of scurvy may occur in British children even today through faulty diet, but this is much less common since orange, blackcurrant, or rose-hips syrups became available to all.

We now come to the B group of vitamins. There are, regrettably, many members of the vitamin B family, but we shall mainly deal with vitamins B1 and B2.

Beri-beri is caused by lack of vitamin B1, which is found in most grains, principally in the embryo and the outer covering. Now, since many people are snobs, who prefer white bread to wholemeal and polished rice to the crude article, it has become the habit to remove the precious outer covering of the grain and its embryo which contain the vitamin: white bread and polished rice *look* so much better. Thus, in those parts of Asia where rice is the staple diet, it was frequently machine-milled, with loss of the vitamin, and the result was the serious form of neuritis known as beri-beri. Just as Captain Cook eradicated scurvy from his men by the use of citrus fruits, so, in 1882, Takaki eliminated beri-beri from the Japanese Navy by giving a good mixed diet. This led two Dutchmen, Eijkman and Grijns, to study the disease experimentally. They found that fowls fed on polished rice developed the disease, whereas those fed on rice with the husk did not. In this country we are still in the rather foolish position of carefully removing the vitamin by "refining" the flour and then replacing it chemically. However, although whole-meal bread is probably better, there is really little risk of any European diet lacking vitamin B1.

The symptoms of beri-beri are neuritis (*i.e.*, degeneration of the nerves), which leads to weakness of the muscles, wasting, and sensations of "pins and needles"; the heart muscle is also affected and œdema—swelling of the limbs—or ascities (fluid in the abdomen) occurs.

Pellagra. Vitamin B2, or rather the vitamins of the B2 group, of which the main ones are riboflavin and nicotinic acid, is another substance deficiency of which in this case leads to pellagra. Pellagra is found in those parts of the world where maize is a staple diet, that is in parts of America and the Far East and round the Mediterranean. Maize does not contain the vitamin which, like vitamin B1, is found in most other grains and vegetables, but, since vitamin B2 is also normally produced by the action of bacteria in the human colon, it would appear that there is some other factor than the mere absence of the substance from the diet. Probably maize contains a substance which prevents the absorption of the vitamin from the colon.

In pellagra there is wasting, soreness of the mouth, diarrhœa, skin rashes on the hands, forearms, face, and neck. In severe cases insanity may occur. The disease does not occur in this country in its full-blown form, but minor degrees may develop with the use of certain antibiotics, such as chloramphenicol and aureomycin, which kill the "good" vitamin-producing bacteria in the intestine as well as the disease-producing ones.

Vitamins.

Whereas vitamins B and C are found mainly in vegetables and fruits, vitamins A and D are found in oils and fats. Vitamin A is, indeed, found in the form of carotene in all green vegetables, but it is not much use to us until it has become concentrated in the fat and milk of the animals who eat the vegetables. Lack of the vitamin leads to *night-blindness*, to difficulty in seeing in the dusk. This is because the retina, the "mirror" at the back of the eye, requires adequate amounts of a substance known as visual purple for its full efficiency, and visual purple is manufactured from vitamin A. (It must be noted, however, that not all cases of night-blindness are due to lack of vitamin A—there is often a very large neurotic element, and it was frequently found during the War that men who on this account pleaded their inability to carry out sentry duties at night might show a very considerable talent for seeing their girl-friend at the camp gate even in pitch darkness.) Vitamin A is also connected with the health of the skin and the ability of the body to resist diseases of the respiratory tract such as bronchitis. Like vitamin D, it is most easily obtained from fish oils, such as halibut-liver oil.

Lesser-known vitamins are vitamins E and K. The former, found in wheat-germ oil, influences fertility; the latter influences the clotting power of the blood and the healing of wounds. Most vitamins can now be produced in the laboratory synthetically; in the case of vitamin B1 from coal-tar.

It is important to realise that vitamins, although necessary to health, are not cure-alls. There are few sights more ridiculous than the fad of over-fed individuals taking vitamin pills as a tonic to keep themselves up to scratch. Any vitamins taken in excess of requirements may either cause damage—as in the case of vitamin D—or else are simply excreted from the body. Extra vitamins are not a tonic, those who take them in excess are simply wasting their money, and if one eats a good mixed diet they are totally unnecessary.

GLANDULAR DISEASES.

The Endocrine Glands.

The workings of the body are regulated in all sorts of different ways—by the nervous system, the circulation, and by the endocrine glands or ductless glands, as they are sometimes called. We have already seen that there are glands, such as the liver (the largest gland in the body) and the pancreas, which manufacture substances and pass them through a duct or tube to their destination. But the ductless glands, as their name implies, have no duct and pass their secretion directly into the blood; the pancreas, for example, discharges the pancreatic fluid down a duct, but it also produces insulin, which is secreted directly into the blood. It is thus partly an endocrine gland and partly an ordinary one. The other endocrine glands are particularly important in that they produce hormones (the word means "chemical messenger"), which have a great deal to do with personality and health.

Myxœdema, we saw, is due to lack of thyroid hormone either because the gland, which is situated at the base of the neck astride the windpipe, has failed or because it has insufficient iodine to manufacture its product. The opposite effect occurs when the gland becomes overactive, and then we get a quite different state of affairs: instead of being dull, slow-witted, and flabby-looking, the patient with an overactive gland—*exophthalmic goitre* or *thyrotoxicosis* is excitable, nervous, flushed, and thin. The eyes become prominent and bulge forward, giving a staring,

scared look. The disease is commonest in young adults, mostly women, and there can be little doubt that what usually sets it off is an emotional shock. Thyrotoxicosis is not primarily a disorder of the thyroid gland, and it is believed that the sequence of events is: emotional shock, which influences the nerves supplying the pituitary gland at the base of the brain, overactivity of the pituitary with overproduction of the hormones, which in turn affect the thyroid. (The pituitary is the main endocrine gland in the body and gives off hormones which control all the other glands—it has been called the "conductor of the endocrine orchestra.") All the body processes—the basal metabolism—are speeded up in this disease, which, however, cannot be treated at its roots in the pituitary. Sometimes it can be treated medically by the drug thiouracil, which damps down the activity of the thyroid, but more usually an operation is necessary to remove part of the gland. It is also possible in suitable cases to give the patient radioactive iodine—a radio-isotope which is carried, as all iodine is, to the gland, where it destroys some of the overactive tissues. The results of these procedures are good, but any exophthalmos, the prominence of the eyes, which may be present always remains.

A similar condition, appearing in middle age, may result, not from shock or from an overall enlargement of the gland, but from a *toxic adenoma*, which is a simple, non-malignant tumour. In this case exopthalmos does not occur, but the tumour should be removed.

The Parathyroid Glands.

We have already discussed the importance of calcium in the body and seen how vitamin D is necessary for its utilisation. But the calcium content of the body is controlled by another factor, the parathyroid glands—two pairs of small glands lying behind the thyroid. Now, calcium, in addition to building the hard structure of bones, has another function in that it acts as a kind of sedative, damping down the nerves and preventing overexcitability. When the parathyroid glands do not work properly, or when they have been partially removed during a thyroid operation, *tetany* (not to be confused with tetanus) arises. The hands and feet go into spasm and there may be generalised convulsions. Tetany can be produced in a number of other ways which influence the amount of calcium in the blood: for example, alkalosis when people have taken too much alkali for stomach disease, or when they have lost acid through persistent vomiting, or even by overbreathing—*i.e.*, persistent deep and rapid breathing, which causes the body to lose carbon dioxide—a condition which may occur in hysterical or neurotic patients. The treatment is to give large amounts of calcium and vitamin D.

Overactivity of the parathyroid glands, usually due to a tumour, causes the reverse effects. The blood calcium is high, but this calcium has been withdrawn from the bones, and a disease known as *generalised osteitis fibrosa* arises, in which the bones become soft and there is pain, fractures, and deformities. Sometimes cysts form in the bones. The treatment is operative removal of the tumour.

Salt is very important in the running of our bodies. Indeed, our blood has been described as an "inner sea"; for, whereas primitive creatures in the ocean, such as sea-anemones and sponges, get their sustenance from the sea surrounding them and do not need a blood-stream within, in the course of evolution the situation gradually changed. As sea-animals grew bigger, the water outside did not suffice, and they had to develop some sort of circulation within; even more so, when they developed into land animals they had to carry their sea about with them. Loss of the salt in this inner ocean is occurring all the time, both through the urine and through sweating. Workers who do heavy jobs in a hot atmosphere lose a great deal of salt through sweating, and if afterwards they drink a great deal of water the remaining salt in the body becomes even more diluted, with the result that they will get painful cramps. Similarly, diarrhœa or prolonged vomiting can bring about the same result through loss of salt from the body. After long periods of exercise it is much more refreshing to take water with added salt than to take pure water, which will increase rather than diminish our fatigue.

Suprarenal Glands.

A glandular disease which influences the balance of salt in the body is *Addison's disease*, named after the famous English physician who first described it. This disease is characterised by great weakness of the muscles, tiredness, loss of weight, low blood-pressure, and a brown pigmentation of the skin. Until recently it was always fatal. Addison's disease is caused by damage to the suprarenal glands, two small glands which sit one on top of each kidney like little cocked hats. These glands produce a number of hormones, one of which controls the excretion of salt from the body; if it is lacking, too much salt escapes, with the results described above. The disease is now treatable by the use of cortisone, one of the suprarenal hormones.

These glands consist of an inner part or medulla which secretes a hormone known as adrenalin—the substance which, when released into the blood, prepares us for states of emergency. It reinforces states of anger or fear, and aids in the process of fighting back or running away. The cortex (the word means "bark of a tree"), on the other hand, secretes a number of hormones, one of which, as we have seen, is connected with the salt content of the body and another which plays some part in sexual development. Thus a tumour of this area may bring about a state of *hyperadrenia*, in which excessive secretion leads to premature or excessive development of masculine sexual traits. Boys show precocious sexual development, their voice breaks, and their muscular development increases. Girls assume male characteristics. This is known as the *adreno-genital syndrome*.

The Pituitary Gland.

The pituitary gland, lying at the base of the brain, is only about the size of a small cherry, yet it not only regulates the behaviour of all the other glands but is responsible for sexual development and growth. It consists of two parts, the anterior (which does all the interesting things), and the posterior, which secretes a hormone known as pituitrin, thus raising the blood-pressure and causing the muscle of the uterus to contract. Many conditions are described in which the anterior part of the gland either produces too much or too little of its hormones. For example, when this part overacts in early life the result is a giant—*i.e.*, anyone over 6 ft. 8 in. In later life, when the bones are set, the result of overaction is *acromegaly*, in which the face is elongated, the hands are relatively huge, as also are the feet. The head, too, is large, and the patient gives a somewhat gorilla-like impression.

When the anterior part of the pituitary underacts there are many unpleasant possibilities: the individual may develop into a fat boy, like the one in *Pickwick Papers*, sleepy, greedy, and monstrously fat; or into a human skeleton who appears to have hardly any flesh at all; or there may develop painful masses of fat in the wrong places, a condition described as *adiposis dolorosa*; or again, dwarfism may result and the individual retain the appearance and size of a child with normal adult mentality. These conditions are known by the various names of *Frölich's syndrome* in the fat-boy type, *Simmond's disease* in the human skeleton, *Dercum's disease* in the case of adiposis dolorosa, and *Lorrain's disease* in the case of dwarfism.

The Sex Glands.

In women these are the ovaries, and in man the testes. The ovaries produce two hormones, one of which, œstrin, brings about, under the influence of the pituitary, the normal sex changes at puberty, controls the release of the ovum from the ovary, and, in animals, produces sexual excitement. The other, also controlled by the pituitary, is progesterone, which in general has a sedative

effect: it prepares the uterus for pregnancy, and, when a pregnancy exists, maintains it.

The internal secretion of the male sex glands is testesterone, and it, like œstrin, produces the sex changes at puberty. The problems of sex, however, will be discussed later.

DISEASES OF THE URINARY SYSTEM.

Everyone knows what kidneys look like—in fact, the term "kidney-shaped" is used to describe other objects. Within the kidneys the blood-vessels carrying waste materials subdivide and finally end up in little coils or glomeruli through which waste products are filtered into the other system, the system of tubes which, beginning as tiny cups around the glomeruli, become larger and larger until they join the ureter passing out at the root of the kidney, the hilum, a point at which both the veins and tubes enter and leave. The kidneys, of course, lie one on each side in the loins, so that if one puts one's hands on the hips and then slides them farther back they will cover the area over the left and right kidney. The ureters pass down on each side to the bladder, which is the storage tank of the products excreted by the kidneys, and lies in the mid-line low down in the abdomen; it is somewhat pear-shaped, and at its base in men there lies the prostate gland—a gland which apparently has few functions but can be a nuisance. Its only known function is that it adds something to the semen from the testes without which the semen would be sterile. Then, from the base of the bladder a single tube, the urethra, passes to the outside. One can, in fact, visualise the urinary system as a capital **Y**, in which the two upper limbs are the ureters, the place where they meet is the bladder, and the single limb at the foot is the urethra. Clearly, then, there may be diseases of the kidneys, of the ureters, of the bladder, of the prostate gland, or of the urethra.

The amount of urine may be increased or diminished. It is *increased* in the following conditions: after drinking excess of fluids; after taking drugs (known as *diuretics*) which are given to increase the flow; in diabetes of both types—mellitus and insipidus; in some types of chronic kidney disease; and finally, in emotional states of excitement. It is *decreased* in the following conditions: acute nephritis; any disease in which fluid is being lost in other ways, such as diarrhœa or sweating in fevers; when the fluid intake is small; and when both ureters are blocked by stones. Passing a great deal of urine is known as *polyuria*, passing very little as *oligouria*, passing frequent small amounts is simply called *frequency*. Normally, the urine is acid, but in infections of the bladder it may become alkaline owing to decomposition by bacteria. Abnormal substances, or normal substances in abnormal quantities, may occur in the urine and give the doctor an indication of what is wrong. In fact, urine analysis is a very important part of medical diagnosis. Thus urea is a normal content of urine which is increased in fevers, wasting diseases, or diabetes; the amount of urea is to some extent a measure of the degree of tissue breakdown. Uric acid is found in small quantities in normal urine, but the amount is increased in fevers and after an attack of gout (uric acid plays some part in the causation of gout, but has nothing at all to do with rheumatism in general, so one may disregard the advertisements in the popular Press showing unpleasant pictures of joints with sharp crystals of uric acid which are alleged to cause the pain of rheumatic disease). Oxalates are not ordinarily found in urine, but, since they occur in such foods as rhubarb and strawberries, and some people are unable to deal with them, such individuals may develop stones or have pain on passing urine after eating oxalate-containing fruits.

Two very important substances which ought not to be in normal urine are albumen and sugar. Albumen is a protein, and its presence in the urine indicates that the filters of the kidney are leaking—they are allowing protein to pass out which ought to remain in the body. Albumen is easily tested for, and its presence may indicate kidney disease or nephritis as it is usually called by doctors. On the other hand, small amounts of albumen occur in fevers and in nervous conditions—*functional albuminuria*. Sugar, too, should not be present, but its presence does not necessarily indicate diabetes; for small amounts may occur in nervous conditions or in some people after taking large quantities of carbohydrate.

Blood in the urine may give it an appearance which varies from bright red to a dark, smoky colour. It is found in many diseases: acute nephritis, stone, tumours, poisoning by certain drugs, infections such as bilharzia or malaria, papilloma (*i.e.*, non-malignant tumour of the bladder), after injury, in high blood-pressure, scurvy, and blood diseases. Sometimes it occurs for no known reason at all.

It will be remembered (or if it is not, you can look it up on p. 28 (1)) that streptococcal infection of the throat may cause in some people disease of the valves in the heart or endocarditis. In such cases, although the germ is found in the throat, it is not found in the heart or indeed anywhere else in the body. *Acute nephritis* occurs in the same circumstances, with the sole difference that the kidneys instead of the heart are affected. The disease appears to be an allergic reaction to the toxins of the streptococcus. The patient, often a child, has a sore throat (and even this may be absent or fail to be noticed) or sometimes the infection may arise in other sites: after scarlet fever, erysipelas, burns, and disease of the ear. A few days later there is headache, vomiting, pain in the loins, slight rise in temperature, and especially typical is *dropsy* or œdema. This begins in the face, first around the eyelids, and then affects the ankles; later it may become more general and affect the rest of the body. Blood and albumen are found in the urine, and the blood-pressure is slightly raised. The outlook is usually good if the kidneys are rested by reducing the amount of protein taken in and also the amounts of salt and water. When this is done, the inflammation soon goes and no permanent harm results. In other cases, however, if treatment is inadequate or the condition severe, the symptoms may go, but the albumen found in the urine persists. This means that permanent damage has been done, and although there may be nothing else to show for many years, *chronic nephritis* develops. In this case, the blood-pressure continues to rise, and since the filters of the kidneys no longer work efficiently, urea, the principal waste-product of the body to be excreted in the urine, is retained in the blood and only small amounts escape from the system. Hence chronic nephritis sooner or later leads to heart failure or hæmorrhage in the brain from the rising blood-pressure, or to the form of poisoning known as *uræmia* which results from the retention of urea in the blood. Uræmia may come on suddenly or gradually, but ends in progressive coma, drowsiness, and unconsciousness. There may be convulsions similar to those of epilepsy, high fever, and difficulty in breathing to complicate the picture.

Another type of nephritis which seems to have nothing at all to do with streptococcal infections, and the cause of which is completely unknown, is *nephrosis*. Developing in early adult life, its onset is insidious, and the patient first shows signs of œdema in his white and puffy face and the swelling of his legs. (It should be said here that if you have swelling of the ankles or elsewhere, you would be foolish to jump to conclusions; for such swelling is common in many diseases—in heart disease, in allergic conditions, in neurotic illness, and even just from hot weather.) When the urine is examined in a case of nephrosis it is found to be full of albumen and, as in chronic nephritis, the blood urea starts to rise. Ultimately, the end-results of nephrosis are the same as those of chronic nephritis, so the outlook is not good. Of course, all these diseases must be treated by a doctor, but it must be realised that damage done to the kidneys is irreversible.

Pyelitis is an infection of the pelvis of the kidney, that is to say, of the part where the ureter leaves the kidney. It is usually caused by the bacillus coli, which is normally present in the body, or by the streptococcus. These germs may reach the ureter through the blood-stream or may

pass upwards from the bladder. Obstruction anywhere in the urinary tract which causes the urine to stagnate is liable to cause pyelitis. Symptoms come on suddenly, with high fever, pain in the loin (the infection is usually on one side only, and is commoner in women), and pain in the abdomen. When urine is passed there is a burning sensation, and it is passed frequently and in small amounts. On examination, the urine is found to be highly acid and full of bacillus coli or whatever the causative germ may be. Pyelitis is fairly readily treated by the antibiotics or sulpha drugs. Plenty of fluids should be given and the urine made alkaline by administration of alkalis.

Cystitis means inflammation of the bladder, either acute or chronic, and its causes are much the same as in the case of pyelitis. There is pain over the lower abdomen, frequency, and sometimes slight fever. The treatment is as for pyelitis. *Urethritis* is an inflammation of the urethra, with burning pain on passing water and frequency. The most serious cause (although it can usually be easily dealt with now) is gonorrhœa. But non-specific urethritis is common, and in this case various germs or none may bring about pain and frequency; there is often a large neurotic element. Urethritis should be regarded as probably due to gonorrhœa, which has already been discussed elsewhere, when there is a thick, creamy discharge from the penis or discharge in women following sexual intercourse with an infected person.

Kidney stones or Renal calculi sometimes form, and, as in the case of gall-stones, what causes them is not certain. They may be caused by disorders of metabolism—that is, in the inability of the body to deal with calcium, proteins, uric acid, and other products; or by vitamin deficiency, obstruction in the urinary tract, and urinary infections. But when a stone or stones are formed various events may occur: thus it may remain in the kidney and cause no symptoms; or it may cause repeated attacks of pain, infection, and blood in the urine (hæmaturia); or it may completely block the passage of urine from the kidney to such a degree that it degenerates and becomes useless; or, lastly, it may pass into the ureter, and when this occurs very severe pain, known as *renal colic*, will occur. A stone passing down the ureter into the bladder may become stuck in the urethra, although this is uncommon, since a stone small enough to get down the ureters is likely to be capable of manœuvring through the rest of the tract. In fact, about 80–90 per cent. of stones are passed spontaneously. Stones not passed spontaneously may have to be removed by operation, but whether this is undertaken or not depends on various factors, such as the general health of the patient, the amount of trouble caused by the stone, and the health of the other kidney —for it is dangerous to operate on one kidney unless one is sure that the other is functioning efficiently.

If a stone blocks the passage of urine on one side for any length of time *hydronephrosis* may result, in which the part where the ureter enters the kidney swells with the retained urine. Ultimately much of the kidney may be destroyed by the back-pressure. The same effect may be produced by kinking of the ureter or anything else which causes obstruction. Sometimes children are born with hydronephrosis, and when the dilation is due to kinking of the tube the condition may be intermittent, with attacks of renal colic during which only small amounts of urine are passed; this is followed with relief and the passage of large quantities.

Tumours and Cysts. The kidney may also be the site of tumours and cysts which produce pain in the loins, sometimes a lump over the kidney which can be felt, and blood in the urine. Cancer of the bladder is a serious condition in which the bladder may have to be removed, so the urinary flow has then to be directed elsewhere. Either the ureters are brought out on to the skin surface, a procedure known as *cutaneous ureterostomy*, or they are implanted in the large bowel, so that the urine flows out with the fæces. This is described as *uretero-colostomy*.

There may also be benign tumours of the bladder or *papillomas*, which are soft and bleed easily; a great deal of blood is passed, but there is usually little or no pain. In this, and similar, diseases of the bladder examination of the inside of the organ is carried out by means of a cystoscope, a thin tube which is passed up the urethra and has a small electric light at the end which enables the surgeon to see what is going on. Instruments may also be passed through the tube, and simple papillomas can be cauterised. Similar instruments are used in the examination of the stomach (gastroscope) and the bronchial tubes (bronchoscope). When some obstruction in the outlet of the bladder or in the urethra occurs the bladder, of course, fills with urine, which cannot be passed, and very painful dilation occurs. In this case an attempt may be made to pass a catheter, a thin rubber tube, into the bladder to relieve the tension, or if this fails a *suprapubic cystomy* is performed—an incision is made in the abdomen over the bladder and a tube inserted into it, through which the urine escapes. This is ordinarily a temporary expedient, and later when the patient's health has improved an attempt will be made to remove the cause of obstruction. The most common cause of such obstruction is *enlargement of the prostate gland* at the base of the bladder, which surrounds this area and the beginning of the ureter. About 40 per cent. of men over sixty have some degree of obstruction due to this cause, and about 20 per cent. of these require operation. The gland is about the size of a walnut, and, as we have seen, its function is to supply part of the fluid which makes up the semen, the male sex secretion. Enlargement of the prostate may be benign or malignant, and, although nobody knows just why, such benign enlargement tends to occur in most men in later life. There may be no symptoms, but characteristically there is frequency during the day and the need to get up at night to pass water. The flow of urine being impeded by constriction of the urethra, the passage is less forceful than normal, and there is a tendency for dribbling to occur. If the obstruction is severe and not relieved the back-pressure may be transmitted to the ureters and kidneys, resulting finally in kidney failure and uræmia. The prostate, except in cases of very mild enlargement, has to be removed either through the abdomen or through the perineum (the part of the body lying between the sex organs and the anus). Sometimes, in less serious cases, it is possible without an incision to cut away the obstructing part by an electrocautery inserted, as is a cystoscope, through the urethra. Prostatectomy was once a serious operation, all the more so because the patient was usually elderly and not in good condition, but new techniques and the use of antibiotics have greatly improved the outlook.

Cancer of the Prostate is always serious, but if discovered in time it can be operated on successfully. The gland, of course, has to be completely removed; in inoperable cases, or in patients unfit to stand operation, the tumour may be treated by means of female sex hormones, which cause it to shrink and may prolong life by some years.

DISEASES OF THE NERVOUS SYSTEM.

The brain and nervous system are like a telephone exchange which sends out and receives messages from the rest of the body. Essentially it consists of two levels, the lower centres, where primitive emotions are felt, the viscera controlled, and simple actions initiated, and the true brain, which holds the lower centres under control. When, for example, one is pricked with a pin, a message is passed up the nerves (the sensory nerves or nerves of feeling) through the spinal cord to the lower centres, which return a message through the motor nerves (the nerves dealing with movement), causing the hand to jerk away. All this takes place without any conscious interference, and can, in fact, happen even when the true brain has been removed. It is, of course, possible for the movement which jerks the hand away to be inhibited, because in this case the brain intervenes; all mental life is a constant interaction between the lower and higher centres.

When we become angry, for instance, the anger originates in the lower centres, but may be inhibited by the higher ones. To some extent, the former correspond to what a psychologist would describe as the unconscious mind, the latter to the conscious mind.

The nervous system is made up of nerve cells which are smaller than the head of a pin but end in a long, thin fibre, which may be several feet long. These fibres form the nerves of the body, and they end in the motor nerves, which bring about muscular movement, or in the skin, where there are separate nerve-endings dealing with pressure, heat, cold, pain, and so on. It used to be supposed that there were areas in the brain dealing with such mental faculties as acquisitiveness, conscientiousness, and other abilities; but this is known to be quite untrue. There are, indeed, areas dealing with movement, sight, hearing, speech, feeling, and thought, but certainly none dealing specifically with the more complex mental faculties. Nor is it correct to suppose that each nerve cell carries some particular thought or feeling; for it appears that thinking and feeling are represented by nervous circuits in the brain and are not isolated in any special area. Thus large parts of the brain can be removed without interfering with mental activity.

The most primitive part of the nervous system is the autonomic nervous system, which has its "brain" in the hypothalamus at the base of the true brain. It is divided into two parts: the sympathetic nervous system, which supplies the viscera with impulses which prepare the body for flight or fight (causing the heart to beat faster, the muscles to become congested with blood, the skin to become pale, and the blood-sugar to rise whilst the intestines become less active), and the parasympathetic nervous system, which, in general, produces relaxation. When the parasympathetic system acts, the heart beats more slowly, the skin becomes flushed, the intestines digest food, and the body is prepared for rest. Since, as we have seen, the lower centres are the centres controlling both emotion and the internal organs, it is clear that emotional states will influence the action of the body. This is the basis of psychosomatic medicine.

The brain and the spinal cord, which passes down the bony canal within the spine, are covered with the thin layer of tissue known as the meninges and surrounded with cerebro-spinal fluid, which is also found in the cavities of the brain known as ventricles. A specimen of cerebro-spinal fluid, or C.S.F., may be removed by pushing a hollow needle between the vertebræ in the lumbar region, and such specimens can give a great deal of information about what is going on in the nervous system.

The diseases of the nervous system can be divided into various groups: there are those due to injuries, such as fractures of the skull or divided nerves; the infectious diseases, most of which have been discussed already; the diseases due to hæmorrhage or embolism; tumours; and, perhaps the biggest group, the degenerative diseases.

The blood-vessels of the brain are one of the common sites of *aneurisms*, bulges like small berries, often at the base of the brain, caused by weakness of the vessel wall. This is sometimes the result of arteriosclerosis, syphilitis infection, or injury, but perhaps most often the aneurisms are congenital—*i.e.*, the individual is born with them. There are usually no symptoms, although if the aneurism is large enough it may press upon other structures and cause symptoms recognisable by the specialist. In most cases the diagnosis is apparent only when the aneurism, as may occur, ruptures. When this happens the symptoms are those of brain hæmorrhage. There is severe headache, vomiting, and loss of consciousness, the patient breathes heavily, and when the doctor does a lumbar puncture the C.S.F. is stained with blood. Such an event is very serious, and ordinarily all that can be done is to rest the patient; nevertheless, over 60 per cent. of cases are fatal.

When, in the few cases in which symptoms occur *before* hæmorrhage, the presence of an aneurism is suspected, this may be confirmed by X-ray. Since soft tissues are not seen in X-ray pictures, it is necessary (for example, in the gall-bladder, the kidneys, the bronchi, or the blood-vessels of the brain) to inject some radio-opaque substance which outlines them. In the brain this is known as arteriography, and when by this means aneurisms or other abnormalities are found surgery is sometimes possible. Hæmorrhage into the brain substance produces what is generally known as a *stroke*. The artery affected is usually the middle cerebral, when in later adult life it has been strained and weakened by high blood-pressure or arterosclerosis. It can, however, be caused by bleeding into a tumour, or in children by birth injuries. Hæmorrhages may also result in the small veins from the strain of coughing in whooping cough.

A stroke comes on suddenly, and the patient is flushed with a bluish tinge. He breathes heavily and, as he breathes, the cheek on the affected side may be blown in and out. Since the left side of the brain supplies the right side of the body, and *vice versa*, the side of the body on the opposite side from the hæmorrhage is paralysed. The limbs and face right down the affected area are flaccid and useless, but if the patient survives they will at a later stage become spastic. There are, therefore, two types of paralysis: flaccid and spastic. In the first, the limb is incapable of movement, and when lifted it falls back like a dead weight; there are no reflexes, so that when the knee-cap is tapped to elicit the knee-jerk there is no response. Flaccid paralysis is typical of injury to the lower parts of the nervous system, and it means that no impulses are getting through. Spastic paralysis, on the contrary, is characterised by rigidity of the limb, overactive reflexes, and even when movement is possible it is out of control. This, in fact, is what has occurred; for spastic paralysis indicates that, although the lower nerves are undamaged, the controlling centre in the brain has been affected.

If the patient survives, there may be varying degrees of improvement in the paralysis, which is always at its greatest in the beginning.

When such an emergency occurs it is best to leave the patient where he is, keep him warm, take out his dentures if any, call the doctor, and on no account to give him any fluids or alcohol. No patient in coma should ever have fluids poured down his throat. Other causes of coma are diabetes, alcohol, uræmia, acute hypertensive (high blood-pressure) attacks, and thrombosis or embolism.

In thrombosis and embolism a similar picture to that of hæmorrhage occurs. Embolism comes on suddenly like a hæmorrhage, but in thrombosis or clotting the onset may be more gradual, with premonitory symptoms of headache, giddiness, and numbness or pins and needles in the limbs. There may be difficulty in speaking.

Tumours and Abscesses. The brain is soft, greyish white in colour, and from the upper surface closely resembles a huge walnut in that it has two sides joined across the middle by a smaller part known, in the brain, as the corpus callosum. It resembles a walnut, too, in that its surface is crumpled up into convolutions. Investigation of the brain has become more and more refined in recent years, the following being some of the techniques employed:

(1) Straight X-rays.

(2) Arteriograms, which have already been described.

(3) Encephalograms or ventriculograms, in which some of the fluid, the C.S.F. surrounding the brain or in the cavities known as ventricles within the brain substance, is removed and replaced by gas. The gas may be helium or oxygen, and it has the effect in an X-ray picture of outlining the brain and ventricles so that any distortion of shape due to a tumour or abscess is outlined.

(4) Electroencephalograms are pictures made of the electrical brain waves produced by the brain, just as the electrocardiograph takes pictures of the similar waves produced by the heart. Electrodes attached to the scalp may show abnormal waves over the site of a tumour or abscess.

(5) Still more recently, radioisotopes have been used to locate tumours, since radio-

active substances become concentrated in the area of the abnormal tissues.

The main symptoms of brain tumour are severe headache, vomiting, and disturbances of vision; such symptoms must be referred to a doctor at once. The pulse-rate is usually slow. All these symptoms are caused by increasing pressure within the brain because of the space taken up by the tumour.

The popular belief that a brain tumour is tantamount to a death warrant is simply untrue; for at least 80–90 per cent. of cases recover. The main types of tumour are meningiomas (*i.e.*, tumours of the brain coverings or meninges); tumours of the nerve fibres within the brain or neurofibromas; tumours of the pituitary gland; and gliomas, which are tumours of the brain substance. The outlook for all of these is good, except in the case of the glioma, which is a type of tumour which tends to infiltrate into the substance of the brain fairly rapidly. It is not localised, and therefore complete removal is not always possible.

Brain abscesses may be spread from the bloodstream in people with bronchiectasis, osteomyelitis, infected sinuses, or chronic ear disease. The symptoms are similar to those of tumour, but there is also fever and drowsiness.

Aphasia is a disturbance of the ability to speak, write, or to understand spoken or written words. It is usually due to a tumour, abscess, thrombosis, or embolism of the speech area in the brain. In motor aphasia the muscles of speech are normal, but the patient is unable to speak intelligibly. In nominal aphasia the patient cannot name objects, which he nevertheless is able to recognise. In agraphia the patient cannot write, although his muscles are normal. In word-blindness and word-deafness the patient cannot understand written or spoken words respectively. Treatment depends upon the cause, but in hopeful cases re-education is sometimes possible.

Headaches. This seems a convenient point to say something about headache, which must surely be one of the commonest symptoms suffered by the human race. We shall begin by noting that at least 90 per cent. of all headaches are nervous in origin or the result of such other minor troubles as gastric upset. It is doubtful whether headache is as frequently brought about by eye-strain as is often supposed, but there is certainly no harm in having one's eyes tested if frequent headaches are present.

A doctor will first try to distinguish between headaches due to mental causes and those due to organic or physical ones. When the cause is physical the headache is often very severe, usually located sharply in one area (for example, on one side of the head), and it is likely to be accompanied by other symptoms, such as vomiting and eye-disturbances. The person with this type of pain often tries to minimise the pain he suffers, but his behaviour—for example, his obvious fear of moving his head—belies him. The neurotic person, on the other hand, suffers from headaches which are "terrible," "awful," "unbearable," vague in their location (they are "all over"), and, if they are accompanied by other nervous symptoms, the diagnosis is clear. Apart from the neurotic type, headaches are caused by migraine, increased pressure within the skull, as in brain tumour or abscess, sinus disease, and eye diseases. Treatment obviously depends on the cause, and the sensible thing to do is to go to a doctor, believe what he says, and take his advice. Neurotic headaches may be dealt with by investigation of the sources of worry, frustration, and so on which cause the pain, or by taking aspirin or other pain-relieving drugs. (Pain, in fact, is one of the very few things aspirin is good for, and as has already been said elsewhere, those who believe that it is good for "nerves," insomnia, and all the various conditions which make aspirin an almost universal cure in the minds of many, are deluding themselves.)

Migraine is a disorder which many claim to possess and not so many really do; if all the people who claim this dubious honour—often those who have little better to do than be bored with themselves—if all these were put end to end, or even stood upright in a line, they would surely encircle the Earth. True migraine, however, is a very clear-cut disease, and happens in a very definite type of person. The owner of the migraine tends to be a highly intelligent and conscientious—even over-conscientious—individual (not at all like Mrs. Jones, who says she suffers from it and could by no stretch of the imagination be described either as intelligent or over-conscientious). The headaches are severe, usually on one side of the head only, occur in periodic attacks, and are not, like the headaches suffered by Mrs. Jones, "there all the time." Vision is affected so that there may be hemianopia (*i.e.*, half-vision), flashes of light before the eyes, and the so-called fortification spectra (*i.e.*, zig-zag patterns in the field of vision). The pain is often prostrating, and is usually followed by attacks of vomiting. Migraine is a mystery disease which apparently has something to do with the personality, with emotional stresses, and conceivably in some cases with allergy; the actual pain appears to be caused by spasm of the blood-vessels in the brain. The usual treatment is with tablets of ergotamine (Femergin), but other remedies are also helpful in different cases.

There are a number of other nervous diseases the cause of which remains a mystery, and of these we shall mention epilepsy, chorea, and pink disease.

Epilepsy is a disease which has troubled many famous men—it has been attributed to St. Paul, Julius Cæsar, Napoleon, and (with more justice, perhaps) to Dostoievsky. Epilepsy manifests itself in various ways, the common type being *grand mal* seizures, in which the patient falls down unconscious, his muscles become tense, his jaw clenched so that he is in danger of biting his tongue, and his body is rigid all over. This is known as the tonic phase, and it is followed by the clonic phase, when, within a minute or so, the limbs begin to contract rhythmically. As this phase passes away the patient lies limp and gradually recovers consciousness. Often he does not know what has happened. Sometimes he is confused, forgets where he is, and wanders away in an attack of loss of memory (amnesia or epileptic fugue). In *petit mal*—the name means the little sickness—the attack may be hardly noticeable. The patient is perhaps talking or doing something, when without any warning he simply stops, looks dazed or confused for a brief period, and then carries on again. Occasionally there may be localised twitchings of the arm or leg. In temporal epilepsy, in which the condition arises in the lobe under the temples, there is no obvious interruption of consciousness, but the patient suddenly stops what he is doing and proceeds to do something else. For example, a man whilst at work may stop what he is doing and for no apparent reason at all proceed to go through his pocket-book, examining its contents with great care, and then puts it back in his pocket without afterwards knowing what he has done. Rarely, criminal acts may be carried out whilst the individual is in this state.

Epilepsy tends to run in families, and it varies greatly in severity from the case where an isolated fit occurs once in a lifetime to the case where fits are frequent and violent, and there may finally be some degree of mental deterioration. Some cases, although not many, pass into a state in which one fit succeeds another until death results. This is known as status epilepticus. Fits may have many causes: hypoglycæmia (*i.e.*, lack of sugar in the blood produced by an overdose of insulin), lack of oxygen, uræmia, injury to the brain from an accident, brain tumours, and meningitis. But true epilepsy shows no such antecedents—it just happens, and although it is apparently the result of something wrong with the chemistry of the brain, what this something is, is not known.

It is important not to jump to the conclusion that because someone has a fit they therefore have epilepsy, and all such cases should be carefully investigated. Children, in particular, may have convulsions during a fever when the temperature is high without necessarily having epilepsy. The treatment of idiopathic epilepsy, that is, the type due to no known primary cause, is to give sedatives which damp down the brain activity. In former

times bromides were used for this, and later phenobarbitone, which, indeed, is still used, but more recently the tendency has been to use such drugs as Epanutin with or without phenobarbitone, as this drug makes the patient less drowsy and is, in some cases, more effective.

Epileptics often find it difficult to get work because of the reluctance of employers to take on someone who may be more prone to accidents and whose fits may distress other workers. Obviously there are some jobs which epileptics should not do because of the danger involved, and they should not drive a car; a few cases are so severe that work is almost impossible. But employers have a duty, whenever possible, to employ these people, whose mental health may suffer greatly if they are made to feel outcasts and who ordinarily are as efficient, or even more so, as the next man. If some of the famous men who have suffered from this disease had had to rely on the charity of some employers today the world would have been much the poorer, although possibly we could have managed without the generals.

Chorea, or St. Vitus' Dance, is connected in some way with rheumatism, especially with rheumatic fever. It is much less common than formerly, and is also known as Sydenham's chorea, after the English physician who first described it and to distinguish it from Huntington's chorea, a serious hereditary and incurable degenerative disease which leads to progressive mental deterioration. Fortunately, Huntington's chorea is rather rare. The patient with Sydenham's chorea is a child, most often a girl, and one who has been rather delicate and nervous. She shows an inability to keep still and makes purposeless movements, such as writhing and twitching of the limbs and grimaces of the face. The speech may be affected, and the muscular inco-ordination may be so pronounced that dishes or other objects fall from the hands when lifted. The treatment for chorea is that for acute rheumatism with the addition of sedatives. The heart may be affected.

Pink Disease is a disease of young children between the ages of six months and three years. Why it should be included here is not certain; for its cause is unknown, and the theories to explain its origin range from the supposition that it is a vitamin-deficiency disorder, an infection, or the result of poisoning by mercury in teething powders, to the more probable theory that it is a vasomotor disorder like chilblains brought about by the nerves which control the diameter of the arteries. (Here it should be said that "teething powders," whether or not they play any part in causing this disease, should never be used, anyhow, since in the first place—doubtless to the great indignation of mothers who, of course, always know best—one must say that it is extremely uncertain whether the many disturbances allegedly due to teething have anything to do with teeth at all, and secondly, that whether or not teething causes anything, it is certain that the numerous powders available in the shops can do nothing about it.) Pink disease was first described in Australia in 1914, and the general picture is that of a child in acute misery with itching or burning of the hands and feet, which are swollen and pink in appearance. Sometimes the face, ears, and nose are affected, there is loss of appetite, sweating, insomnia, and thirst. The treatment of the condition, which may last many months but with an ultimately good outlook, is injection of the B vitamins, especially B12, rest, and sedatives.

Angio-neurotic œdema. Another mysterious disease, common to both children and adults, and mentioned here because it, too, seems to be caused by malfunctioning of the nerves controlling the blood-vessels, is angio-neurotic œdema in which attacks of œdema (swelling) occur in various parts of the body, but are most apparent in the face. Undoubtedly allergy to various foodstuffs can play some part, but emotional factors are at least equally important. Very frequently, without any warning at all—but often after an emotional outburst—the face within a short time swells so that the patient is almost literally unrecognisable. Sometimes the swelling is so severe that breathing is endangered by œdema of the glottis, the entry to the windpipe. An immediate injection of adrenalin usually starts to clear up the condition, and for later use the antihistamine drugs have proved helpful.

THE DEGENERATIVE DISEASES.

There are very many conditions coming into this category, and they are given different names according to the parts of the nervous system affected. However, they all have this in common, that they are the result of a degeneration of groups of nerve cells, usually for no known reason, and, since nerve cells once destroyed can never regenerate, the diseases are usually irreversible and progressive. In a few cases, however, they can be arrested.

It would be impossible to deal even briefly with all these diseases, so here only a few of the more common ones will be discussed. The ones we shall mention are: muscular atrophy, amyotrophic lateral sclerosis, disseminated sclerosis, syringomyelia, and subacute combined degeneration.

Muscular atrophy is, in fact, a whole group of diseases in which there is some damage to the lower parts of the nervous system, usually in the nerve cells at the point where they leave the spinal cord. The common type, *progressive muscular atrophy*, occurs in middle age or over, and the patient begins to note wasting of the muscles in first one hand and then the other. Ultimately, the hand becomes claw-shaped, and some wasting may spread up the forearm. It may finally spread up to the base of the brain, with fatal results. There is no known cure. In children a similar condition is *peroneal muscular atrophy*, in which degeneration of the nerve cells in the spinal cord leads to wasting both of the hands and legs. In this case, however, the disease may stop of itself after several years.

Amyotrophic lateral sclerosis affects both the lower and higher nerve cells. There is wasting of the hands and arms, with increasing weakness, and the legs show a spastic type of paralysis, *i.e.*, they do not waste, but the muscles are in varying degrees of spasm and the knee-jerk and other reflexes are increased. The disease has been treated with concentrated vitamin E, but the results are uncertain. It should be noted that to say that a disease is incurable is not at all the same thing as saying that the patient is going to die from it. Some of these diseases progress very slowly, or may stop of themselves, and any disease process tends to go slower as one gets older. For example, many old people with cancer die of old age long before they are in danger of dying from the disease.

Disseminated sclerosis—sclerosis means hardening of the affected parts of the nervous system—is a progressive condition which goes on with periodic intermissions of improvement. Often the first symptom is double vision or sudden weakness in a limb, but the later symptoms are largely those resulting from loss of muscular co-ordination; thus, when the patient is asked to shut the eyes, stretch out the arm at right-angles to the body and then touch the tip of his nose, he manages the first part of the movement fairly adequately, but as the finger nears the nose it starts to wobble and fails to reach its goal. There is thus some loss of sense of position and difficulty in carrying out such actions as drinking tea from a cup. Another typical symptom is nystagmus, in which, when he is asked to look to one side, the patient's eyes jerk back and forth (this condition is, of course, also a feature of so-called "miner's nystagmus," which appears to have a large psychological element and certainly has nothing to do with disseminated sclerosis). In later stages the spinal cord becomes affected and there are varying degrees of paralysis in the lower half of the body so that the legs are useless and there is loss of control of bladder and bowels. Thus, although disseminated sclerosis is not by itself a fatal disease, it does result in the long run in the patient becoming increasingly bed-ridden. Ex-

amination of the nervous system reveals that the covering of the nerve fibres—which have a sort of insulating layer much the same as in the case of electric wires—has been damaged and the underlying fibres have degenerated themselves. Where this damage occurs, and this appears to be completely fortuitous, determines the nature of the symptoms and where they occur. Many treatments have been tried, but their number only emphasises how little we know. The disease may be the result of inborn weakness in the fibres, of allergy, or of a virus infection with a so far undiscovered virus, but since it occurs in young adults in the prime of their life it is a particularly tragic disorder. Strangely enough, it is confined almost entirely to Europeans, and is rare elsewhere in the world.

Syringomyelia, another degenerative disease, is caused by the formation of small cavities in the upper parts of the spinal cord in the neck and chest regions. These cavities become surrounded with scar tissue, and hence interfere with nerve impulses passing down the areas where they occur. The patient may be any age between ten and thirty, and suffers from both sensory and motor symptoms. There is wasting of the muscles of the hand, and sometimes of the arm and shoulder, and specially typical is loss of the sense of pain with retention of the sense of touch. Because of this, the patient may burn or cut his fingers without noticing anything. The disease is slowly progressive over a long period of time, and there is no known effective treatment.

One of the few degenerative diseases which can be treated is *subacute combined degeneration*, which is invariably associated with pernicious anæmia. A middle-aged patient notices numbness, pins and needles, and so-called lightning pains in the fingers and toes and later in the limbs. The muscles are weak, and the tongue is smooth and glossy. On examination, the symptoms of pernicious anæmia are found. Treatment for the anæmia puts a stop to the disease, although damage already done may remain.

INFLAMMATORY DISEASES.

These are those, such as shingles or neuritis, which may be due, as is shingles, to virus infection, or to various causes, as is neuritis. The virus causing *shingles* is apparently the same as that causing chickenpox. Shingles, or to give it its proper title *herpes zoster* (it must not be confused with *herpes labialis* or cold sore of the lips, with which it has no connection whatever), shows itself in the form of a band of pain surrounding the upper abdomen or chest, which is then followed by an eruption with blisters in the affected area. There is no specific treatment; aspirin may be given for the pain and the eruption painted with collodion or " New Skin." Ordinarily the condition clears up fairly quickly, but the pain may persist for a long time. Injections of vitamin B12 are sometimes helpful.

The word " neuritis," meaning inflammation of a nerve, covers many different types of illness: polyneuritis, simple neuritis, neuralgia, sciatica, prolapsed vertebral disc, and other conditions. All they have in common is nerve pain; for, as in the case of " colds," one cannot assume that because a condition has one name it represents one disease or has even one cause.

Multiple, peripheral, or polyneuritis is, as the name indicates, a condition in which numerous of the peripheral nerves, mainly in the limbs, are affected. The symptoms will vary according to whether motor or sensory nerves are attacked. The causes are various: poisons, such as lead, arsenic, or alcohol; bacterial poisons, such as those of diphtheria, typhoid, or gonorrhœa; vitamin deficiencies, as in beri-beri; and, finally, diseases of metabolism, such as diabetes. Rarely, an infection known as acute infective polyneuritis causes the symptoms. The parts affected depend to some extent on the cause. Thus alcohol brings about, when taken in excess, pain in the calves and foot-drop (*i.e.*, the foot hangs down and cannot be raised to its normal position); neuritis due to diabetes and arsenic shows similar symptoms, whereas in lead poisoning not only the foot but also the wrist may be affected. Diphtheria tends to attack the palate and the eyes, causing difficulty in swallowing and in vision.

The ordinary type of neuritis, however, is localised—and here it should be said that many pains described as neuritic are nothing of the sort, being probably caused by fibrositis or muscle and joint disorders. Typical of localised neuritis is *Bell's palsy*, neuritis of the facial nerve, in which one side of the face is paralysed so that the eye on the affected side will not shut, and the mouth droops down. Asked to whistle or blow out his cheeks, the patient with facial paralysis is unable to do so. The usual cause of Bell's palsy is cold—for example, it is common to find that the patient has been driving with the car window open in cold weather. But facial paralysis may also be caused by infection in the middle ear. Most cases clear up in a fairly short time, but in a few instances the palsy is permanent. There is very little evidence that the treatments usually employed, such as electrical stimulation, have any effect, but injections of concentrated vitamins B may be useful.

Other familiar types of neuritis are *sciatica* and neuritis in the arm. They can be caused by fractures, or pressure from tumours, or the callus (excess bone) in badly healed fractures; cold, too, is said to be a factor, and then there is always " idiopathic neuritis "—which, in everyday language, means that one does not know the cause. Most cases, regrettably, are idiopathic. In sciatica, we have a condition which is not a disease but rather a symptom. The familiar pain down the back of the leg may be caused by alcohol, rheumatism, diabetes, tumour, fibrositis, " slipped disc," arthritis of the hip joint, infection from local areas in the body, such as tonsillitis, and so on. Treatment depends on the cause, which frequently is never found.

Prolapsed Intervertebral disc is a popular disease in these days. It causes a sciatica-like type of pain, and is brought about by the bulging of an intervertebral disc (the shock-absorbers, which lie between the vertebræ of the spinal column) into the area where it can press upon the nerve root. Treatment is first by rest and pain-relieving drugs; if this is not enough laminectomy is performed and the protruding part of the disc removed.

Paralysis agitans or Parkinson's disease may result in young adults following an attack of encephalitis, or in older people, in whom the part of the brain concerned simply deteriorates. The face becomes expressionless, the movements stiff and slow, the gait shows a shuffling tendency, in which the patient bends forward and seems to be running to catch up with himself. There is tremor of the fingers and the so-called " pill-rolling " movements, in which the thumb and fingers are constantly moving against each other. Treatment is by drugs, such as hyoscine or more modern proprietary ones; in some cases surgical operation has been used with varying degrees of success. The disease is also known as " shaking palsy."

MENTAL DISEASES.

Psychosis.

Mental diseases are divided into psychoses (*i.e.*, insanity) and neuroses (*i.e.*, what is ordinarily known as " nerves "). Psychoses, in their turn, are divided into organic and functional—those due to physical disease and those in which no physical cause has been discovered. In point of fact, the distinction into organic and functional is rather meaningless; for if we accept the modern view of psychosomatic medicine which regards the body

and mind as a single unit it is clear that organic disease brings out psychological defects which were already there and that functional disease must, in the final analysis, be the result of physico-chemical causes, even if this is brought about by mental stress.

Organic disease results from poisoning of the nervous system by such poisons as alcohol, carbon monoxide, or lead; vitamin deficiencies, as in pellagra; infections such as syphilis; and degeneration of the brain, either primary or as a result of poor blood supply. In all cases its main symptoms are confusion, signs of other disease, and loss of memory. Alcohol leads to various conditions: in *delirium tremens* heavy bouts of drinking end in delirium ("D.T.s"), confusion, hallucinations—although not necessarily of pink elephants or rats. It is a serious disease, but the outlook is much improved since it was discovered that injections of concentrated vitamins B and C in the form of "Parentrovite" can help. In more chronic cases *Korsakov's syndrome* manifests itself in the form of mental deterioration and memory defects. There can be little doubt that previously existing mental instability is a predisposing factor in these conditions. The same may be said of *general paralysis of the insane* or G.P.I., and in this case the immediate cause is syphilitic infection of the nervous system. Nevertheless, of all the patients with chronic syphilis, only a small number get syphilis of the nervous system. G.P.I. is typically associated with the usual symptoms of organic disease and delusions of grandeur; for example, a man with this disease may go out and buy several expensive cars in one day. However, it is not uncommon to find G.P.I. associated with severe depression—again the picture depends on the previous personality. At one time G.P.I. was considered hopeless, but treatment by malaria (that is, deliberate injection of malarial germs) was found to be helpful. Today, although in some places the treatment is still used, penicillin is found to be adequate. The association of the above symptoms with a positive Wasserman test—which proves the presence of the spirochæte in the blood—indicates neurosyphilis. When the lower centres of the nervous system are affected the disease is known as *tabes dorsalis*, in which there is difficulty in passing urine, limb pains, inability to stand when the eyes are closed, and finally difficulty in walking. The patient becomes paralysed and ultimately bedridden. Treatment is with penicillin.

People age at varying rates, so that some are hale and hearty at eighty or ninety whereas others are old at sixty or seventy. They present the typical picture of old age: "second childishness and mere oblivion, sans eyes, sans teeth, sans everything." When this condition, which is caused by degenerative changes in the brain or by defective blood-supply resulting from arteriosclerosis, is pronounced we speak of *senile psychosis*. There is mental confusion, forgetfulness, and delusions, in which the previous personality defects which we all have are accentuated. Such patients may have to be put under special care, but the process is largely irreversible.

The functional psychoses are two in number: schizophrenia and manic-depressive insanity. In *schizophrenia*, which, when it occurs in early adult life, is known (or used to be known) as *dementia præcox*, the symptoms are bizarre. There are delusions and hallucinations, so that the patient often believes himself to be persecuted and hears voices which say objectionable things to him. Sometimes the schizophrenic is wildly excited, and in other cases he goes into a state of stupor which is described as a catatonic state. Although the disease is described as functional, recent discoveries seem to suggest that there is some derangement of the blood chemistry. Treatment by insulin and the new tranquillising drugs has revolutionised the outlook in this admittedly serious disease. Indeed, some cases of psychosis are more easily treated than neurotic patients, since the former respond to physical methods, whereas the latter may require fairly prolonged psychotherapy (psychological treatment).

In cases which do not respond to other methods, the brain operation known as *leucotomy* may be performed. Leucotomy is also performed to alleviate intractable pain, as in incurable cancer, but some of the ataraxic drugs (tranquillisers) are probably equally useful for this purpose. Leucotomy involves the severing of the connecting nerve fibres between certain areas of the brain, and the results are most favourable, but in fact the operation should be performed only in cases where the outlook is otherwise very poor; chronic severe neuroses, frequent attacks of manic depressive psychosis, severe chronic depression, and schizophrenia which has not responded to other forms of treatment. The operation reduces anxiety, fear, aggressiveness, and agitation, but may result in the less-desirable symptoms of apathy, impaired judgment, lack of self-control, and loss of initiative.

Schizophrenia developing in later life is likely to be less dramatic in origin, and the delusions tend to be more systematised—that is, they take a persistent form, which does not change from day to day. This type of the disease is known as *paraphrenia*. In those beyond middle age the rare but dangerous condition described as *paranoia* may develop in which there are no hallucinations and the only symptom is a completely systematised collection of persecutory delusions, which on recital may sound entirely convincing even to the ordinary doctor. Such people are dangerous precisely because they are so plausible, and they fill the ranks of the litigious, the trouble-makers, and the political and religious eccentrics. One such patient known to the writer spent his life in a mental hospital from which he had parole, which he used to form a society propagating highly eccentric sexual and political beliefs. It says little for the intelligence of the general population that his meetings were invariably crowded out (although, of course, when one reads of the people who apparently believe that the various fictitious families on radio or television—the Groves, the Archers, and the like—really exist, one need not be surprised at such examples of communal dottiness, even if one may despair of democracy).

Manic-depressive insanity is characterised by mood swings in which the emotions alternate between wild elation without obvious cause and equally causeless depression. However, the picture is not quite as simple as this; for phases of mania or excitement may occur without depression obviously following, or there may be a single attack of depression with no manic phases. The disease may be absolutely incapacitating, or there may be periods of relative normality; typically, then, manic-depressive insanity is a disease of alternating moods. The depression responds to electroconvulsive therapy or E.C.T., but mania is less responsive to treatment. However, it ordinarily remits of itself. Sometimes in middle age *involutional depression* occurs, and this in the vast majority of cases is cured by E.C.T.

Neurosis.

The main neuroses are anxiety neurosis, hysteria, and obsessional neurosis. *Anxiety neurosis* is an illness in which the main symptom (as the name implies) is anxiety. There is fear which rationally the patient knows to be groundless; there may be anxiety attacks, in which the heart pounds, the patient feels he is going mad, is unable to sleep, and worries "for no reason at all." In hysteria, anxiety is largely absent, but there may be apparently physical symptoms ranging from paralysis of the limbs to blindness, deafness, inability to write, and lapses of memory (the so-called hysterical fugues or loss of memory). Typical of *hysteria* is the fact that the patient is less worried by his symptoms than would be expected from their apparent seriousness; this is what the early psychiatrists described as "la belle indifference." The reason for the indifference is simple—it is that the paralysed individual *wants* to be paralysed, the blind *want*

to be blind, the deaf to be deaf (there are none so blind—or deaf—as those who don't want to see, or hear), and the person who doesn't want to write conveniently finds that he cannot.

Generally speaking, neurotic people are suffering from a failure to face up to reality. They are not physically ill and are largely the end result of a faulty upbringing. It is wrong to suppose that the only bad families are those in which the children are ill-treated; much the worst ones are those in which children are spoilt, the parents possessive, and the wrong kind of love is dispensed. Neuroses are the result of a conflict between primitive desires and what the individual has been brought up to believe he should be. For example, before an examination a student may develop a nervous breakdown because he fears failure when he has been brought up to expect success. The excuse, of course, is "overwork"—an entirely non-existent condition. With his breakdown he solves his problem, he avoids the fear of failing and preserves his self-respect: he has been ill. Similarly, the soldier with "shell shock" (another non-existent condition) has a conflict between his sense of duty and his fear of death, which again is solved by becoming ill. Or, to take a final example, a woman feels the duty to look after her ageing mother. But she also wants to get married. So she unconsciously develops a neurosis which says, in effect, "I should like to do my duty in looking after my mother, but unfortunately I am unable to." There is an unconscious rebellion on the part of the mind.

Neurosis, in effect, is not a disease—it is a self-inflicted injury, a form of maladaptation to life. The neurotic, no matter how much he suffers, does not want to get well; he has found some way of getting along, even if a foolish way, and he intends to keep it. Often his symptoms are the sort of excuse that say: "If only I wasn't ill what wouldn't I be able to do!" The neurotic is a person who is different and is afraid to be himself; his problem is a conflict between being "ordinary," "like other people," and being what he was supposed to be. You will find some other suggestions about neurosis in the section dealing with Family Affairs.

Obsessional Neurosis is a more severe type of neurotic illness; for although in anxiety neurosis we find such symptoms as phobias—irrational fears of open spaces, closed spaces, animals, and so on, obsessional states are characterised by compulsive feelings that certain acts must be performed or certain thoughts thought. In a mild form we all have obsessions: we feel that we must walk on the spaces between paving-stones, that we must touch lamp-posts, and so on. But when this type of compulsion gets to the stage when we must go back several times to make sure the lights have been put out, when we feel the need to wash our hands every few minutes, become obsessed with numbers on cars or dates on coins, then it becomes a nuisance and requires treatment. Usually the treatment is psychotherapy—whether psychoanalysis according to the method of Freud or shorter methods—and, in serious cases, physical methods such as L.S.D. (lysergic acid) or leucotomy. The obsessional neurotic is a person who feels that life must be controlled; he is "a creature who moves in predestinate grooves—he's not even a bus but a tram." His symptoms are an attempt to devise self-imposed rules which will control the unconscious desires of which he is so afraid.

Neurasthenia is an entirely imaginary condition allegedly due to exhaustion of the nervous system. Since no such condition exists, we need not bother with it. Neuroses cannot be treated by feeding the nerves (which are perfectly normal). They can be helped by such things as sedatives, but not cured. *Neurosis has nothing at all to do with disease of the physical nerves, so nerve tonics do not exist, and anyone who asserts that they do is a humbug.* Glycerophosphates and the usual contents of tonics are excreted almost as soon as they are taken in, and tonic wines are one of the best ways of becoming an alcoholic. The one reason for not taking alcohol is when one craves it, and many a "respectable" old lady has required several dust-carts to carry away the store of empty bottles left behind when she died.

Psychopathic Personality is the term given to anyone who has different standards of behaviour from those generally accepted by society. Some of these unfortunates may be *inadequate*, that is to say, although perfectly intelligent, unable to earn their own living. Others are the *creative* people, who, as in the case of Van Gogh, did many eccentric things but also many productive things—Van Gogh was gifted, or cursed, with an intense sensitivity. Lastly, there are those who have what others regard as peculiar sexual habits. Of the first two classes nothing more need be said, and all that is necessary is to mention certain of the so-called sexual perversions. (When we say so called the implication is not that none of these forms of behaviour is perverse but that some of them are carried out by otherwise quite ordinary people.) *Sadism* and *Masochism* refer to, in the first place, pleasure in inflicting pain and, in the second, to receiving pain. The pleasure is sexual, and it is incorrect to talk of cruelty in itself as sadism. Sadism is named after the Marquis de Sade, who suffered from this perversion, although he certainly did much less harm in his small way than numerous politicians or generals of our time, and masochism is named after the Austrian novelist Sacher-Masoch, who wrote books which, although unpleasant, were not notably more so than certain Sunday newspapers of today.

Masturbation, which used to be known as "self-abuse" and, even more incomprehensibly, as Onanism (after a story in the Bible which has no relationship to the problem at all) is sexual self-stimulation. Needless to say, it produces no more *physical* harm than ordinary sexual intercourse—that is to say, none at all, although some people have the strange belief that every act of intercourse weakens the body and it has even been believed that each act shortens life by a specific length of time. This is rather illogical in view of the fact that most of the famous rakes have been noted for their longevity! Masturbation is almost universal in infancy, adolescence, or even in later life when other outlets are not available. It need only be a matter of concern: (*a*) when it is chosen in preference to normal sexual activity, or (*b*) when it is compulsive and excessive, since then it is a sign, not of sexual desire, but of severe underlying anxiety.

Homosexuality is, as presumably most people now know, an attraction between individuals of the same sex. Feminine homosexuality is not illegal in Britain, but male homosexuality is. The Wolfenden Report of 1957 takes a much more tolerant view of the problem than has been hitherto current, recommending, in effect, that homosexual acts between consenting adults should be legalised. Homosexuality is, so far as is known, not inherited, and is the result of psychological difficulties in early development; occasionally it can be treated by psychotherapy, but it is doubtful whether those "cured" in this way were ever genuine homosexuals. To any humane person it must seem that the Wolfenden Report gives a sensible solution to the problem; for it is difficult to see why the homosexual should be treated differently from the heterosexual offender. That is to say, what adults do (with consent) together is their own business, but the male homosexual who seduces a boy under age should be treated in no way differently from the man who seduces an under-age girl.

All that remains to be said is that many of these conditions are treatable or, if not treatable so far as cure is concerned, they can at least be relieved. The world is full of people who are "different"; there are those who are different in the right way, who should take satisfaction from their achievements, and those who are different in the wrong way, who should seek expert advice. Since psychological treatment is time-consuming, it is not very easy to obtain it within the National

Health Service, although group treatment has simplified the problem. However, any person with such difficulties would probably benefit from a discussion with his family doctor.

DISEASES OF THE SKIN.

The skin in the course of development before birth is particularly closely associated with the nervous system. It is therefore not surprising that so many skin diseases are influenced by emotional states. Other causes of skin disease are infections, glandular disorders, vitamin deficiencies, and the numerous conditions for which no cause has been discovered, but which presumably are due to metabolic disorders.

One of the commonest of skin symptoms is *itching or pruritis*, as it is more properly described. This may be caused by parasites, such as the *scabies* mite or *lice*. The scabies mite is very small, and since it burrows under the skin surface, is even less likely to be seen; it is the cause of itching most commonly between the fingers and on the front of the wrists. The itching is worse when the body becomes heated, as when one goes to bed. Treatment is hot bathing, followed by inunction with sulphur ointment, although there are now more pleasant preparations available. Scabies, of course, is contracted through close personal contact with an infested person. Lice are specialists, one type of which affects the scalp, another the body, and a third the genital area. There are various preparations which can destroy head lice, from lethane, a relatively pleasant treatment, to the traditional mixture of equal parts of olive oil and paraffin, which, needless to say, is as unpleasant as it sounds. The head must be covered with this mixture for about two hours and then washed. Body lice are best dealt with by D.D.T. powder, and genital lice by shaving off hair and washing. Obviously, the clothes, especially in the case of body lice, should be disinfested, either by the use of D.D.T. or, if this is not available, by using a hot iron over the seams, which lice (for some inexplicable reason) seem to favour. Apart from the discomfort they cause, lice are dangerous as potential carriers of typhus fever.

Itching may also result from other causes, and is especially common around the anus and genital organs. In these areas it may be caused by worms, by irritating vaginal discharge, by acid urine or —as in diabetes—by sugar in the urine. General diseases in which itching may occur are diabetes, jaundice, gout, and leukæmia. Lastly, and perhaps most commonly, pruritis may occur during the change of life in women, in old age, or in nervous conditions. Itching during the menopause is sometimes helped by sedatives and sex hormones, and there are ointments which may help; in very severe cases X-ray treatment may be necessary.

Baldness, or Alopecia, is a very common condition, as is manifested by the extraordinary number of preparations advertised as curing it. When many preparations are offered for the treatment of one condition it is a fair judgment to assume that none of them is likely to be effective. There are, in fact, two types of baldness; one, which is much the commoner, is hereditary, and cannot be influenced in the slightest by any treatment, the other, *alopecia areata*, is caused by nervous stress, and would recover in most cases by itself, whether one used a solution of soot and water or the most expensive "hair food." There is no such thing as a hair food, any more than there is such a thing as a nerve food, and although it is probable that hair hygiene may delay baldness, it certainly cannot prevent it. All hair tonics and "foods" are useless, and their uselessness is only equalled by their costliness. Those who have lost their hair and find it growing again after using some alleged tonic are people who have had *alopecia areata* and whose hair would have grown back anyhow.

Seborrhœa is a condition in which there is over-activity of the sebaceous glands, with subsequent infection. The most usual form it takes is *dandruff*. However, it takes other forms, and those who have dandruff may also have rashes on the face, shoulders, and chest. In these areas there is a patchy, greasy, and often itchy, rash which does not clear up until the primary condition in the scalp is dealt with. The scalp should be washed with one of the modern sulphur-containing shampoos at least twice a week, and the affected parts on the face and chest should be dealt with by the use of sulphocalamine lotion (*not* on any account by greasy ointments). Seborrhœa is not in itself difficult to treat, but, since the condition depends on over-secretion of sebum, the skin lubricant, treatment may have to be persisted in during the years of early adulthood, when it is most active.

Erythema Intertrigo is, quite simply, the sort of irritation which occurs usually from excessive sweating under the armpits, between the legs, and under the breasts in women. All that need be done is to wash frequently and to dust the affected areas after washing with powder. This is the condition which, in the tropics, is known as "prickly heat" and elsewhere as a "sweat rash." In some people *hyperidrosis* or *excessive sweating* is a problem, especially when the sweating is accompanied with body odour—the sort of thing that, according to the advertisements, "even your best friends won't tell you." There is little need for anyone in these days to suffer in this way: for the cosmetic firms have produced many highly efficient deodorants which not only control odour but also control the amount of sweating. Chlorophyll, which has been much advertised as removing odours, is, there can be little doubt, effective when applied directly to surfaces which give off an unpleasant smell. It is effective, for example, in septic wounds, and probably in the mouth. What is much more doubtful is whether, when taken by mouth, it prevents body odours. One is reminded of the fact that goats are: (*a*) noted for their strong odour, and (*b*) live on chlorophyll in the vegetation which they ordinarily eat:

> "The goat that reeks on yonder hill,
> Has fed all day on chlorophyll."

But, say the manufacturers, the chlorophyll we prepare is different; it is not sufficient simply to take chlorophyll as it comes from grass or any other type of green vegetation. And they may be right—who knows? In any case, one way or another, there is no reason why, in these days, one's best friend should have anything to tell at all.

A symptom which is only important because some people regard it as a sign of saintliness is *chromidrosis* or *hœmatidrosis*—the sweating of coloured perspiration, or what sometimes appears to be blood. Alas! the red coloration (as in the case of a certain "miracle" which occurs yearly in a church, which—to avoid offending religious susceptibilities—shall be nameless) is caused by bacteria. Blood is not sweated by anyone; not even by saints.

Chilblains are extremely common in cold weather, especially in those with poor circulation. Ordinarily they occur in the toes and fingers, but may appear on the nose and ears. The part affected becomes swollen, dusky, and there is pain and itching, sometimes leading to ulceration. Treatment is to give plenty of nourishing food and to stimulate the circulation. Vitamins A and D are useful, in the form of Adexolin or capsules of halibut-liver oil, and either nicotinic acid or "Pernivite" may be used. It is best to wear woollen socks and gloves during the cold weather. A skin affection caused by heat is rather grandiosely described as *erythema ab igne*, and is frequently seen on the legs of ladies addicted to roasting their legs before the fire. It takes the form of red patches on the front of the legs, and can be removed only by avoiding the cause.

Dermatitis means "inflammation of the skin," and therefore the word could be, strictly speaking, applied to any skin disease. It certainly does not

warrant the terror it usually seems to inspire when, as is often the case in industry, the worker, on being given the diagnosis, says: "You don't mean *dermatitis*, do you?" For some reason or other, the word is now ordinarily used to describe skin diseases caused by substances which harm the skin either because the individual is sensitised to them or because they are in themselves dangerous. When the injury is the result of a substance such as strong acids or alkalis which would be harmful to anyone, the condition is known as "primary dermatitis," and it is typical of such injuries that when the harmful material is removed the dermatitis goes. When, on the other hand, the disease is caused by allergy to an otherwise harmless substance—vegetables, detergents, soap, fruit, and even cosmetics—it may persist for a long time, even after the patient is no longer in contact with the material. At least 95 per cent. of cases come into this category, which has been described by an eminent skin specialist as "a disease of the personality," and only the remaining 5 per cent. are dermatitis caused by genuine irritants. As regards these cases, no problem exists; they clear up rapidly with conventional treatment. But the other 95 per cent. are a serious problem; such cases may respond to the antihistamine drugs, sedatives, and psychological treatment. In the most real sense they are suffering from a self-inflicted injury due to their problems, their resentment, or anxiety, and it is noteworthy that most cases of this type of dermatitis occur in departments where morale is low.

Impetigo is an infectious skin disease caused primarily by the streptococcus, but later often infected with staphylococci. It usually occurs on the face, and takes the form of blisters filled with pus on a red base; when the blisters burst their place is taken by yellow crusts. Impetigo is very infectious and easily spread by the fingers, dirty towels, or cloths; therefore, one of the first necessities is to prevent infection of others or reinfection of oneself by avoiding scratching and using a different towel each day, which must on no account be used by anyone else. Treatment is simple, with sulphonamide powder or penicillin, so the main issue is prevention of contamination. If care is not taken on this point, no treatment is of the slightest use.

Sycosis or "Barber's Rash" occurs in men, and is similarly treated.

Urticaria, or Nettlerash, is a familiar skin disease in which blisters appear on the skin for no obvious reason. It is not infectious, and is caused by allergy to some foodstuff (such as shellfish, mushrooms, or fish of any type which is "a bit off"), certain drugs, and nervous stress. The blisters are itchy, and in those who are specially susceptible it may even be possible to write on the skin with the finger-nail: the "writing" appearing in the form of weals. This is known as "dermographia." The immediate treatment is an injection of adrenalin; afterwards the antihistamine drugs may prove useful.

Acne, or "Blackheads," is a condition found on the face and shoulders; its appearance is so familiar that no description is necessary. Acne is one of those conditions which is the end result of many factors. There is, first, a greasy skin, the result of glandular upset (which is why the disease usually occurs in adolescence); secondly, there is infection of the skin; and thirdly, there is blockage of the sebaceous ducts, which ordinarily allow the grease from the skin to pass out on to the surface. Since the condition starts with excess secretion of grease, ointments should never be used, and probably the best application is sulphocalamine lotion. The face should be frequently washed, and it is possible now to obtain detergent solutions which are both antiseptic and prevent grease formation. In severe cases X-ray treatment may be necessary.

Rosacea. As has already been implied elsewhere, although the wages of sin may be extremely unpleasant, the wages of extreme virtue may be no less troublesome. Thus *rosacea*, in which the nose and cheeks become red and greasy and the skin coarsened, occurs alike in chronic alcoholics and elderly ladies with no vices other than a preference for strong tea. Both cases are associated with indigestion, since, regrettable as it may seem, strong tea and alcohol are about equally liable to cause the gastritis which is invariably at the root of this complaint. Treatment consists in the careful attention to diet and temperance in all things—especially tea.

Lichen Planus is one of the numerous skin diseases which seem to be due to nervous states of tension. It may occur on any part of the body, but is most common on the front of the forearms and legs. The rash takes the form of blisters which are lilac in colour and have a dent on the top; when these disappear a stain is left behind. There is severe itching. Treatment is a matter for a specialist, as it also is in the case of *psoriasis*, a very common disease of largely unknown origin, which is extremely resistant to treatment. It takes the form of slightly raised papules, usually on the elbows and knees; typically the papules are covered with dry, silvery-looking scales. Apart from the rash, the patient is usually in perfectly good health and there is no itching. Many drugs have been used in psoriasis, notably chrysarobin, and while it is not difficult to cause the rash (which may occur anywhere on the body) to disappear in one area or even in all areas for a time it has a strong tendency to return.

Warts, or Verrucae, are familiar enough. They are caused by a virus, and are, theoretically at least, contagious (although having removed many warts, the writer has never found them contagious). Most frequently they are found on the hands, but may occur elsewhere. Treatment is best carried out by a doctor, who will use a cautery, a caustic stick, or in severe cases X-rays. A curious feature of the common wart is that it can sometimes be caused to disappear by suggestion, which is presumably why so many old wives charms are not necessarily without effect. Different altogether from the common wart is the *plantar wart*, which occurs on the soles of the feet and often causes a good deal of discomfort. It is best dealt with by a chiropodist or in bad cases by a skin specialist.

Icthyosis. A condition with which some unfortunate people are sometimes born is *icthyosis*, in which there is absence of secretion from the oil and sweat-producing glands, rendering the skin dry and scaly like the skin of a fish. It is, however, possible to help the condition, which does not affect the general health, by frequent alkaline baths to wash off the scales, and the subsequent use of lanolin to replace the lacking oil. Large doses of vitamin A seem to help in some cases, and there have been reports in the medical Press of cases being helped by hypnosis; this, however, is very much a matter of opinion.

Cancer, Rodent Ulcer, and Cysts. Cancer of the skin occurs mostly in old people, and takes the form of what is described as an *epithelioma*. It is most common on the face or hands, and usually appears as a nodule which breaks down and produces an ulcer. The glands may later be affected, but such cancers can almost invariably be cured unless a considerable time has elapsed during which they have been neglected. *Rodent ulcer* is a form of ulcer which appears on the inner corner of the eye or the side of the nose in old people. It does not spread over the body, but acts by eating into the tissues in the area where it has started. X-ray or operation is necessary, but the outlook is good. *Cysts* on the skin are due to blockage of the sebaceous glands. They may become very large, and should always be removed, as they may become infected. They do not turn into cancer, and there is no such thing as "male" and "female" cysts. It does sometimes happen that *moles*, especially of the bluish-black type, may become malignant, so it is perhaps best to have them removed surgically

when they exist. *All moles which change in appearance or size should be at once referred to a doctor.*

Skin Grafts.

These are a very complex subject which can be only briefly discussed here. They are used basically for a number of conditions in which large areas of skin have been removed from the body, as in burns or serious accidents. In other cases, as in plastic surgery, grafts may be used to make a new nose, eyelids, and so on. The following are the main types:

Pinch Grafts are small, circular pices of skin cut from some other part of the body. (The former method of using grafts from another person has been given up almost completely, since such grafts—except in the case of identical twins—never "take.") The small pieces are laid on the area without skin and gradually grow together. *Split-thickness grafts* are grafts removed from another part of the body by an instrument known as a dermatome, which cuts sections about 4 in. by 8 in. containing part of the deep layers of the skin.

In *Full-thickness Grafts*, on the other hand, the whole thickness of the skin is removed from elsewhere and applied to an area which has to bear friction or heavy weights, such as the hand or the foot. Lastly, and this is largely used in plastic surgery, there is the *Pedicle graft*, which, unfortunately, although it is certainly the most exciting type, is rather difficult to describe. Briefly, if one, for example, wants to make a new nose, one cuts an area of skin and underlying fat about 2 in. wide and 5 or 6 in. long in the abdomen. One end, however, remains attached so that it gets adequate blood-supply. The problem is how to get this tissue to the nose, and this is done by a complicated process of leap-frog. First, the free end of the graft is attached to the forearm, whilst its "root" remains in the original site, and when it begins to grow and get its blood-supply from the arm, the original "root" is cut. So we now have a "sausage" of tissue attached to the arm. The arm is then lifted to the face and kept firmly in position there until the new free part becomes attached. It is then detached from the arm, modelled to the correct shape, and grows where the nose used to be!

THE RHEUMATIC DISEASES.

The main rheumatic diseases (or so they are described, although they seem to have little relationship one with the other), are *rheumatic fever*, the acute form, which has already been dealt with; *chorea*, or rheumatism of the nervous system, also mentioned; *rheumatoid arthritis*; *osteoarthritis*; *gout*; and *fibrositis*. The only thing these diseases seem to have in common is that most seem to be associated with the muscles or joints—this, of course, with the single exception of chorea. Apart from this, there is very little similarity.

Rheumatoid arthritis often starts without evident cause in early adult life, and affects the small joints of the fingers and toes, causing swelling and pain. No infective process has been discovered, yet the disease goes on and on, sometimes better, sometimes worse. It is (and this is all one can say) a disease commoner in women, commoner in temperate climates, commoner following emotional stress. Although, as we have seen, rheumatoid arthritis is a disease characterised by frequent remissions, it takes a considerable time to burn itself out. The most likely explanation for its occurrence is that stress reactions act on the suprarenal glands and the secretion of cortisone is inadequate to play its usual part in preventing the body from responding too severely to injury. However, the injection of cortisone has proved, on the whole, less useful than might have been expected, and there is little reason to suppose that in most cases it is any better than aspirin.

Osteoarthritis is essentially a degenerative disease of old people. The bones affected are ordinarily the larger joints: the shoulders, the hips, or the spine. There is no disease in the ordinary sense, and essentially what has happened is that these joints have got "old" and the bone has overgrown so that movement is less simple than it once was. Osteoarthritis is not curable, but can be relieved by drugs and physiotherapy.

Gout, so far as one knows, has nothing at all to do with rheumatism. It is a metabolic disease caused by the inability of the body to deal with certain protein breakdown substances, such as uric acid. Typically, the pain develops in the big toe, and the foods concerned are such luscious products as wines, spirits, liver, sweetbreads. Although drugs such as cinchophen can help, the plain fact is that those liable to gout can either have sweetbreads and wine, liver and spirits, or gout! Most people, perhaps, would prefer the food and wine, but those who dislike gout must abstain.

Fibrositis. All diseases are annoying to the patient, but fibrositis is just about equally annoying to the doctor. Fibrositis, in fact, is a condition in which people come along (and how often they do so!) with muscular pain which may be caused by anything from falling down the stairs to quarrelling with their mother-in-law. Although at one time, and perhaps even now, it used to be said that those with fibrositis could be diagnosed by the presence of "nodules" in their muscles, it is almost certain: (*a*) that there are no such nodules, and (*b*) that muscular pain may be due to many causes and very largely to psychological ones.

DISEASES OF THE EYE AND EAR.

The Eye.

The eye is frequently compared to a camera, and in a general sort of way there is some resemblance. First, there is the very thin protective conjunctiva, the part which gets inflamed and irritable when you get germs or dust on the surface of the eye, and beneath this there lies the similarly transparent cornea. Light entering the eye passes through these two layers and then through the iris, which corresponds to the aperture or diaphragm of a camera; as in a camera, the amount of light passing to the back of the eye is regulated by the size of the aperture. When light is very strong, the aperture of the iris contracts to cut the light down; when it is dark it dilates to allow the maximum amount to enter. Behind the iris is the lens, which is controlled by a series of muscles which increase or diminish its curvature, and thus produce, according to the nearness or distance of the object, a clear picture on the retina, the screen at the back of the eye. (It is the lens which has developed an inability to focus properly which is the cause of short and long-sightedness, and the defect of the lens has then to be compensated for by glasses—that is, external lenses.) All these parts of the eye may, of course, be affected by disease. But here we shall deal only with a few of the more common ones.

Blepharitis is an infection of the eyelids which is easily recognisable from the red, sore appearance at the margins, the formation of crusts, and the falling-out of the eyelashes. If it has just developed, an attempt may be made to treat it at home with hot bathing and the so-called Golden Eye Ointment, but *blepharitis* is liable to become a chronic disease, and it is wiser to see a doctor. Penicillin cream or ointment can cure the disease, but must *never* be used save under medical advice; allergy to penicillin is commoner in the eyes than anywhere else, and in some cases patients have lost their sight through its use in this way.

Conjunctivitis is the result of infection of the conjunctiva, and the symptoms are the familiar

ones of a feeling as if some grit had got into the eye, running from the eye, and frequently gummed-together eyelids in the morning. In some cases it can be treated by hot bathing and eye-baths with one of the proprietary lotions on the market, but it is much wiser to see your doctor, who can supply much more effective remedies and may save you a lot of unnecessary discomfort.

Other Eye Diseases. We can only mention briefly *keratitis*, inflammation of the cornea; *iritis*, inflammation of the iris; and *glaucoma*. These are all potentially serious diseases, and should not be diagnosed or treated by the layman. Glaucoma, in particular, may lead to blindness if help is not sought in time. If there is redness and congestion over the eye, dimness of vision, *severe* pain (as contrasted with the irritation caused by conjunctivitis), and perhaps even vomiting, the doctor must be called immediately.

The main disease of the lens is *cataract*, in which the lens becomes opaque and varying degrees of blindness result. Ordinarily, cataract is a condition found in people after middle age, but sometimes it is found in children at birth. The treatment is by operation—one which has been carried out for centuries—in which the opaque lens is removed. The patient thereafter has to wear glasses, but the vast majority of patients obtain good vision.

In *retinitis*, however, where the "screen" at the back of the eye is affected, the general outlook is more serious. This is because, whereas cataract is a localised disease, retinitis often signifies some bodily illness: infection, hardening of the arteries leading to hæmorrhage, diabetes, or kidney disorders. Sometimes the retina becomes detached, leading to blindness. As has been suggested above, except in very minor conditions, such as styes (a localised infection treated in the same way as blepharitis), or conjunctivitis, the doctor should always be consulted. He should be consulted, too, when a foreign body gets into the eye unless it can be removed by very gentle manipulation with a handkerchief, for it must be remembered that such "poking about" on the surface of the eye may do much more harm than the original condition. So, if a couple of minutes fail to remove the grit, give up, and go to the surgery.

The Ear.

This is not merely the outer portion which is visible to all of us—this part of the ear performs the sole function of collecting the sounds and leading them into a tube which consists of three parts: the outer part (which is the part in which the main troubles are collections of wax, small boils, and sometimes skin irritation); the middle ear, which is separated from the outer ear by a membrane, the ear-drum, and the main disorder of which is otitis media, due to infection; lastly, the inner ear, where the sound impulses, transmitted by a chain of tiny bones through the middle ear, reach the nerve which passes them to the brain.

Wax, or Cerumen, is naturally secreted in the ear, but in most cases will dry up and fall out. Some unfortunate people, however, tend to accumulate it, so that after varying periods of time the ear is completely blocked and deafness occurs. Then they have to go to the doctor to have it syringed. There is no cure for this tendency except periodic syringing, although there is an oil on the market which allegedly softens the wax and makes it come away of itself. *Boils* in this part of the ear are small but rather painful; they should be entrusted to the doctor, who will give something to relieve the pain. However, once the boil has started, it is unlikely to regress, and will probably come to a head and burst, with consequent relief to the patient. Whilst we are dealing with the outer ear it should be said that, like the eyes, it should not be interfered with except by someone who knows something about it. Mothers should not poke the corners of towels into the ear in an attempt to clean it, nor if, as frequently happens, a child puts a bead or a pea into the ear should they try to dig it out. This should be left to the doctor.

Otitis Media, or infection of the middle ear, is another cause of earache, and, since the middle ear is shut off by the ear-drum from contact with the outside world, the ordinary source of infection is from the throat by way of the Eustachian tube, a narrow tube which passes between the back of the throat and the middle ear. Its normal function is to equalise pressure between the middle ear and the atmosphere—that is why, for example, when a large gun is being fired, soldiers are told to keep their mouths open, otherwise their ear-drums might be burst. But not only air but germs can pass up the tube, and when infection exists in the throat (such as adenoids or tonsillitis) it may move up to the middle ear and start disease. When this happens, pus begins to form and accumulates until it presses against the ear-drum, which causes severe pain. Without treatment one of two things may then happen; either the ear-drum bursts or the infection may spread backwards into the mastoid area—an area of spongy bone immediately behind the ear. This is known as *mastoiditis*, and together with otitis media, can be dealt with only by a skilled doctor. Sometimes antibiotics are adequate, but in other cases operation is necessary.

Tinnitus is the medical term for noises in the ears, which is one of the commonest conditions met with in the doctor's surgery. There are numerous physical causes, but there can be little doubt that very many of the cases seen are neurotic and show no physical disorder at all. Some of these unfortunate people, who undoubtedly suffer a great deal, go around from one doctor to another seeking relief and failing to find it, because the trouble is so often in their minds rather than their ears. One of the physical causes of tinnitus is *otosclerosis*, a disease of the inner ear in which the tissues become hardened and increasing deafness results. The treatment has not been, on the whole, very successful, but the fairly recent operation of fenestration sometimes gives good results.

DISEASES OF WOMEN.

The internal sexual organs of women, like the urinary system, can best be described as shaped like a capital Y. At the tips of the letter are the ovaries, the female sex glands; the two limbs running downwards are the Fallopian tubes; the point where they meet is the uterus or womb; and the single leg at the foot is the vagina. The ovaries have already been mentioned. They give out two hormones which control the sexual life: œstrin, which, in a very general way, may be said to be stimulating, and progesterone, which, during pregnancy, has a sedative effect on the womb. These two hormones also control the menstrual cycle: (*a*) by producing an ovum each month which passes down the Fallopian tube to the womb ready to be fertilised (this happens about the fourteenth day—half-way between two periods), and (*b*) when fertilisation does not occur, bringing about the removal of the lining of the womb—which is the meaning of menstruation—and then proceeding to build it up again.

The breasts, too, are secondary sexual organs, and are also under the influence of the ovarian hormones. One of the commonest and most trivial complaints encountered by the doctor is that they are either too small or too large. However, small breasts cannot be made larger, and are just as efficient for feeding babies as large ones, which are not always so effective as they appear. If breasts become too large they can be dealt with by plastic surgery. Two more serious conditions are *mastitis* and *cancer of the breast*, both of which are characterised by lumps within the breast tissue. It is not proposed here to discuss these two conditions in detail except to say that mastitis may be uncomfortable but is not necessarily dangerous, and can usually be treated medically, whereas cancer is obviously extremely grave. The reason nothing more is being said is that any woman with a lump in her breast must go *at once* to a doctor—reading about it is useless,

and, although nothing serious may be wrong, there can be no doubt that, if there is, every day wasted lessens the chance of prolonging life.

Abscesses also occur in the breast, nearly always during the time when the mother is feeding her child. Here again a lump appears, but in this case it is accompanied by redness over the area and fever. Treatment is surgical.

Oophoritis and Salpingitis. The former means inflammation of the ovary, which is ordinarily not due to infection but to some internal defect. The symptoms are usually low back pain (which is a very common gynæcological symptom) and heavy loss during the periods. Treatment is entirely a matter for the gynæcologist. The latter disease is an infection of the Fallopian tubes, often following abortion, but sometimes conveyed by the blood from another septic source in the body. There is high temperature, pain in the lower abdomen, and frequently vaginal discharge. Since the disease can become chronic and is likely to lead to sterility, immediate attention should be sought. *Ovarian cysts* are of different types and of varying degrees of severity; before the era of effective surgery it was not uncommon for certain types of cyst to become larger than the patient. But needless to say, this does not occur now.

The womb, or uterus, is subject to many diseases, but here we shall only mention *fibroids*, a non-malignant tumour, which, however, may necessitate major surgery. The main symptom of fibroids is severe menstrual loss.

Cancer of the Womb is of two types, cancer of the body or of the cervix. The womb is pear-shaped, and the body is the main part, whereas the cervix is the narrow part which projects into the vagina. Cancer of the cervix usually occurs in middle-aged women with a large family, whereas cancer of the body of the uterus occurs slightly later in life (fifty to sixty) and most commonly in those who are childless. The symptoms will not be described in detail, but any woman who, after the menopause, has slight bleeding, especially after intercourse, and fairly constant watery discharge, *must* see her doctor at once. The treatment of cancer depends upon circumstances. Operation is nearly always necessary, but in certain cases radium will be used. Finally, the uterus may have an infected lining, *endometritis*, another cause of discharge and low back pain, or its ligaments which ordinarily support it in the pelvis may sag with age or frequent childbirth, and *prolapse* may occur. In prolapse, the womb sags down into the vagina, and the cervix may even appear outside. The usual symptoms, apart from visible evidence, are low back pain and a heavy, dragging feeling in the lower abdomen.

Discharge, or Leucorrhœa (strictly speaking, leucorrhœa refers to white discharge), may be, as we have seen, due to many causes—in fact, to infection of any part of the genital tract. In the upper part, the womb and the Fallopian tubes, the most common cause of infection is following a childbirth in which all the products have not been removed or after abortion, but discharge is also common when the vagina has been infected with various types of germs and fungi. Generally, it is advisable for a patient who has discharge which is (*a*) too copious, (*b*) blood-stained, (*c*) offensive, or (*d*) irritating, to see a doctor as soon as possible. On the other hand, there is a perfectly normal discharge, more plentiful in some women than others, which may become offensive if personal hygiene is inadequate. This need not be the subject of concern, but women would be well advised to adopt here the continental habit of douching—not with antiseptic, but with ordinary warm water.

Dysmenorrhœa, or pain with the periods, is very common, and occurs in many different conditions. However, in those who have not had children, and especially in young girls, it is likely that there is a large psychological element involved. In a symptom which has so many varying causes the sensible thing to do, if the pain is troublesome, is to see the doctor.

Many women are very troubled at the prospect of the change of life or *menopause*. This, in itself, is not unnatural; for nobody likes growing older. But this quite natural fear is overlaid with all sorts of additional ones based on sheer nonsense; women often talk to each other as if the change of life means the end of being a woman, as if it must be accompanied by all sorts of painful and uncomfortable symptoms, such as "hot flushes," depression, severe losses of blood, and so on. Now the menopause has no influence whatever upon the sexual life (although naturally it has upon fertility); desire is not affected, and indeed it is recounted that a famous courtesan, at the age of eighty, on being asked by Voltaire when women ceased to feel desire, replied: "I don't know—I haven't lived long enough." The "hot flushes" appear to be a disease of civilisations, since they are rarely found amongst simpler peoples. In any case, they can be treated by hormones and clear up fairly readily. The same applies to heavy losses of blood. There is no reason at all why women should suffer during the menopause.

Abortion is a word which, to the doctor, does not have the unpleasant connotation which it apparently has to those who perhaps too avidly read some of the Sunday newspapers. It does not necessarily signify any criminal act, and its simple definition is: "Expulsion of the uterine contents before the viability of the fœtus (*i.e.*, the twenty-eighth week)." This means that an abortion or miscarriage is the termination of any pregnancy prior to the time when the fœtus is able to survive. The two main symptoms of abortion are: (*a*) bleeding, and (*b*) abdominal pain. The bleeding may be slight initially, but obviously any bleeding during pregnancy ought to be reported at once. Pain is in the lower abdomen and spasmodic in character; like colic, it works up to a height and then temporarily passes off. Any pregnant woman with pain and bleeding should at once go to bed and send for the doctor. *Criminal abortion* is brought about deliberately, either by the use of drugs or by injecting substances into the womb. Both these practices, although very common, are extremely dangerous; there are no drugs taken by mouth which can produce abortion without also endangering life, and injecting water or anything else into the womb is liable to lead to sepsis and death. The frequency of abortions in general is about one in every five pregnancies.

Amenorrhœa means stopping of the periods. It may signify either pregnancy, glandular disease, or can be purely psychological.

Contraception.

This is another subject which will be only briefly dealt with, since if one does intend to practise birth control one should either go to the local Birth Control Clinic or to a gynæcologist. The matter of whether or not a baby is born is too important to leave to chance, so any method used should be effective. Basically, there are four methods of contraception: (1) chemical, whether with tablets, douches, or jellies; this is increasingly reliable, but certainly not 100 per cent. effective: (2) The use of appliances, such as the sheath in men or the cap which fits over the opening of the womb in women (these, properly fitted, and combined with a chemical contraceptive jelly, are almost 100 per cent. effective); (3) The type of method which is "physiological" —that is, which makes no use of any artificial appliance or chemical; one such method is simply to cease intercourse before emission takes place—to say the least of it this method is unreliable. The other is the use of the "safe period," which is recognised by the Roman Catholic Church and based on the fact that ovulation occurs at some time in the mid-period, usually about the fourteenth day. Intercourse outside this period is unlikely to lead to pregnancy, since, in effect, there are only about four days in the month when this could occur. The only problem is: which four days? It is possible to find this out by daily readings of the vaginal temperature carried out over some months, but it must be repeated that advice about birth control should be accepted from nobody but a thoroughly qualified specialist.

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Pruritis, 52 (1).
Psittacosis, 12 (1).
Psychosis, 49–50.
Psychosomatic diseases. Psychosomatic diseases are those physical ailments due to emotional causes. They include such complaints as high blood-pressure, gastric ulcer, certain skin diseases, and certain glandular diseases (*e.g.*, exophthalmic goitre). Most physicians nowadays believe that all diseases may show a greater or less degree of emotional causation; that physical and mental factors are both present in all illness. Even in psychosomatic illnesses, heredity and other factors play a large part. Briefly, the main cause of these diseases is worry. The importance of this lies in the fact that they cannot be cured without dealing with the fundamental cause. *See also* **New Views on Medicine**, 4 (1), F 53 (2). Individual illnesses will be found under their names.
Psychopathic Personality, 51 (2).
Pulmonary embolism, 29 (2).
Purpura, 25 (2).
Pyæmia, 14 (2).
Pyelitis, 44–45.
Pyloric stenosis, 35 (1).
Pyorrhœa. An infection of the gums which causes the edges of the tooth sockets to bleed easily when the teeth are being brushed. There is a constant discharge of pus, which causes the breath to smell and may lead to arthritis and other diseases. Treatment should be carried out by a dentist.

THE NATIONAL HEALTH SERVICE

The interest of the State in the health of the people is not a new thing. As long ago as 1642 Parliament accepted the principle that those who fought in the service of the State and were sick or wounded must be cared for by the State. This principle was applied in the wars with the Dutch of 1653 and 1664. There was however, no extension of this state care to civilians for a very long time, and it was not until the appalling living conditions resulting from the Industrial Revolution threatened to spread disease throughout the country that any further national action was taken. The first medical officers of health were appointed just over one hundred years ago, and their main task was to deal with the fearful epidemics, such as cholera and smallpox, which were then prevalent. For the remainder of the nineteenth century the control of infectious disease and the improvement of sanitation and water supplies were the main concern of Parliament and the local authorities, and much progress was made in the prevention of disease. The diagnosis and treatment of illness remained a personal matter between the patient and the doctor. It is true that the State made provision for destitute patients under the Poor Law and that the voluntary hospitals provided free treatment to those who could not afford to pay, but there was no general organisation of medical care. Many people subscribed to clubs and societies to provide medical treatment when they were ill, and it was not until the beginning of the present century that the State began to take an active interest in the medical care of the individual. The health of school children was protected by the formation of the school medical service in 1907, and about this time measures to protect the health of expectant mothers and young children were introduced. The National Health Insurance Act of 1911 provided for the first time a service whereby the bread-winner of a family when he was ill could receive treatment by his " Panel " doctor and obtain certain other benefits. These benefits were limited and the National Health Insurance Scheme did not cover the dependents of the insured persons, not did it make provision for hospital care.

From the time of the Great War of 1914–1918 up to and during the last war remarkable advances were made in medical and surgical skill, and these advances are continually being added to. New aids to diagnosis and new forms of treatment, for example the sulphonamides and penicillin, were discovered, and the great advances in medical care and in surgery were aided by blood transfusion, improved X-ray diagnosis, physiotherapy, and many other new services. The range of treatment now available is wide. It is also very costly. Indeed, many hospitals found it difficult to carry on before the last war, and many patients were unable to afford the expensive investigations and treatment which modern science has made available. For these reasons alone some form of national health service was inevitable, but there were other equally important reasons. For a long time doctors and others who have studied the subject of medical care had felt that a national medical service was essential in order to make the best use of hospitals in each area and to bring the full range of modern medicine within the reach of everyone. Towards the end of the last war a number of social measures were introduced, such as the National Insurance Act and the National Assistance Act. These measures and all the other welfare measures introduced at that time depended on a national health service for their medical requirements. It was to meet these needs that the National Health Service Act was passed in 1946. The new Scheme came into operation on July 5th, 1948.

THE NATIONAL HEALTH SERVICE ACT 1946.

This Act was intended to provide a comprehensive health service in England and Wales. Similar Acts were passed for Scotland and Northern Ireland. The health services to be provided fell under three principal headings:—

(1) Hospital and Specialist Services.
(2) General medical, dental, and pharmaceutical services outside the hospital.
(3) Local Health Authority Services.

HOSPITAL AND SPECIALIST SERVICES.

The Hospital and Specialist Services make provision for every kind of hospital care, including general hospitals, maternity hospitals, infectious disease, and special hospitals such as the mental hospitals and mental-deficiency institutions. They also provide for convalescent treatment and rehabilitation. These hospitals are staffed by consultants and specialists, numbering approximately 6,900 employed on a full-time or part-time basis, who work in the wards, out-patient departments, and in special units, such as X-ray and pathology departments. At the request of the general practitioner, domiciliary visits to the patient's home are made by consultants in cases of emergency. The hospital consultants are assisted by medical and surgical registrars, and by house surgeons and house physicians, many of whom reside in the hospitals.

The total number of available beds in hospitals in the National Health Service in England and Wales is about 477,000, of which nearly 50 per cent. are in mental hospitals and institutions. To nurse the patients in these hospitals there are more than 190,000 nurses and midwives, including student nurses, and a maintenance and domestic staff of 177,000 is also employed. In addition, there are many special workers, such as almoners, records officers, radiographers, physiotherapists, speech therapists, teachers of occupational therapy, etc., so that it will readily be understood that the hospital service is one of the greatest employers of labour, expecially of women, in the country.

There are also many special activities within the hospital service, including the supply of surgical and other appliances. To give only one example, more than 630,000 hearing aids have been distributed from the special distribution centres since the service began.

A most important part of the hospital and specialist services is the National Blood Transfusion Service, which takes blood from a civilian Donor Panel of about 716,000 people and distributes this to the hospitals as required. In a recent year (1958) the total distributions of blood were 775,792 bottles, each containing about ¾ pint and being the gift of one donor. An important part of the work of the Blood Transfusion Service is the testing of the blood of expectant mothers for the rhesus (Rh) factor. Many maternal and infant lives have been saved by detecting this incompatibility.

On July 5th, 1948, the Minister of Health became responsible to Parliament for the efficient administration of hospital services. To secure this he set up fourteen Regional Hospital Boards,* four for London and the Home Counties, and ten for the remainder of England and Wales. The 36 great teaching hospitals in England and Wales have their own governing bodies responsible direct to the Minister. In Scotland the arrangement is that all hospitals are included in the Regional Hospital Board areas. The Regional Hospital Boards are responsible for planning and administering the hospital and specialist services of their areas. For day-to-day administration they are divided into small groups under the care of 388 local Hospital Management Committees. This arrangement also ensures that the best use is made of the hospital beds in each area and that the limited building and staff resources available are not wasted by competition between adjoining hospitals. At the same time it is the duty of the Regional Hospital Boards to arrange for the medical staffing of the hospitals and to see that special facilities are available for the treatment of patients requiring chest surgery, plastic surgery, brain surgery, and other special forms of treatment which can best be provided on a regional, rather than a local basis. The members of the various boards and committees serve entirely voluntarily and receive no payment for their work.

* *Shortly to be increased to fifteen by the division of the South-Western Region into two.*

They number between nine and ten thousand people. Were it not for these voluntary workers the permanent administrative staffs, secretaries, accountants, clerical officers, etc., would require to be much larger than is now the case.

Many patients stay in hospital only a short time, or receive all the care and investigation they need in the out-patient departments, and it is necessary to ensure that there is a close link between the hospital and home care services. This may be ensured in a variety of ways, notably by communication between the consultants and the general practitioners engaged in medical care in the home, and also by close liaison between the hospitals and the Local Health Authorities in the area.

GENERAL MEDICAL AND DENTAL SERVICES OUTSIDE THE HOSPITAL.

The number of persons in England and Wales whose names are recorded as being on doctors' lists is about 45 million, *i.e.*, over 97 per cent. of the population. The general medical services, which include medical and dental services, pharmaceutical services, and supplementary ophthalmic services, are administered locally by Executive Councils. The areas of the Councils coincide with those of the Local Health Authorities, except where two or more Executive Councils have been merged by agreement.

The members of the Executive Councils, who give their services voluntarily, include twelve lay and twelve professional people. The latter include doctors, dentists, and pharmacists. The work of the Councils is mainly executive, but they may deal with complaints and disagreements, and also with applications from doctors who wish to set up practice in their area or to succeed to a vacancy.

(*a*) **Medical.** Under the Service every person in the country is entitled to advice and treatment from a doctor. This care includes the prescription of medicine and appliances and arrangements for specialist advice and hospital treatment where necessary. There are approximately 21,000 general medical practitioners in the Service.

(*b*) **Dental.** Every person is entitled to dental treatment, including emergency treatment as well as the provision of dentures and the preservation of existing teeth.* There are about 10,300 dentists in the Service, and they give full courses of treatment to about 10 million people each year to make them dentally fit. In view of the importance of doing all that is possible to preserve teeth (rather than wait until they are so bad that the only remedy is to remove them), priority is given to expectant and nursing mothers and to children. The school dental service, operated by the Local Health Authorities, plays a vital part in securing the dental fitness of children, including education in the care of the teeth.

(*c*) **Care of the Eyes.** The Service provides for sight testing and supply of spectacles, either at hospital or by means of the supplementary eye service whereby patients may get their eyes tested by general practitioners with special knowledge of the diseases of the eye, or by sight-testing opticians. Opticians undertake the supply of spectacles.* Approximately 4,500,000 spectacles are supplied each year.

(*d*) **Pharmaceutical Services.** The prescriptions given by the doctors under the National Health Service are dispensed by chemists and pharmacists. The 15,000 chemists in the Service dealt with 203 million prescriptions in 1958, at a total cost of £65 million, *i.e.*, 6*s*. 6*d*. per prescription.

LOCAL HEALTH AUTHORITY SERVICES.

The Act has placed important new duties on the County Councils and County Borough Councils. There are 146 of these Local Health Authorities in England and Wales, and they administer their health work by means of a Health Committee and the medical officer of health and his staff. These local authorities provide services which help both the hospitals and the general medical services outside the hospital. For example, they provide a midwifery service in the home, and arrange for home nursing, domestic help, ambulance services, and a number of other facilities. It will be best to describe these services one by one.

(i) **Midwifery.** The County Council or County Borough Council arranges for trained midwives to care for the expectant mother in her own home either by employing the midwives directly or by arrangement with the district nursing associations. There are approximately 7,500 domiciliary midwives in England and Wales. Arrangements are also made for care before and after the confinement. The midwives must be able to call for medical aid when they are in difficulty General practitioners skilled in midwifery are available in each area, and they may in turn call on the obstetric consultants of the hospital service. Thus these home services are linked with the maternity departments of the hospitals. Many women nowadays prefer to have their babies in hospital because the home conditions are not suitable or because of other young children in the house. In such a case the expectant mother may make arrangements direct with the hospital and may have her ante-natal care done in the hospital clinic. If on examination everything is found to be normal the mother may be referred back to her own doctor or to the local maternity and child welfare clinic for regular ante-natal examination. Obviously it is not possible or desirable for every mother to have her baby in hospital, and where home conditions are suitable she may prefer to stay at home. The provision of home helps will assist with the domestic work, and many women also prefer to have the care of their own doctor. Some mothers, particularly those who have already had children, may not go in the first instance to the hospital or to their doctor but will go to the midwife whom they know. The midwife, in addition to arranging for the confinement, will advise the mother to be examined regularly at the welfare clinic or by her own doctor. It is also important that every mother, after confinement, should be examined before resuming work and again a few weeks later. Only by this means can any minor defects resulting from the confinement be found and corrected before they give rise to permanent disability. This post-natal examination can be carried out by the general practitioner, or at the clinic or hospital outpatient department. It is one of the essential features of a comprehensive midwifery service.

(ii) **Child Welfare.** For the first year of life, the health of the mother and the infant are so closely bound up that they may be considered as one person. There are, however, a number of conditions affecting the child which may require specialist knowledge, and indeed disorders and diseases of childhood have for a number of years been a separate branch of medicine under the title of Paediatrics. The physicians specialising in diseases of children are therefore known as paediatricians, and it is one of the duties of the hospital service to provide a paediatric service with children's beds, outpatient and clinic facilities, and trained staff. It is, however, necessary to go farther than this. The study of diseases of children has shown that many of these can be prevented or diagnosed at an early stage. It was to detect such departures from the normal that the maternity and child welfare clinics were first set up, and the work they have done has been invaluable. It is clearly most important to see that the young child is examined regularly by the family doctor or at the Welfare Clinic.

(iii) **Vaccination and Immunisation.**

Smallpox. It is advisable to consider at this stage another provision of the National Health Service, which deals with vaccination against smallpox. Compulsory vaccination against smallpox has been abolished by the National Health Service Act, but every Local Health Authority must arrange for anyone who wishes to be vaccinated free of charge. This can be done either by the patient's own doctor or at the local authority clinics. Although compulsory vaccination is abolished it is nevertheless still advisable that every person should be vaccinated in infancy. Smallpox is now rare in this country, but when it does occur it is just as serious as ever it was and can quickly prove fatal. Only by vaccination can its epidemic spread be prevented.

* *The National Health Service Act, 1951, imposed certain charges on dentures and spectacles, and these have been continued by subsequent ensuing Acts.*

Diphtheria immunisation has produced the most remarkable results in reducing the number of deaths from diphtheria in the British Isles. Local Health Authorities now arrange for free immunisation against diphtheria to be available to everyone, either by the patient's own doctor or through the local health clinics. It is of course, essential that every infant should be immunised against diphtheria.

Whooping Cough. The child may also be immunised against whooping cough, where the family doctor or the doctor at the Welfare Clinic considers this to be advisable.

Poliomyelitis. Responsibility for vaccination against poliomyelitis has been placed in the hands of the Local Health Authorities.

Tetanus. Some Local Health Authorities include the provision of immunisation against tetanus in their approved arrangements for vaccination and immunisation.

(iv) **Home Nursing.** The responsible duty has been laid on the Local Health Authorities of ensuring that trained nurses are provided for people who require nursing in their own homes. The Local Health Authority does this either directly or by entering into arrangements with district nursing associations. District nurses in some areas act also as the district midwives and health visitors. The need for an efficient home nursing service becomes obvious when it is remembered how many people have to be cared for in their own homes, and in particular those suffering from chronic diseases and the aged and infirm. There is, however, another reason. An efficient home nursing service means that patients who now go to hospital for relatively minor conditions can be nursed at home, and other patients can be discharged from hospital earlier to be nursed at home. By this means valuable hospital beds can be saved for serious cases. The home nursing service is organised so that the district nurse is in the closest possible touch with the general practitioners whose cases it is her responsibility to nurse. Normally it is for the doctor in charge of the patient to arrange for the services of the home nurse, but in an emergency she can be called in direct. In 1958 home nurses in England and Wales, numbering about 10,000, paid over 24 million visits.

(v) **Domestic Help.** If sick or aged persons are to be cared for at home the provision of home help is often necessary, and it is also important that a mother who has her baby at home should not be burdened by domestic care. Local Health Authorities now have the power to provide domestic help for these mothers and for any household where there is a sick person, a mentally defective, or an aged person, or where there are young children. Clearly this is a most important service. It is useless to provide home midwifery and home nursing services without someone to do the general work. At the present time there is a serious shortage of woman-power, but this home help service offers a new field of work, whole-time or part-time, for the middle-aged and elderly woman. The Local Health Authority may make a charge for the services of home helpers. In 1958, home help was provided in 271,968 cases.

(vi) **Health Visitors.** Health Authorities have for a long time employed specially trained nurses to act as health visitors to give advice at home or at clinics to expectant mothers and mothers with young children. These health visitors have proved so successful that under the National Health Service their duties were extended to the giving of advice on the welfare of the family. They also advise, in conjunction with the family doctor, on the prevention of the spread of illness within the home. This advice is particularly necessary in such diseases as tuberculosis. There are approximately 7,000 health visitors, whole or part-time, in England and Wales.

(vii) **Ambulance Services.** A most important duty laid on the Local Health Authority is the provision of ambulance services. Every Local Health Authority must arrange for ambulances and, when necessary, sitting-case cars to convey sick or injured persons or expectant mothers or nursing mothers or other types of patients to and from hospital as required. These ambulances and cars travel about 100 million miles in a year and carry 15 million patients at an average cost of 17*s.* 5*d.* per patient. The ambulances are also available to take cases of infectious diseases to and from hospital, but special precautions are taken to prevent the spread of such diseases.

(viii) **Care and After-care of the Sick.** It is not enough to make provision for efficient hospital treatment unless some arrangements are made whereby patients can also receive proper care and attention in their own homes. The National Health Service Act gave the Local Health Authorities power to make arrangements for the prevention of illness and the care and after-care of persons suffering from illness, including mental illness, and the care of the mentally defective. This care and after-care of the sick may include such things as the provision of special foods, blankets, and extra comforts required by the sick person. Equipment for home nursing may be provided so that district nurses and midwives can obtain such items as water-beds, bed-rests, bed-blocks, crutches, and wheel-chairs for their patients. Local Health Authorities can make grants to voluntary organisations for doing work of this kind, but they cannot make any cash payments to the patient, as this is provided for under other Acts of Parliament, such as the National Assistance Act.

(ix) **Tuberculosis.** The extent of care and after-care provided will be governed very largely by the needs of a particular area and the resources of the local authority concerned, but the Minister of Health has given specific directions that every Local Health Authority must make arrangements for the prevention of tuberculosis and the care and after-care of persons suffering from this disease. By this means any person suffering from tuberculosis may be helped before entering and after discharge from the sanatorium or hospital, and the health of his family is also safeguarded. Local Health Authorities must not make any charge for the care of the tuberculous patient. Local Health Authorities are also empowered to offer B.C.G. vaccination against tuberculosis to certain selected groups of the population including school children between the ages of 13 and 14 years. By the end of 1958 a total of 1,215,553 persons had been vaccinated with B.C.G., under Local Health Authority schemes.

(x) **Health Centres.** Under the National Health Service Act provision was made for the building and equipment of health centres. These are intended to be places where general medical practitioners and dental surgeons may see their patients, and specialists from the hospital may attend if necessary. There may also be other clinic facilities. It will take a long time before the ideal type of health centre has been devised, and the restriction on building may also hinder the general development of health centres. Meanwhile there is scope for experiment, and a number of different kinds of health centres are coming into use in various parts of the country, particularly in the new towns and housing estates.

MENTAL HEALTH SERVICES.

The importance of safeguarding mental health, in addition to providing treatment for mental illness, has come increasingly to be recognised in recent years. In this connection it is necessary to distinguish between mental disease, which affects the developed mind, and mental deficiency due to failure, or partial failure, of the mind to develop fully. In the one, treatment and cure may be, and very often are, possible. For the other, *i.e.*, mental defectiveness, true cure is usually impossible, but much may be done to help and teach the mentally defective to become useful and happy members of society.

In addition to disease of the mind, and the existence of mental deficiency, it must also be remembered that mind and body are so closely associated that disability of the one may affect the other. Thus the simplest of bodily ailments, such as a cold in the head, or a bilious attack, may cause temporary mental depression. The pace of modern life is also a factor of importance in the production of mental stress and anxiety.

The care of the mentally ill has in the past been handicapped by the fear which many people had of this type of illness, and also because it was believed to be incurable. Modern experience has shown that illness of the mind is often as amenable to treatment as bodily illness, particularly when

treated early, and both mental and general hospitals now have many patients receiving out-patient care in the same way as those with physical disabilities.

It has also been demonstrated that prevention is better than cure, and the subject of preventive psychiatry is now an important one, particularly in the formative years of life.

The National Health Service makes special provision for mental illness. The mental hospital usually provides both in-patient and out-patient accommodation, and psychiatric clinics are also held at many general hospitals. Long-stay annexes are provided for old people who are mentally infirm, and day hospitals are being developed whereby patients may spend the nights in their own homes, and attend the hospital during the day. Increasing attention is also being paid to rehabilitation of the mentally ill. Mental defectives may be retained in special hospitals or colonies, or they may remain in the community under the care and supervision of the Local Health Authorities.

Mental hospitals and metal-deficiency colonies now form part of the hospital and specialist services. The care and supervision of mental patients and mentally defective people in their own homes is carried out by officers of the Local Health Authority. These officers have special experience in dealing with this type of patient, and the hospital specialists are also available to help. They are assisted by trained psychiatric social workers, one of whose functions is to investigate the social background of the patient and to assist him to return to his place in society when treatment has been completed.

The Report of the Royal Commission on the Law Relating to Mental Illness and Mental Deficiency, published in 1957 (Cmd. 169, H.M.S.O.) recommended that the trend from institutional to community care should be augmented. Under the Mental Health Act of 1959 the local health authorities are given increased responsibilities for the care of the mentally ill, by providing residential accommodation, training centres, the appointment of mental welfare officers, and acting as guardians.

THE AGED AND THE INFIRM.

The introduction of a comprehensive health service has revealed many groups of people in the community who were, in the past, ill cared for, including those suffering from permanent disablement as a result of injury or disease, and also those who by reason of age and infirmity required prolonged care. The old Poor Law infirmaries provided accommodation for many of these people, and, once admitted there, they usually stayed for life. Today it is realised that many disabilities can, if treated early, be prevented from becoming serious, and that the best way to prevent the aged and infirm from becoming a burden to themselves and to others is to keep them actively interested within the community. Rehabilitation after accidents, injury, or disease, is therefore an important part of the health service, and many different ways of ensuring this are employed. Convalescent homes, a short stay in hospital, and home-care schemes are some examples. So important has the care of the older members of the community become that special Geriatric Units have been established at many hospitals under the care of a physician known as a geriatrician. The preservation of the link between the hospital and the home is particularly important with these cases, for unless there is a reasonable prospect of return to their home after hospital care they will remain in hospital, and thereby block the beds required for others. In doing so, their own return to full usefulness in the community may also be delayed.

HOW TO OBTAIN THE SERVICES.

The detailed arrangements inevitably vary from district to district. It is therefore necessary to enquire locally for the precise arrangements, but the following general guide may help:—

1. **Hospitals and Specialist Services.** Through the family doctor.

In case of accident or grave emergency go direct to the hospital if a doctor is not available.

2. **Medical Advice and Treatment.** If you have not already done so, or when you move to a new area, you should choose your family doctor immediately. The simplest way is to ask him to accept you, and if he agrees to do this give him the official application form when you have filled it in. A separate form must be filled in for each member of the family. If you do not know a doctor you will find a list of those practising in the area at the Post Office.

In emergency apply to any doctor practising in the area who has joined the Service.

The names of doctors specialising in midwifery are kept on a special list. Your own doctor will advise you on this.

3. **Medicines and Appliances.** Take your doctor's prescription to any chemist. In country districts your doctor will advise you where to go. He may dispense the medicines himself.

4. **Dental Treatment.** Expectant mothers and children get priority care. Apart from these priority classes you may choose any dentist who provides dental treatment in the Service. The procedure is simple. You call on him by appointment, and he will begin treatment immediately after you and he have signed the appropriate form.

5. **Eye Services.** Your family doctor will recommend you to an eye specialist or ophthalmic optician. If your spectacles need repair you can go direct to the optician.

6. **Supplementary Services.**

(1) *Ambulances* through your own doctor. In emergency an ambulance may be summoned through the police or by dialling 999 on the telephone.

(2) *Home Nursing* through the family doctor or directly to the nurse in an emergency.

(3) *Midwifery Service* through the family doctor or the district midwife or the local welfare clinic or the hospital.

(4) *Health Visitor* through the family doctor or the local welfare clinic or local health department.

(5) *Home Helps* through your doctor or the district nurse, midwife or health visitor, or the local health department.

(6) *Vaccination and immunisation* through your own doctor or through the welfare clinic or local health department.

7. **Care and After-care of the Sick, including Equipment.** Arrangements may vary from one district to another. Your own doctor and the home nurse will be able to advise you.

For care in cases of tuberculosis ask at the hospital or chest clinic or the local health department.

On the home care of mental patients or mental defectives consult your own doctor in the first instance. In case of doubt enquire at the local health department.

Cost of National Health Services. The estimated cost for 1960–61 is £597 million.

THE FUTURE.

The British National Health Service is one of the greatest experiments in health care ever undertaken. For the first time in our history every man, woman, and child in the country is entitled to free medical care. At present the energies of those employed in the National Health Service are devoted mainly to curing the sick, but it must not be forgotten that the main purpose of this Service is to improve the health of the people. To be, and remain, healthy requires many things such as a healthy environment, good food, and healthy working and home conditions. Above all it depends on the intelligence and common sense of the individual concerned. Many of the conditions treated to-day by the doctors in their surgeries or at hospital could have been prevented altogether or cut short. The spread of such a disease as tuberculosis, for example, is preventable. Again, many people fear cancer and will not go to a doctor until it is too late. The ideal for everyone is a happy, healthy, well-balanced life. The National Health Service is a step towards this, but it remains for the individual to ensure that by common-sense application of the simple rules of health, and the avoidance of excesses, he makes the most of his life. State services can help a man, but they cannot live his life for him. That remains his responsibility.

BABY CARE

THE HEALTH OF THE MOTHER.

The health of a baby during its early years of life is so bound up with the health of the mother that the two must be considered together. Indeed the intimate relationship which exists between the two before birth is, in normal circumstances, continued after birth and throughout the whole of the first year. It is therefore necessary to consider first the health of the mother before the birth of the child.

It has now been established beyond doubt that the health of the expectant and nursing mother affects profoundly the health and well-being of her infant. It is not merely a question of good bodily health. Mental contentment and freedom from anxiety are also important. It is necessary, therefore, to encourage a placid state of mind from the outset. This can best be done by making the arrangements for adequate care and supervision as early as possible. As soon, therefore, as pregnancy is suspected the mother should seek the advice of her family doctor.

When the pregnancy is confirmed the question whether to have the baby at home or in hospital must be decided. Much will depend on the opinion of the doctor, who may consider confinement in hospital advisable on medical grounds. Other considerations will also enter into this decision, such as the suitability of home conditions, the care of other children in the family, the availability of domestic help and so on. If it is decided to have the baby at home, arrangements must be made for securing the services of a midwife. The sooner these arrangements are made, and other matters such as the provision of home help and care for the other children decided, the sooner will the mother be able to settle contentedly to prepare for the baby. Subject to the advice given by the doctor and midwife the more natural the life the expectant mother lives the better.

Experience in a number of countries, including Great Britain, in the Second World War, confirmed the view that the nutrition of the expectant mother is of vital importance, both to her own health and to that of the baby. That is so throughout pregnancy, and especially in the earlier months. From the moment that pregnancy is diagnosed, therefore, it is essential that the mother should have a good and varied diet, with plenty of fruit, salads, and vegetables, in addition to fresh meat and fish, milk, butter, eggs, and cheese, for it is from these materials that the essential proteins, the fats, carbohydrates, and mineral salts required by the developing infant are drawn. Adequate supplies of vitamins are also required, especially when the baby is growing rapidly in the later months of pregnancy, and these are usually supplied in the form of cod-liver oil or halibut-liver oil which contains vitamins A and D, and fresh orange or tomato juice or concentrated orange juice, rose-hip syrup, blackcurrant syrup, etc., which contain vitamin C. Multi-vitamin preparations containing a number of vitamins may be taken on the recommendation of the doctor or welfare centre.

Mineral salts, and especially calcium and iron, are essential for both the mother and the child, especially during lactation. Calcium is supplied naturally by means of milk, cheese, and vegetables, and iron by way of green vegetables, egg yolk, liver, peas, beans and lentils, oatmeal, and wholemeal flour.

The old tradition that the expectant mother should attempt to eat enough for two people is, of course, a fallacy. A good, well-nourishing diet taken at regular meal-times is all that is required. Similarly, the other elementary principles of healthy living should be followed, with adequate fresh air, exercise and sleep, and a rest during the day. Before attempting anything exceptional, such as hard exercise or swimming, medical advice should be taken.

MEDICAL SERVICES.

It is no part of these notes to describe the arrangements for the confinement, but it is obvious that this will be made much easier if adequate preparation has been made. The expectant mother should therefore make sure that she is getting all the help which the health and welfare services can give. These services are now very extensive, and they are available to everyone. Under the National Health Service, for example, the help and advice of a doctor and midwife are freely available, and so also are the welfare clinics of the local authority and the expert care of the hospitals. These services are described in detail in the notes on the National Health Service. (P62–5.)

The Local Health Authorities now provide a free ambulance service for those who may need it, and also a home help service whereby a helper experienced in the running of a home can come to assist the family during the time of confinement, and also if necessary during the nursing period. Local Health Authorities may make a charge for this home-help service.

If there are other young children in the family it may be possible to make use of day or residential nurseries where these are provided by the Local Health Authority, and old people in the house may be encouraged to go to an old people's club during the day, or be found temporary residential accommodation elsewhere. In making these arrangements the advice of the health visitor will be valuable. Local Health Authorities are empowered, under the National Health Service Act, to provide nursing equipment and additional comforts in the home. These may take the form of bedding and blankets, and nursing equipment may include such items as bed-pans, macintosh sheeting, air-rings, and bed cradles. Local authorities can make a charge for lending this equipment. Another helpful provision is that of a recuperative holiday after confinement.

It goes without saying that regular examinations of the expectant mother's health should be made, and these ante-natal examinations may be carried out by the general practitioner, at the welfare centre, or at hospital. Similarly, an examination to detect that no minor disability remains as a result of the confinement is also essential to prevent subsequent ill-health. This post-natal examination, which is usually made about six weeks after the confinement, may be undertaken by the family doctor or at the welfare clinic or the hospital.

GENERAL PREPARATION.

Two of the important things to prepare in advance are the baby's clothing, and equipment and furniture.

Clothes have undergone revolutionary changes in the past thirty years. Whereas it was formerly the fashion to provide elaborate sets of clothing, often in three or four layers, the objective to-day is to provide the simplest and lightest clothes which will keep the baby warm and comfortable and at the same time allow free movement and exercise. It is essential to remember when buying or making baby's clothes, and also later on when washing them, that a baby's skin is very sensitive and liable to chafe easily. The under-garments must be of soft and fine material that will wash and wear well, and the layer next to the baby's skin should be the same in summer and in winter and night as well as day. A common mistake is to put too many clothes on the body. A baby loses heat quickly from the whole skin, including the legs, and in cold weather the legs should be covered. The old tradition of wearing bonnets is now nearly dead. Provided that the baby is not directly exposed to draughts and keen winds, there is no need to wear any head covering except in very cold weather, when a woollen bonnet which covers the ears should be worn out of doors.

Vests should be of soft, fine wool, silk or silk merino, and long enough in the body to ensure that there is no gap between vest and napkin. A wide piece of tape can be sewn to the bottom of the front of the vest so that the napkin can be pinned to the vest without tearing it. The neck of the vest should be wide enough to go over the baby's head without force.

Napkins are usually of two kinds; soft muslin squares to be worn next to the skin, and turkish towelling worn over these as an added protection. The various ways of putting on and changing napkins are best learnt by demonstration by the midwife or at the clinic.

In cold weather the baby will need, in addition to vest and napkin, a woollen jersey and knickers and good woollen socks long enough to reach almost to the knee. As woollen socks are easily kicked off they should be drawn in by a ribbon and tied above the ankle. In really cold weather a long-sleeved double-breasted matinee coat of wool should be worn.

In hot weather the baby may need only vest and napkin, but care must be taken to add clothes as soon as it turns cooler. Incidentally it is wiser not to speak of summer and winter clothes when dealing with young children. In the British Isles, at any rate, a winter day can be warm, and cold spells occur in the summer. If the system is adopted of adding warm garments to the foundation of vest and napkin according to the temperature indoors or outdoors, the child will be most comfortable. In this, as in all other matters relating to the care of the baby, common sense plays a very large part.

Bibs are needed to save the clothes when the child dribbles or regurgitates its food after feeding. They should be of soft, absorbent material, such as drill or cotton, with tapes to tie round the neck and the waist. Bibs made of plastic material are not recommended, as they may cover the child's face if he falls asleep, and a young baby was stifled in this manner not long ago.

Binders are *not* necessary after the first ten days of the baby's life. Once the stump of the umbilical cord has separated and the scar at the navel has healed the binder should be discarded.

The equipment and furniture required are simple and will vary with the type of home and financial circumstances, but the underlying principles are the same for all homes. The first essential is cleanliness. This means not only provision for bathing the baby, but also facilities for washing the baby's clothes and napkins, and for the clean preparation of the baby's food and clean surroundings generally. It is essential also that the mother should be able to see to her own cleanliness and in particular the care of her clothes and hands.

A low chair on which the mother can sit to nurse and bath the baby is useful, and this can be improvised by cutting down an ordinary wooden chair. It can be painted a bright colour and it should be scrubbed at regular intervals—for example, once a month.

The cot for the young baby can, if necessary, be improvised from such things as a wicker basket. During the late war, cots were even improvised from orange boxes! It is, however, worth while to buy a wicker cradle and later a large dropside cot, as this will last well into infancy. A point to be remembered about cots and also about play-pens is that the bars should not be more than 3 inches apart, so that the baby cannot get his head through. Also there should be no collapsible parts which can suddenly give way and trap the fingers.

Bedding for the cot will include a blanket to go under the mattress. Next comes the under-blanket on top of the mattress. Over this comes the macintosh or other waterproof material with the flannelette drawsheet over it. The baby is wrapped in a shawl or soft blanket and covered with a top blanket. An extra blanket may be needed in cold weather. Many leading authorities on baby care recommend that a pillow should never be used, and certainly not a soft pillow, for babies have been known to be suffocated by these. When discussing later on the preparation of food, the washing of the baby and the washing of baby's clothes, reference will be made to some other items of equipment required.

With quiet and orderly preparation for the coming of the baby, pregnancy can be a very happy time. Indeed, that is what Nature intended it to be, and most women are never so well as during the months of pregnancy.

THE HEALTH OF THE BABY.

So far these notes have dealt primarily with the health of the mother. Independent life begins for the baby from the moment he is born. The stimulus of the external air makes him draw his first breath, and immediately his own circulation replaces that of the mother on which he has been dependent for the past nine months. But a new association begins. It is the baby's birth-right that he should be nursed and fed by his mother, and the intimate relations which exist between mother and baby render them, in effect, one person for nearly the whole of the first year of life. The more the mother knows about babies in general, and her own baby in particular, the better.

Care of the Newly Born Baby.

This is, of course, the province of the midwife, who, in addition to cleaning the eyes and freeing the mouth from mucus, will bath the baby and wrap up carefully to prevent chilling. After weighing, the baby is put into his cot while the midwife looks after the mother.

The Cord. Before birth the baby gets his nourishment from the mother through a cord which enters his body at the navel and at the other end is fixed to a large sponge-like structure (the placenta) attached to the inner wall of the mother's womb. Although the bloods of mother and baby do not intermingle, oxygen and nutritive substances in the mother's blood pass via the placenta into the baby's circulation and waste products are transferred from the fœtus to the mother's blood. The baby is part of the mother. That is one reason why the expectant mother should not over-indulge in tobacco or alcohol!

Directly after birth the midwife or doctor ties off the cord and the stump falls off in about seven days. The scar at the navel heals about the tenth day. If strict cleanliness is not observed in handling the baby during that time the cord stump may become septic and the baby's life be endangered. The directions of the doctor and midwife must therefore be followed carefully.

Weight and Length. The weight at birth varies usually between 6½ and 8 lb. It is sometimes as high as 10 lb. or as low as 5 lb. Boys usually weigh more than girls; the length of a baby at birth is usually 19 to 20 in.

The premature baby is not necessarily one which is born before the end of the normal pregnancy, and often babies born three weeks before they are expected are normal in size and do not require special care. The newly born baby weighing less than 5½ lb. is usually regarded as premature and treated accordingly. Premature babies have not got the natural resistance of the normal baby and require special care. For example, the results of a cold or influenza, or any septic infection, are more serious in these babies, and it is therefore necessary to exercise strict watch over them and keep them apart from other children and adults. Again, the body temperature of these babies is often low and requires to be kept up to normal by artificial means, such as hot bottles and extra clothing or electric blankets. Some babies are so small and delicate that they have to be nursed in an incubator. Premature babies are difficult to feed and they do not suck so vigorously as a normal infant. On the other hand, it is even more important that they should be breast-fed, if possible, than with normal infants. Extra care is therefore necessary with the premature infant, and many Local Health Authorities have arrangements for nursing these babies either at hospital or at home with a specially experienced nurse. It is important to remember that premature babies need special attention throughout the first year of life, for if neglected they are especially liable to bronchitis and pneumonia. The care taken by health and hospital authorities to save such babies is well worth while, for once they pass the critical early months they develop fully, both in mind and body, into normal healthy people.

The Skin. At birth the skin of a baby is red and covered with a protective fatty substance which comes off with the first bath; the redness persists for a few days. The skin of a baby is extremely delicate and needs very careful attention. This will be emphasised later when the question of washing and bathing is considered.

The Head of the new-born baby may look a little out of shape. This is because of the pressure during birth and it rapidly becomes normal. The bones of the skull are separated from each other in the new-born baby, and on the middle of the top of the head there are two diamond-shaped soft spaces where the skull bones meet. The space towards the front of the top of the head is known as the anterior fontanelle, and the doctor and midwife often gain useful information on the child's condition from the bulging or depression of this area. The other opening towards the back

of the skull is smaller and is known as the posterior fontanelle. This closes in six or eight weeks, but the anterior fontanelle remains open for about eleven to eighteen months.

Chest and Abdomen. No special comment is needed concerning the chest of the baby, but the abdomen is normally more prominent than in older children. This is due partly to the very large liver of the young baby and also to the fact that the stomach stretches to take in as much as 3 or 4 oz. of milk at one feed.

Nervous system. Even a newly born baby can grasp an object and hold it. It can also suck and swallow from birth, but the special senses are not well developed. Loud noises will startle the baby, but he cannot at first recognise where a particular noise comes from. Babies are particularly sensitive to bright lights, but for some time cannot properly control the movements of the eyes and head so as to be able to gaze steadily at anything. The sense of smell and taste develop in a few days. Movements of arms and legs are not co-ordinated at first, but at the end of the third or fourth month of life the child can usually hold up his head. At the end of five or six months the baby makes an attempt to sit up, although this may be delayed until the seventh or eighth month. By the ninth month the child begins to crawl and can usually stand at the end of ten months. At twelve or fourteen months he walks. The young baby is very sensitive to his surroundings. If these are unfamiliar he may, for example, refuse to feed. Also if the mother or a relative is nervous in handling him he will immediately become frightened. It is therefore very important to learn how to handle a baby properly and firmly so as to gain and hold the child's confidence.

Speech. Sounds are made a few weeks after birth, but single words are only said towards the end of the first year. Real talk does not occur until about twenty months or two years.

The Teeth. One of the reasons why it is important to ensure the adequate nutrition of the mother during pregnancy is that the infant's first, or milk teeth, are developing at this time, so that they are already present within the gums at birth. They appear through the gums in the following order —

Lower central incisors	5th to 6th month
Upper central and outer incisors	7th to 8th month
Lower outer incisors	10th to 12th month
First molars	14th to 16th month
Canine teeth (eye teeth)	17th to 18th month
Second molars	24th to 30th month

Although there are wide variations in the time of appearance of teeth, eight teeth should be present by the end of the first year, and all twenty of the milk teeth by the end of the second year.

The prevention of dental decay depends, therefore, partly on the good nutrition of the mother, but also on freedom from illness of the infant, especially one which affects the intake of food for any length of time. The preservation of the teeth depends on the presence of an adequate supply of mineral salts, and especially calcium, and also of vitamin D. Exercise for the jaws by the gnawing of hard crusts, or rusks, is also necessary.

GENERAL MANAGEMENT.

It is important to have a clear idea of the needs of the young baby, in order that a regular routine may be worked out which will place the least strain on the mother and give the baby the maximum degree of comfort and security. It is also necessary to know where to turn for guidance and advice in a difficulty. The family doctor is, of course, the stand-by in emergency and if illness is suspected. He is, however, a very busy man, and the young mother may not want to worry him with enquiries which, although important to her, are relatively trivial to him. The midwife, the health visitor, the home nurse, and the Welfare Centre are all available to advise. When in doubt do not hesitate to ask for advice. The mere sharing of an anxiety with another is helpful.

The baby's material requirements are simple. They are food, cleanliness, warmth, and sleep and, above all, an orderly routine.

The Daily Routine.

Opinion varies as to the frequency of baths for the newly-born infants, but it is now a common practice to bath the baby immediately after birth, and then to leave him until the stump of the cord has separated, at the seventh to the tenth day, the skin being cleaned, when necessary, with olive oil.

After this time the baby will take a bath each day.

A baby's skin is very sensitive and will quickly chafe and get sore if roughly handled. It is therefore necessary to exercise the greatest care in the choice of materials used for washing and in the handling and drying of the skin. Great care should be taken to select the finest soap and the softest of washing flannels or sponges. Towels must be soft, dry, and clean, so that the skin can be dried thoroughly by gentle rubbing. Gentle handling is particularly necessary for the creases of the skin and behind the ears. Some experts say that powder is unnecessary after bathing, but there is little doubt that a good dusting powder helps to preserve and soothe the baby's skin and to keep it dry.

If the skin becomes inflamed and sore expert advice should be sought, as the baby is very susceptible to septic infections which can enter through small abrasions or cracks in the skin.

Sun and Air.

Many skin conditions in infancy, and indeed other illnesses, are predisposed to either by neglect or excessive care. Leaving the baby to lie in wet and dirty napkins is one example, and at the other extreme is the failure to allow free access of air and sunlight to the skin by over clothing. The human skin has many important functions, including the maintenance of the temperature of the body, and it is also concerned with the manufacture of vitamin D by the action of sunlight on the skin. It is therefore essential that the body should obtain a reasonable amount of fresh air and sunlight.

Sore Buttocks. The best way to prevent a baby from developing soreness of the skin of the buttocks is early training in clean habits, as in many instances the inflammation of the skin is due to irritation set up by the child's urine or motions. Obviously a clean dry napkin will not cause this soreness, and the well-trained child soon learns to keep clean and dry. Accidents will, of course, happen and some little upset in the diet may cause frequent stools. It is therefore essential to change the napkins regularly and to clean the buttocks thoroughly after a motion. All fæcal matter should be removed with cotton wool swabs (which are put immediately into the "dirty" bucket), and the buttocks are then cleaned gently with warm water, dried and powdered. If the skin is red and sore, olive oil may be used for cleaning instead of water, and zinc and castor oil ointment or cold cream instead of powder. If the soreness is marked the daily bath can be stopped for a day or two, but expert advice should be sought if it does not clear up quickly.

CARE OF THE CLOTHES.

Apart from the fact that every mother likes her baby to look clean and neat it is essential to keep the clothes clean because of the sensitiveness of the young infant to infection of all kinds. Cracks or abrasions of the skin may turn septic if dirt comes in contact with them, and dirty clothes or towels are particularly liable to cause infections of this kind. Apart from this, badly washed clothes may also set up inflammation of the skin by being hard, and thereby chafing the skin, or because irritating fatty acids from the wrong kind of soap have not been completely rinsed out. The first essential is therefore to wash all articles which may come into contact with the baby regularly and frequently.

The mother must see that her own clothes and body are clean and in particular that her hands are washed thoroughly before the baby is handled. Her aprons and overalls should be washed frequently and discarded at once if soiled. This is particularly important if soiling takes place when the baby's napkins are changed.

Towels must be clean, soft, and thoroughly dry, before they are used.

Flannels and sponges should be washed frequently in hot water and thoroughly rinsed free of soap. Face flannels should be boiled once a week.

Napkins require special care. They should

first be sluiced under running water to wash out all solid matter, and then left in a bucket of cold water until ready for washing. Washing should be done in warm water with a good soap lather with thorough rubbing, and rinsed in several lots of water until all the soap is rinsed out. After wringing they are hung up to dry. Drying should not take place too quickly, as the napkins will then be hard. For this reason it is best to dry them out of doors. Mangling will help to make the napkins soft after drying.

Baby's Clothes. Different materials require different methods of washing, but the principles set out above hold good for all clothes. The washing must be thorough, in water which is hot enough to enable dirt to be removed but not so hot that the clothes cannot be well cleaned by hand. It is particularly necessary to see that neck and cuffs are cleaned properly, and the same comment applies to the lower edge of the vest which may be soiled from the napkin.

Bibs should be boiled at regular intervals, as they are liable to get smelly from regurgitated milk.

SLEEP.

If a baby is warm and comfortable and well fed its natural reaction is to sleep. The newborn infant sleeps for eighteen to twenty hours each day, waking only to be fed, and even at twelve months he will require fourteen or fifteen hours sleep each day. Sound sleep is essential to good health, and bad management of the young baby may result in faulty habits which last throughout life. Thus undue excitement before being put down to sleep, or irregular hours, may sow the seeds of insomnia. Ideally the baby should be made so comfortable that he will sleep from ten o'clock at night until six o'clock the next morning, but hunger may prevent this, and feeds may require to be re-arranged accordingly.

Restless sleep, with sudden nervous starts, is not a normal condition, and expert advice should be sought if this persists. A common cause is some digestive upset, such as colic or constipation, and coughs and colds also disturb the normal sleep rhythm, especially if there is a rise of temperature. It may then take a few days for the normal sleep habit to return.

CRYING.

It is normal for the young baby to cry, and a lusty yell is a good way to expand the lungs. Attacks of crying and screaming do not always signify pain or colic. Although it is a mistake to pick up a baby every time he cries, it is necessary to exclude sources of discomfort, such as hunger, a wet napkin, colic, constipation, and pain. Apart from these, the child may quite easily get into the habit of crying, or the baby, even the very young baby, may realise that he can readily attract attention by a display of tears or temper and thus be spoilt. It is advisable to seek expert advice if the fits of crying persist without apparent cause.

CARE OF THE MOUTH, NOSE, AND EARS.

Common sense applies in the cleanliness of the mouth, nose, and ears, just as in all other matters relating to the care of the baby. The lining of the mouth is very delicate and easily scratched. It should not, therefore, be cleaned. Indeed, any attempt to clean the mouth may result in an infection which will result in difficulty in feeding and fretfulness. As mentioned earlier, the nostrils must be cleaned regularly, but this only means the entrance to the nostrils. Sneezing and discomfort are caused if the cotton wool is pushed up too far. The cotton wool swabs used to clean the nose should be moistened in warm water and twisted to a point. The ears may also be cleaned gently in the same manner as the nostrils, but no attempt to remove dirt or wax with a solid instrument, like a match-stick or hair-pin, must be made. Permanent injury to the ear-drum and hearing may easily result.

BREAST-FEEDING.

Every baby has the right to expect that his mother will feed him herself. That is the natural way and has advantages to both mother and baby. The baby gets the best possible food without any of the risks of contamination that may occur with the preparation of artificial food. The temperature of breast milk is that of the infant's body and it contains various protective substances which help to shield the baby from infection.

The mother, for her part, has the satisfaction of knowing that she is "mothering" her baby in the fullest sense. Incidentally, breast-feeding costs nothing, whereas artificial feeding can be quite an expensive matter. There are certain medical conditions where a mother should not feed her baby herself, but they are very few in number.

As in everything else in life confidence arises from the knowledge of the right way to do a thing. Breast-feeding is no exception to this rule, but it is particularly important that the mother should have full confidence in her ability to feed the baby, as any nervousness and anxiety on her part are soon transmitted to the child. This is one of the reasons why regular visits should be made during pregnancy to the doctor or clinic, in order that the mother's general health may be investigated and such important details as the care of the nipples attended to. The midwife will see that a regular routine is taught during the first fortnight of the baby's life, so that by the time the mother assumes full responsibility for the baby she will have had quite a lot of experience.

The general rules are, of course, quite simple. A regular routine is desirable both for the sake of mother and baby. The latter must be able to have his food at the same times each day, and the regular routine helps the mother to lead her normal life. The mother will already have had instruction on the care of the breasts, and in particular the preparation of the nipples so that they will not become tender when the baby starts feeding. The next essential is, of course, cleanliness. The nipples must be carefully washed before and after feeding and particular care should be taken in drying after feeding, as a little crack or fissure in the skin of the nipple, in addition to causing pain and discomfort, may let organisms enter to cause a breast abscess.

The third essential is to persevere. Many young mothers get discouraged at what proves to be in fact only a temporary upset. For example, the baby with a cold in the nose has difficulty in breathing and feeding at the same time, but a little patience will soon ensure that he does not suffer, by taking a little longer at each feed.

The last great requisite is calmness. Breast-feeding is a natural process, and countless millions of women have successfully fed their babies since the world began. It is not therefore a matter for nervous speculation and anticipation. Any nervousness or sense of strain on the part of the mother is quickly felt by the infant, who will in turn be restless and irritable. A comfortable position in quiet surroundings, and a regular routine, will ensure that the baby can give his entire attention to feeding, and the supply of milk almost invariably keeps pace with the demand. If any little anxiety or doubt arises in the mother's mind she should seek competent advice and not listen to "old wives' tales." The doctor, midwife, or health visitor, are the best people to advise.

WEANING.

No sensible grown-up person would contemplate changing suddenly from a normal diet to one entirely different. In the same way, weaning should be a gradual process. Between the sixth and twelfth month of life the baby will be changing from four-hourly feeds to the "three good meals a day" routine which he will hope to continue for the rest of his life. To begin with, therefore, it will be natural to change his diet by altering *one* of his feeds, for example that at 10 a.m. This may be at first one of the recognised proprietary milk foods, and later such items as milk pudding, potato and gravy, and green vegetables, may be given. From the sixth month onwards, the baby will want to nibble a rusk or hard-baked crust, which may be smeared with butter, egg, honey, etc. It is not necessary to continue breast-feeding beyond the ninth month and many mothers stop earlier. Much depends on the health and energy of the mother. Generally speaking she should try and continue breast-feeding during the hot weather and not wean until the autumn. By this means the anxiety of protecting the baby's food from contamination during the summer months is avoided. It is also inadvisable to wean if the baby is suffering from illness. It is much better to continue with breast-feeding until he is well. It

is sometimes necessary suddenly to wean a baby. For example, the illness of the mother may make this imperative. In that event expert advice should be taken, as the sudden transfer to an unsuitable food may upset the baby's digestion. Again, the amounts of food taken by different babies vary very much, and one may take several ounces more than another in the course of twenty-four hours. It may therefore be necessary to try different kinds and amounts of artificial food before the right one is found, and expert advice on this is most helpful.

ARTIFICIAL FEEDING.

It would be unwise in these notes to attempt to describe the various kinds of artificial food for a baby. Babies vary in their likes and dislikes from one to another just as grown up people do. The basis of artificial food is cow's milk modified in various ways. Very few infants will tolerate whole cow's milk as the amounts and nature of the fat, sugar, and protein, are different from human milk. Expert advice should be sought on the best type of artificial food for the baby, but there are certain fundamental rules which must be followed in all cases. In addition to the essentials already set out for breast-feeding, namely, a regular routine, quiet surroundings, and personal care all the time the baby is being fed, particular attention must he paid to cleanliness. It is very easy to contaminate the baby's food in the course of artificial feeding and infections caused in this way may prove to be serious.

First, the mother must make sure that her own hands are clean by scrubbing with soap and water and drying on a clean towel before each feed is prepared. This precaution is particularly necessary if the mother or one of the other members of the family has an intestinal upset, such as diarrhœa. Next, the room in which the food is prepared must be scrupulously clean and free from dust and dirt. The outside of tins and containers must be cleaned before they are opened and so must the table or tray on which the food is kept. Much time is saved by neat and methodical preparation. If everything required is kept always in the same place, and used articles are cleaned and replaced immediately, the risk of contamination by constant handling of unnecessary articles is thereby reduced. Saucepans and bowls and basins must also be absolutely clean, but the most frequent source of infection is in the feeding-bottles and teats. If these are not cleaned properly after each feed the film of milk left behind makes an ideal breeding-ground for bacteria. Feeding-bottles should be washed after each feed, rinsed, and kept in cold boiled water until required again. They should also be boiled for five or ten minutes every twenty-four hours. Teats should be turned inside out and cleaned thoroughly after each feed, and boiled once a day in water to which a little salt has been added: the salt helps to preserve the rubber. Between feeds they also should be kept in cold boiled water.

It is advisable to boil all milk for babies, especially in hot weather. Indeed, where there are no proper facilities for keeping fresh milk, it may be wiser to use dried milk in very hot weather. It is also essential to see that jugs and bottles containing milk are securely covered to keep out dust and flies.

The actual feeding of the infant should follow the same routine as for breast-feeding. The baby feeds best when he is quiet and comfortable, and the napkin should therefore be changed before feeding. In no circumstances must the baby be given a bottle and left to his own devices. The mother should stay during the whole feed and hold the bottle herself. Only by this means can the little encouragement and attention which mean so much to the health of the infant be given.

Vitamins

Milk, fruit, and vegetables make the basis of the baby's diet, but by the age of nine months he is able to digest tender and finely divided meat, and also fish. At this age all fruits can be eaten, but fruit with pips and skins, *e.g.*, black and red currants and gooseberries, require to be strained and given in the form of gooseberry fool, etc.

Similarly, all vegetables can be taken, provided that they are young and tender and well cooked, and small amounts of lettuce, carrot, and other salads can be given, provided that they are finely divided.

It is essential to ensure that the infant receives an adequate supply of vitamins, especially in the winter. This may be done by adding fresh or concentrated orange juice or rose-hip syrup, and cod-liver oil or halibut-liver oil, to the diet, or by means of vitamin concentrates. It is advisable to take expert advice on the most suitable way of supplementing the vitamin content of the diet especially following an infection, for coughs, colds, and other infections, tend rapidly to lower the reserves of vitamins in the body.

Foods containing iron include green vegetables, and bone and vegetable broths. Calcium, so important for bone formation, is supplied with the milk in the diet.

THE SYMPTOMS AND SIGNS OF ILL-HEALTH.

It is, of course, essential to seek advice immediately illness is suspected. The signs and symptoms of illness in the baby are not so clearly defined as in grown-ups, nor can the baby tell where he has pain or discomfort. Again, anxiety or doubt in the mother's mind is best shared with an expert as soon as possible. The following notes may, however, serve as a guide in interpreting some early departures from the normal.

Temperature. A young child will often develop a rise of temperature for no apparent reason, as the mechanism for controlling the heat of the body is not so well regulated as in older people. A slight temporary rise in temperature may not therefore be so significant as in older children, but if at the same time the child is restless, irritable and "off his food," it should not be neglected. The thermometer should be placed under the armpit with the arm held closely to the side, or in the fold of the groin with the legs held closely together. As the skin temperature is a little lower than the body temperature it should be kept in position for five minutes before reading the result. The normal temperature is 98·4° F.

General Appearance. The mother will be able to tell when a child is ailing, as she sees the baby constantly. Restlessness, irritability, pallor or undue flush, sweating, crying and unusual movements or positions, may all give an indication that the child is unwell. Colic, or vomiting and diarrhœa or constipation, may also help to show abnormalities.

Restlessness and disturbed sleep in a baby who had previously been sleeping and eating well are obviously indications that there is something not quite right. This is especially the case if at the same time there are other symptoms, such as sweating and a rise in temperature. Lying in an abnormal position, or the development of rigidity in the back or neck, should be enough to seek expert advice at once.

The Air Passages. The common cold may be quite a serious matter in the young baby. In addition to making him feverish and fretful it interferes with his feeding because the nose is stuffed up. A cold in the head should not be treated lightly and every effort should be made to keep away people who have a cold so that the baby does not catch it. When nursing a child with a simple cold make sure that he has plenty of fresh air. A stuffy atmosphere delays recovery, and the child will come to no harm if he is warmly clad. Patience in feeding is required, as he will need frequent rests to get his breath. Plenty of warm, sweetened, boiled water will help to relieve thirst. The nostrils should be kept clean and soreness prevented by lightly rubbing vaseline round the nose and upper lip.

Cough and Shortness of Breath. If the baby develops cough, and shortness of breath, expert advice should be sought at once. There is, of course no need to assume that the child has some serious condition such as pneumonia. Probably he has some simple condition which will get better in a few days with expert treatment. On the other hand, it would be sheer stupidity not to take advice, as even a simple bronchitis can cause the baby distress and interfere considerably with his feeding.

Refusal of Food. A young child refuses food either because he does not want it, or he is "full up," or because he is not feeling well, or because he is feeling cantankerous and is "playing up" in consequence. The first and last reasons are soon

cured by hunger, but the onset of illness, and especially the early stages of infection, are not easy to detect, and it is inadvisable to delay too long before seeking advice.

Vomiting and Diarrhœa occurring together should lead the mother to seek advice at once, particularly if this happens during the hot weather and other cases are known to have occurred in the neighbourhood.

Vomiting without Diarrhœa. It is normal for the child to regurgitate a little food after feeding particularly if he has had too much. Again he may bring up a little milk with the wind, but the vomiting of sour curdled milk is not a normal event. Persistent vomiting, particularly if "explosive," or not related to food, will need expert advice, as it may be the first symptom of illness.

Diarrhœa. Slight changes from the normal, righting themselves in a few hours, are only to be expected from time to time. If diarrhœa persists, and particularly if the child is also out of sorts, expert advice must be taken. A change of colour of the motions from orange-yellow to a green slimy stool is an indication for seeking advice at once. In any attack of diarrhœa, however slight, particular attention should be paid to the skin of the buttocks, as this readily becomes inflamed and sore. The treatment for sore buttocks is described earlier in this article.

Constipation is not a cause for anxiety unless it is persistent, or the child is ill in other respects. In fact many babies tend to be constipated. Drastic measures are not called for. It is, of course, essential to persevere with the regular routine each day in order that regular habits may be acquired. The first essential in treatment is to see that the baby is getting enough food, and adequate exercise, together with plenty of sweetened water, or fruit juice and water to drink. Constipation is more frequent in the older infant who is taking mixed or artificial food, and he can be given such simple (and usually effective) remedies as a teaspoonful of prune juice or a teaspoonful of honey in warm water. Persistent constipation requires expert advice, and remedies such as glycerin suppositories or enemas should not be given without that advice.

Feeding Troubles. In addition to the above indications of ill-health there are other signs and symptoms which help to show when the baby is not feeding properly. Distention and discomfort may be indications that all is not normal. Some distention after a feed is not abnormal, but it should subside before the next feed. Persistent distention, especially if it is increasing, should lead the mother to seek expert advice.

Discomfort after feeding is not normal. It may vary from mild restlessness and fretfulness to attacks of colic with screaming and the legs drawn up. Examination of the motions may show that they are loose and green or contain white undigested lumps, in which case expert advice should be sought.

Failure to Gain Weight and Wasting. It is essential to remember that babies are not machine made. Therefore they vary from one to another. One may be big and sturdy with a loud cry and a lusty appetite. Another may be small and quiet with only slow gain in weight. Too much attention must not be paid, therefore, to the weighing machine. If the baby is placid, healthy, and sleeping well, the fact that he is not gaining rapidly in weight does not matter. If, on the other hand, the child looks tired and thin with sunken eyes and the fontanelle on top of the head drawn in, expert advice must be sought. If he also has diarrhœa and is irritable or apathetic, then expert advice should be sought immediately.

Teething. There is no doubt that teething causes temporary disturbances in most babies, but it is important that illness due to other causes should not be dismissed as teething trouble. It is safer, therefore, to assume that any illness is not due to teething and to seek advice. The kinds of disturbance that may occur in teething are local and general. The local symptoms are pain in the mouth with sore and inflamed gums. The child resents any attempt to see the teeth. There may also be dribbling, and enlargement of the glands in the neck. The general symptoms may include a tendency to eczema, and bronchitis, and nervous symptoms, such as fretfulness, irritability, sleeplessness and convulsions. Expert advice should be sought for such conditions as eczema, bronchitis or convulsions. Beyond this no treatment is required except patience and watchful care. Common sense will show the wisdom of studying the child's needs for soft and easily digested food, and avoiding hard crusts and rusks until the tooth is through.

Convulsions. The occurrence of convulsions is a danger signal indicating the need for immediate medical advice. In many instances the cause and the remedy are simple, such as faulty feeding with insufficient vitamins in the diet. On the other hand, they may be an indication of the onset of an acute infection, or some other condition requiring careful investigation. Fortunately convulsions are rarely fatal, and the first-aid treatment is to put the baby in his cot in a quiet corner of the room and send at once for the doctor.

Head Injuries. Babies and young children can fall in the most alarming manner without sustaining anything more serious than a bruise. If, however, following a head injury, the baby is pale and drowsy with vomiting, then expert advice must be sought immediately.

PREVENTION OF ACCIDENTS

Each year about 6,000 people die, in England and Wales alone, as the result of accidents in the home. More than one-quarter of these are children under the age of fifteen, and between the ages of one and five years a fatal accident in the home is the third most frequent cause of death. Many of these are either due to accidental suffocation or to burns and scalds.

Down pillows for small babies were formerly a common cause of suffocation. Burns and scalds may result from an unguarded fire, or one in which the fire-guard is faulty. Electric flex with worn insulation is a particular danger to the toddler, for he may fall over it, or get an electric shock if he plays with it. A saucepan handle put within easy reach of the child, or an over-hanging table-cloth with a tea-pot on the edge of the table, may result in a bad scald if the child can reach to pull it down.

Medicines or garden chemicals, etc., left lying about may tempt the child to eat them, and in this connection it should be remembered that young children are more susceptible to poisons than adults.

Finally, a very young child, like an old person, falls readily, and care should be taken not to put obstacles in its path, such as a loose mat on a slippery floor, or a worn carpet with loose strands.

The young baby should be so well protected that accidents do not happen, but they do sometimes occur, even in the best regulated families! The first essential is, of course, prevention, and the wise parent will look carefully round the rooms in which the baby lives to see that all fires are protected by guards, electric light and power flexes and switches are not exposed, and that hot kettles and taps are out of reach. The table must be so laid that sharp knives cannot be touched and table-cloths cannot be pulled, and tea-pots, and other vessels containing hot liquids, thereby spilled over the infant. *See also* S38.

Protection against Smallpox, Diphtheria, Whooping Cough, and Poliomyelitis.

Smallpox is now rare in the British Isles because of the care taken at the sea and airports to keep it out of the country, and because vaccination prevents it from spreading if it is introduced. It is a very serious disease with a high mortality, particularly in young children.

Although compulsory vaccination has been abolished it is still essential that every baby should be vaccinated. This can be done either by the family doctor or at the Welfare Centre.

Diphtheria, Whooping Cough, and Poliomyelitis. During the late war the diphtheria immunisation campaign was so successful that the number of cases and the deaths from diphtheria were reduced beyond all expectation. Diphtheria remains, however, a very serious disease and the baby must be protected against it. Immunisation is a simple procedure and does not leave any after-effects. It can be done by the family doctor or at the Welfare Centre. It is now possible to immunise also against whooping cough, and poliomyelitis, and it is a wise precaution to take medical advice on protection against these serious diseases.

MATERNAL AND CHILD CARE IN THE SO-CALLED BACKWARD AREAS OF THE WORLD.

People living in wealthy countries, with highly developed medical services, soon come to take those services for granted. In many parts of the world, and particularly in tropical and sub-tropical regions, the combination of poverty, the great killing diseases such as malaria, and malnutrition, make the problems of care of mothers and children peculiarly difficult to solve.

Fresh milk and feeding-bottles for infants may be unknown, and the scarcity or pollution of water supplies may render the preparation of infant food a hazardous undertaking. The simple nature of the houses renders elaborate provision impossible and there may not be storage space for food. There is often a shortage of fuel, and few cooking-utensils are available. In many areas the food for the infant is prepared in the same pot and at the same time as that of the adults. The result is that breast-feeding is prolonged, often for two years or more, with a sudden change to the diet of adults. As this may consist largely of carbohydrates, and because first-class proteins in the shape of meat and fish are only rarely available, children tend to be kept on starchy food. They are thus deprived of the balanced diet of fats, carbohydrates, and proteins, and of the essential vitamins which are required for healthy development. As their mothers may also be undernourished, they start life with a double handicap. The result is then only too clearly seen, in the form of anæmia due to deficiency of iron, and various conditions due to lack of proteins and vitamins. Avitaminosis, as it is called, may take a number of forms, including the onset of blindness or rickets. Indeed, rickets is now more common in such countries as India, tropical Africa, the Middle East, and some areas in South America than it is in temperate climates, in spite of the adequate amount of sunshine.

A condition which is receiving much attention at the present time is the disease known as kwashiorkor, due to deficiency of first-class protein, and seen in many tropical and sub-tropical countries. The child victims of this disease not only fail to grow but also show marked mental changes, manifested by lack of interest in their surroundings and a general appearance of misery. Other symptoms include widespread skin lesions, changes in the colour of the hair, loss of appetite, and vomiting. In more extreme cases the infant may display the wizened, shrunken appearance of extreme starvation, a condition then known as marasmus.

It will readily be appreciated that such infants are particularly susceptible to infections of all kinds, in addition to those peculiar to the region in which they may live. Besides the common infectious diseases of childhood, these undernourished children are at risk from tuberculosis, malaria, yaws, worm infestations, and dysentery. It is not surprising, therefore, that as many as 40 per cent. of children born in such areas may fail to survive the early years of life. Poverty, a low standard of health, and a general shortage of medical and nursing services, combine to produce high infant and maternal death-rates, and these are usually associated with high birth-rates.

It is clear that any programme for the protection of maternal and child health in the so-called backward countries must be based on adequate knowledge of the area concerned, including its climate and culture, the standard of health of the population, the economic circumstances of the country, the level of education, and the efficiency of the government organisations.

After the Second World War two international agencies were established which have a special interest in maternal and child care. They are the United Nations Childrens' Fund (UNICEF), and the World Health Organisation (WHO). *See below and also* C18.

WORLD HEALTH.

The study of world health is a very recent development, made possible only by the establishment of the great international organisations, such as the United Nations and the World Health Organisation. One of the functions of these bodies is the collection and comparison of statistics from many countries, and, although much of this information is as yet incomplete, it has, within the last few years, become possible to form a rough estimate of the population of the world, its rate of growth, and its state of health. Thus, in 1957, the population of the world was estimated to be 2,795 million people, of whom over half lived in Asia, 15 per cent. in Europe, 9 per cent. in North America, 8 per cent. in Africa, 7 per cent. in the U.S.S.R., 5 per cent. in South America, and less than 1 per cent. in Oceania (*United Nations Demographic Yearbook* 1958). The average birth-rate was 34 per 1,000 population and the death-rate 18 per 1,000, with an annual growth rate of population of 1·6 per cent.

Although these statistics are most valuable in predicting broad population trends, and for estimating the food requirements of the world in future, they are by no means a true picture for various parts of the world. Further scrutiny of the statistics reveals, for example, that in Northern and Western Europe the birth-rate is only 18 per 1,000 and the death-rate 11 per 1,000, with a population growth of 0·6 per cent. In South-West Asia, on the other hand, the birth-rate is 42 and the death-rate 18, with a population growth of 2·4 per cent. In Tropical and Southern Africa the birth-rate is very high, at 45 per 1,000 population, but death-rates are also high, at 26, so that the rate of population growth is only 1·8 per cent.

Clearly, then, health conditions vary widely in different parts of the world, and this is emphasised by the fact that while the average expectation of life at birth in some countries is seventy or more years, in others it remains at about thirty. That is due principally to the fact that the great killing diseases of infancy, childhood, and early adult life have been brought under control in some communities but are not yet under control elsewhere.

We live, in effect, in two worlds. In the smaller, composed of countries like those of Western Europe, North America, Australia, and New Zealand, the population is composed of relatively few but healthy children, many healthy adults, and an increasing number of old people. The principal causes of death are those of later life, such as heart disease and cancer. In the much larger part of the world the killing diseases of infancy and childhood, the great acute infective diseases such as smallpox, typhoid fever, dysentery, and pneumonia, and the chronic infectious diseases illustrated by tuberculosis, malaria, and syphilis, still take a heavy toll of human life, especially in the early years. These diseases are also the cause of much human misery and suffering, especially when they are associated, as is so often the case, with severe malnutrition, with resulting deficiencies of vitamins and first-class proteins.

Twelve years ago, on April 7th, 1948, the World Health Organisation came into being. In the preamble to its Constitution health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Article I stated that "the objective of the World Health Organisation shall be the attainment by all peoples of the highest possible level of health."

During the past twelve years the World Health Organisation has striven to attain this end, in association with other international agencies such as UNICEF (The United Nations Children's Fund), in a variety of ways. Through its head-

quarters in Geneva, and the Regional Offices for Africa, the Americas, Europe, the Eastern Mediterranean, South-East Asia, and the Western Pacific, attacks on a massive scale have been made on the great killing diseases of the world. Malaria, tuberculosis, the venereal diseases, and other infections have been met with the most modern methods of prevention and treatment. At the same time the education and training of skilled medical, nursing, and ancillary staffs have been undertaken, together with the improvement of nutrition, environmental sanitation, and the organisation of health services.

Although the amount of money available for all this work work is limited, much progress has been made. By its Constitution WHO is restricted to assisting Governments on request, but there are very few countries which are not now in active association with the work of the Organisation, and it is truly world-wide. Definite improvements are already apparent. In some countries the control of one disease, malaria, has caused the death-rates to fall to one-half of their former numbers. In many countries, also, the expectation of life from birth has risen so rapidly as the result of the control of disease that it is now forty-five years or more as compared with thirty years or less until quite recently. A very great deal remains to be done, but already it is possible to foresee the time when it could be one world again from the point of view of the control of disease and the maintenance of health.

Unfortunately, it is not just a simple matter of preventing and curing disease. The success achieved so far has already revealed further problems. Many more people are now surviving to adult life, more babies are being born into the world, and they in turn are being aided to survive the great killing diseases of infancy and childhood. As noted earlier in this article, world population is now increasing at the rate of 1·6 per cent. each year, and the most urgent problem is to ensure that sufficient food is produced for these increased numbers to survive and live full and useful lives. There is no point in preventing death from disease merely to die later of starvation, or to live in a state of chronic malnutrition. All Governments are now aware of this danger, and it is fortunate that modern methods of agriculture enable more intensive cultivation of existing land to be undertaken, and that additional land is continually being brought into use.

The first advances towards health were made by attacking the physical environment. Attention was paid to the purity of water supplies, the disposal of waste products, contamination of food, better housing conditions, and the prevention of industrial injuries and poisoning. Atmospheric pollution was also found to be an important cause of disease. While these improvements were being made the growth of scientific knowledge made it clear that man was also at risk from other living organisms, especially bacteria, viruses, and various parasites, and so began the attack on the biological environment, in the effort to control the diseases caused by these organisms and to prevent their transmission from one person to another. The most recent development has been the realisation that many conditions favouring ill-health are made by man himself. That is particularly true of mental stress and anxiety, and much attention is now being paid to the subject of mental health. The social environment has only received detailed consideration in the present century, but much is now being done to instruct and advise people to be more enlightened in their dealings with others.

The individual, the family, the local community, and the State each have their parts to play in the promotion of health. We are, indeed, only at the beginning of our struggles to conquer disease and promote health throughout the world, but a most promising start has been made.

WORLD MENTAL HEALTH.

In ancient times, as in many parts of the world today, the strange behaviour and unpredictable reactions of the mentally ill were regarded with fear, as a visitation by some supernatural force or "possession" by a spirit. Indeed, in many primitive societies some form of seizure or fit, of a hysterical nature, is still the socially accepted reaction to a personal disaster, or emotional crisis, to be cured only by the exorcisms of the priest or witch-doctor.

The treatment of the mentally afflicted in such primitive societies was often violent and cruel, but, on the other hand, the closely knit ties of family provided for community care in the best sense of the term, just as the simpleton was kindly treated by the other inhabitants of the village in mediaeval Europe.

As civilisation became more complex, particularly in Western Europe, the lot of the mentally afflicted became harder. Segregation in institutions, such as Bedlam (originally Bethlehem) in London, confinement in chains, whippings, and beatings, and even public exposure like wild animals in a zoo, were the usual fate of the insane poor, while the wealthy were imprisoned in a locked and barred room with a keeper. So heavy was the stigma of insanity that its presence within a family was concealed, as is the case in some Eastern countries today.

This grim picture began to change in Western countries about one hundred and fifty years ago when Philip Pinel in Paris first struck the chains off the lunatics under his care and the Quakers founded The Retreat at York in England. But, although physical cruelty became unfashionable, society still required the insane to be confined in asylums, usually for life, and this imprisonment was not accompanied by any form of investigation or treatment worthy of the name. It did, however, provide opportunities for the study of mental disease, and gradually certain broad patterns of mental disorder became apparent. It was recognised, for example, that one form, known as mental deficiency, was due to an incomplete or arrested development of the mind, either because of some defect of development or as a result of some injury or disease in the formative years of life. It also became clear that certain forms of mental illness appearing in those whose minds had already developed fully were, in essence, extreme manifestations of the normal emotional responses. The violent alternations of excitement and depression which characterise the manic-depressive, the despair of the melancholic, and the withdrawal from the outside world of the schizophrenic, to give only some examples, are all pathological manifestations of reactions which, in moderation, might be regarded as normal for an individual of a given temperament. Thus many apparently obscure mental conditions were found to be capable of rational explanation, and the way was opened to more enlightened methods of care and, indeed, prevention.

With the extension of these studies to the backward areas of the world it is becoming recognised that similar departures from the normal may be found in all races. It has been found that the tribal African, for example, will reveal certain broad patterns of abnormal mental behaviour which are similar to those of his more sophisticated counterpart in the West, but, by reason of his upbringing and environment, the detailed nature of his disorder may be very different.

Although the nature of man's mental reactions may be determined at the moment of conception, it is his external environment, particularly in infancy and childhood, which determines his subsequent development, mental as well as physical. Thus a person of excitable temperament, easily roused to anger or moved to tears, may by early training in a suitable environment learn discipline and self-control, so that these endowments become assets and not hindrances. If the early environment is not favourable, or if he is transplanted to

unfavourable surroundings, such a person may become at best unstable or, at worst, show signs of gross mental disorder. When a member of one culture is suddenly transferred to another the reactions may be equally unpleasant. The African in a European city may respond to stress by violence, while the European can deteriorate rapidly in the loneliness of a tropical environment unless he is by nature calm and placid, with adequate reserves of self-control.

It is against this background that the world picture of mental health must be assessed. Basically it may be said to be one world, in that all men are born with certain common patterns of behaviour, just as they share a given number of blood groups, and similar anatomical and physiological development. From a very early age, however, even before birth, the effects of differences in environment become evident. Malnutrition and disease in the mother, poverty, and even the place of birth, may be decisive in determining the future mental development of the individual, quite apart from the nature of the family into which he is born and the society in which he matures.

Hence it ceases to be one world and becomes two, for the people of the Western countries have so modified their environment that they have succeeded in adding many years to their average expectation of life. A man in such a country may expect to live for seventy years and a woman for several years longer than this, whereas in an under-developed country the expectation of life, especially for a woman, may not exceed thirty years. Those who live in the vast rural areas of the world are at the mercy of the elements, whereas Western peoples have become dependant on the machine, and the speed of existence is governed largely by this. In the former, endurance, amounting almost to fatalism, is an essential requirement for survival, whereas in the latter speed and precision are required, sometimes with a margin only of seconds between success and disaster. These factors produce different manifestations of mental stress in the two types of society.

In highly industrialised communities the problem child, the problem family, and juvenile delinquency, for example, flourish in the overcrowded and congested areas of large cities, especially those parts which are falling into decay. The long time-lag between sexual development at puberty and full social maturity, which may occur ten or even twelve years later at the end of university education, also imposes heavy strains on the young which are not felt in the under-developed countries where early marriage and unrestricted child birth are customary. The adult in urban society has also many responsibilities in addition to the stress and fatigue of his work and the journeys to it. Failure to achieve promotion, or inability to hold down a more senior post, may produce unfavourable reactions in the individual concerned and in many of those in contact with him, both at his place of work and in his home. Finally, the mere extension of the expectation of life brings problems unknown to the short-lived communities in other parts of the world. The depressive states associated with the sexual changes of later middle life, and the slow mental and physical deterioration of the aged, are exaggerated by the restrictions and loneliness of urban life. But it is, above all, in the loosening of spiritual and family ties that the greatest differences between the two worlds may be seen. In spite of its many hardships, poverty, and disease, the pattern of life in the "backward" rural communities provides a continuity, and a sense of permanence and security, which is lacking in industrialised societies.

It might be said, therefore, that the inhabitants of these two worlds have drifted so far apart that their problems in the field of mental health are no longer comparable, but that is not true. The poorer countries, aided by the more wealthy, are now in a state of ferment. Great industrial cities are developing, and the rural workers are finding that their ancient way of life, hitherto unchanged for thousands of years, is becoming the subject of intensive study, so that all aspects of it, even the number of children they should have, are being questioned. With the control of the great killing diseases the expectation of life is rising rapidly, the pressure of population is increasing, and the problems of mental health, hitherto obscured by more important aspects of a brief and hard life, are becoming important in those countries also.

Thus it is not irrelevant to speak of world mental health, and indeed the World Health Organisation chose the theme "Mental Illness and Mental Health in the World of Today" for World Health Day in 1959. What, then, are the requirements? First and foremost is the need for accurate and acceptable definitions of mental disease. Unlike tuberculosis of the lungs, for example, mental disorder may manifest itself in a great variety of ways, but with the growth of modern knowledge certain broad categories are merging, such as a state of subnormality so severe that the person concerned is incapable of guarding himself against common dangers, or of being taught to do so, as compared with mere backwardness requiring special education or training in a sheltered environment. Among those whose minds have developed fully it is possible to recognise those who are so ill that they require the same kind of care in hospital that is given to the great crippling diseases of the body. Between these extremes are a large and ill-defined section of people who are not mentally defective, nor do they suffer from one of the gross psychoses, but they are mentally unwell for shorter or longer periods of time, and often the illness is a recurrent one. Included here, for example, would be those suffering from some psychopathic disability, in which the disorder of mind renders the victim irresponsible, anti-social, or aggressive, so that he does not fit readily into the pattern of society. The precise definition of these various groups is, of course, a matter for the experts, and psychiatrists are now reaching a degree of unanimity which would not have been possible a few years ago. The study of mental illness will become as exact as that of bodily illness, although there is still a long way to go in this respect.

The next requirement is for accurate statistical information. Western countries have come to take for granted the reliability of medical certificates, but in some parts of the world as many as 70 per cent of the people may live and die without any medical care, other than that provided by the untrained village practitioner. In such communities, where even the reported cause of death may be limited to "cough" or "fever," accurate statistics of mental illness are quite impossible to obtain. All that can be done at present is to draw certain broad inferences and check these by surveys conducted by trained research workers.

Fortunately the basic requirements for promoting and maintaining mental health are sufficiently well known, and they are capable of application throughout the world. Thus, it is generally accepted that a happy home life in infancy and childhood, with devoted parents, is, in itself, the greatest safeguard, especially if the individual concerned remains within the society in which he was reared. If he is removed to an alien environment he may break down, but even then his early training will usually enable him to survive, particularly if it is reinforced by some spiritual sheet-anchor. In this respect the village community, with its tradition of mutual help, has great advantages over the impersonal nature of the cities, where loneliness plays an important part in precipitating mental illness.

These problems are now capable of free discussion, and the recognition that each individual can only reach optimum development in favourable surroundings will go far to prevent the misfits of the past. Indeed, the main task today is so to improve the physical and social environment that every child may have an opportunity to attain full physical and mental maturity according to his capabilities.

Family Affairs

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Family Affairs

INTRODUCTION.

THIS section has been written with an entirely practical purpose: for it is going to deal with the problem of how you or I, the man, or woman, in the street can be happy and make the most of our opportunities in this exciting, fascinating, but often perplexing and terrifying world in which we live.

Of course, it would be impossible to deal with every special human problem in the space available here. Nor is it desirable to do so; for most problems cannot be solved merely by reading about them. The section attempts to do two things: first, to give understanding (which is the first step in solving any problem) and, second, to suggest where you may go for more personal and detailed advice.

There are also suggestions in this Family Affairs section for those who are thinking of buying a house; and there is a guide on the whole field of insurance, both on life and property. It would indeed be a tragedy if you should be needlessly worried or unhappy when there are so many people willing to help. Let us see what can be done!

I. HUMAN RELATIONS

By a Doctor

In most countries scientific knowledge has made possible greater material well-being, better education, improved health, and a higher standard of living for the ordinary man and woman, yet it is doubtful whether our capacity for happiness and peace of mind has correspondingly increased. There is an old saying, "happiness is with people," which means that satisfaction in living springs from good relationship with our fellows. This is something which wealth, health, and good education cannot guarantee, no matter how important these things are in themselves.

CAUSES OF UNHAPPINESS.

If you were a doctor, a social worker, or a psychologist, you would soon find that there are three immediate causes of unhappiness: ignorance, environmental problems, and psychological problems. Most unhappy people are suffering from a mixture of all three.

By *ignorance* I mean that many people are discontented or troubled either because they do not know where to turn for help when it is needed or because they have got into difficulties through not knowing the rules of living.

By *environmental problems* I mean not getting on with the people one has to associate with, being in a job which one finds unsatisfying and all the other everyday situations which arise from clashes between the individual and his surroundings.

Psychological problems are difficult to define; but, generally speaking, I shall speak of "environmental problems" when I mean that the trouble lies mainly in the person's surroundings and circumstances, and of "psychological problems" when I mean that the trouble lies mainly within the individual himself. If, for example, a man is unhappy in a particular job, leaves it, and later finds a job in which he is quite satisfied, we should suppose that it was originally a case of "right man, wrong job"; but if he goes from one job to another, never finding the "right" one, then there is surely something wrong with the man. Similarly, it is quite possible for a girl to meet the wrong man once, or even twice, but if all her attachments end unhappily, it is likely there is something wrong within herself.

THE MEANING OF HAPPINESS.

Pleasure and Happiness.—Many people confuse two quite different things—pleasure and happiness. *Pleasure* is always temporary and usually physical in origin, and is associated with those things which one usually (depending, of course, upon one's tastes) considers "fun" to do: having a good meal, making love, lying in the sun, listening to music. You will notice that all these things have this in common: (1) they all come through the senses of sight, feeling, hearing, and tasting or smelling; (2) they are always temporary; (3) they are all "pleasant" in the sense that they are, quite simply, enjoyable in the most obvious way. But *happiness* is something quite different; for while it is true that all people enjoying pleasure are, for the time being, happy, the reverse is not true. One can be happy when quite unpleasant things are happening. "Happiness," said a famous psychologist, "is a state of going somewhere." It is no coincidence that the suicide rate always drops in war-time; for war, in spite of all its horrors, supplies the three emotional needs felt by all normal people—the need to be appreciated—to "belong" as the Americans say; the need to be useful; the need to have an aim in life. There is a dramatic relationship between human misery and loneliness or lack of an aim in life.

Conclusions.—In order to be happy one needs a goal to strive for, the love of a few, and the respect of those who share our views. The opinions of others need not matter. Therefore one is unhappy:—

(1) If one has no goal.

(2) If one is prevented by circumstances from attaining reasonable goals.

(3) If one has chosen unreasonable goals which cannot be attained.

(4) If one is compelled by circumstances to mix with the kind of people one finds uncongenial.

(5) If one is prevented by one's own personal defects (shyness for example) from mixing with those who are congenial.

There may be three causes of all these five: ignorance, environmental maladjustment, and psychological maladjustment, as has been explained above. The second and fourth, for example, are likely to be due to environment, the other three are more likely to be psychological in origin.

EVERY PERSONAL PROBLEM IS ALSO A SOCIAL PROBLEM.

This means that most of our problems, no matter how personal they may seem, are connected

with the type of society in which we live. How to bring up children, what to do with old people, whether a married woman should go to work or stay at home, problems of loneliness, of the unmarried woman, of sex, and even of religion, are problems of people living in a particular society at a particular time and place. If you are living in present-day Britain, some of these matters are bound to affect you. But if you are living as a small farmer in the South of France or Italy or Greece—or even in the West of Ireland or the North of Scotland—they may hardly have begun to affect you at all. In Central Africa, parts of Asia, or of South America, you could not even conceive of them. Why should this be so?

Peasant Communities.—First of all, those areas—rural France, Britain, Italy, Greece, and much of Asia, Africa, and South America—which we choose to think of as relatively "backward," are, in fact, leading the sort of life which was the rule almost the whole world over prior to about 1750. That is to say, they are areas where people make a living on the land, dwell in villages or small towns, and are guided in their conduct by tradition. Peasants living this sort of life have large families, and you would probably find numerous children, the parents, and the grandparents living under the one roof. There are no financial problems relating to children and grandparents, because both are economic assets: from a very early age the children can work with their parents in the fields, and the grandparents stay at home and look after the very young ones. Nor do problems of how to bring up children arise, because tradition ensures that all children are brought up (rightly or wrongly) in the same way. For the same reason, there are few difficulties about sex or religion or moral conduct generally; most people have the same religion (in Southern Europe, the Roman Catholic Church) and the same rules are accepted by everyone. Women work in the fields or at home, and no question of the type—career or family?—can arise, because the choice does not even exist. Nor is it possible to be lonely in such circumstances—in the village or small town everyone is acquainted with everyone else, and whether their feelings are of liking, disliking, or indifference towards any one person, at least they are never unknown to each other. In peasant society there is little room for romantic love, and the plain woman has just as good a chance of marrying as the good-looking one. There is no need to struggle against one's fellow-men, because few people move up, or down, the social scale, and what one is born, one remains. Man's main fight is against Nature, against disease, hunger, and the weather.

THE PROBLEMS OF MODERN LIFE.

(1) **The City.**—But in time we find ourselves living in a different community—a community in which there are big towns where most of us work in shops or factories. Even if we still work on the land, it is more often for somebody else than on our own small cabbage patch—for agriculture, too, has become industrialised. In this new sort of community life is different. Children cannot work until they leave school, so for fifteen years they are an economic liability—every doctor knows all too well the mother-to-be who tells him: "But, doctor, I can't afford another." Old people also become a liability because they find it difficult to get work in industry.

The functions of the family are increasingly taken over by the State. Children under school age go to kindergarten whilst their mothers go out to work; family squabbles are more often dealt with by social workers than by the parson; medicine is socialised, with many good results and some not so good; there is hardly any aspect of family life which does not have some external body to deal with it. In themselves, these changes are neither "right" nor "wrong"; we have to find out how best to use them, not how to turn the clock back.

(2) **Mass Communications.**—Other important changes have been due to mass methods of communication—to the popular magazines, radio, and television. Two main results have followed from these. The first is that, although we learn more, we understand less. Our minds, instead of being filled with one self-consistent belief, which, whether right or wrong, did make some sense about morals and the nature of things, are now filled with all sorts of garbled theories which, no matter how true some may be, collectively mean little to the ordinary individual. Thus, practically speaking, in the field of medicine (or any other field) we must either know a good deal or nothing at all; formerly, in our ignorance, we simply trusted our family doctor. Now we are in doubt and ask him whether he hasn't read of the new treatment in the *Daily Blank* or *Everyman's Digest*. Yet as G. K. Chesterton used to say, when one form of superstition is got rid of, it is replaced, not by reason, but by other superstitions which are not necessarily going to make us happier. Thomas Hood in his poem "I remember, I remember," tells how, as a child, he used to think that the sky rested on the tops of the tall fir-trees at the foot of his garden. Being older, he can no longer believe that this is so, and he adds:

> "It was a childish ignorance,
> But now 'tis little joy
> To know I'm farther off from Heaven
> Than when I was a boy."

I do not suggest that we must make ourselves believe what we find incredible, but I do suggest that when we seek opinions we should go to those we can trust *and then believe what they tell us*.

The second result of mass methods of communication has been the influence of advertising, which sometimes makes us regard as necessities things which are not necessary at all. We become more competitive and spend our time trying to "keep up with the Joneses"—they have a washing-machine (or a television or a car), so why shouldn't we? There is a perfectly harmless side to this too, but, as a famous psychologist has said: "It is much easier to create wants than to supply the means of satisfying them. To widen the gap between what people want and what they actually have or can reasonably expect to have is to make for widespread discontent and nervousness." We are always hearing that people are "frustrated," but it is important to remember that they are frustrated in terms of what they *think* they should have (and don't) rather than in terms of what they actually need. "Expectation minus realisation equals neurosis"; so the Arab chieftain with fifteen Cadillacs who wants sixteen is just as frustrated as his poorest subject who has no bread for tomorrow.

(3) **The New Position of Women in Modern Life.**—Two world wars have accustomed women to taking their place in industry, and once they acquired the taste they were less easily satisfied with life at home. This is the fundamental cause of woman's new attitude to work and family. But there are other causes which maintain the situation. One we have already mentioned is "keeping up with the Joneses"; for when people have raised their standard of living they are reluctant to reduce it, and obviously another breadwinner in the family raises its standard of living. Another reason is quite simply the social one. Many single girls work in a factory and, for the time being, the one important thing in their lives is to get married. But when they are married they dislike being left alone, as they often are, in a small flat, and return to work in order to be back with their friends.

Economically, women are less dependent on their husbands, so if things are not going well at home they see divorce as the obvious solution. It is this, rather than an increase in "immorality," which has caused the number of divorces to go up. (Incidentally, anyone who thinks that people are more "immoral" than they used to be must know very little about social history—even in the most conventional sense everyday behaviour is more moral than at any previous time.) But when many women are working, a new problem is bound to arise, the problem of career or family. The new situation means that the married woman in her less happy moments is likely to look back

and say: "What might I not have been if I had continued in business?" Whereas the unmarried business woman may wonder: "How happy might I have been had I been married with a family?"

(4) **Loneliness in Modern Life.**—In the large city there are more lonely people than in simpler societies, and there are a number of reasons for this. (Although it must be added that some areas of large cities are more liable to have this problem than others—for example, in the East End of London there is a greater sense of community life than, say, in the well-to-do suburbs.) One obvious reason for the increase in loneliness is simply that, whereas in the small village everybody knows everybody else, their virtues and vices—especially the latter—in the large town there are too many people and one does not feel confident in meeting others precisely because they are unknown. Then, whereas only about fifty years ago there were millions of people who had never been farther from their homes than twenty miles or so, today there is a great deal of shifting about. Students come to the big city to study, or workers to get jobs, and all of them are anonymous to each other. Many are afraid or suspicious of each other just because of this, and quite literally they wonder whether those they meet in restaurants or who live in the room next-door may be in one way or another undesirable. So the individual who is shy or unsure keeps clear of strangers no matter how lonely he may be.

For example, only a short time ago in one of the "better" suburbs of London a man fell down in the street. It was snowing, and many people were passing by, but none of them went near him. (They were, presumably, quite ordinary citizens, and one can imagine that they supposed the man to be drunk or that he had been involved in a brawl—in any case, they only wanted to avoid trouble.) In the morning the man was dead. He had had a heart-attack, and his life would have been saved if a single passer-by had thought to call an ambulance.

Lastly, it is, of course, true, that there is a higher proportion of emotionally unbalanced people in towns than elsewhere; for it is to the towns that not only the successes but the failures gravitate. A few are running away from practical difficulties, some from their families, and some just from themselves. Perhaps most fall into the two latter categories, and these, together with the merely shy and reticent or timid, form the bulk of the lonely. They are literally starving for companionship in the midst of plenty.

(5) **Boredom in Modern Life.**—If there are many lonely people in the modern city, there are others who are suffering from problems which may be classified under the head of "boredom." Indeed, this group may be much larger than the other. Some, surrounded by large families in small flats, will be saying to themselves: "Loneliness? I just wish I had a bit more of it. Why, I can't have even a moment's privacy!" Such people, even if they have some hobby or interest, have neither the space, peace, nor freedom from interruption to practise it. Then there are those with jobs which are either dull in themselves or associated with such emotional tension or resentment in their place of work that they have little inclination to interest themselves in anything else when they get home. Here again the question of stimulation by mass media comes in; for modern man cannot, like his country forebears, do nothing in his hours of leisure or amuse himself in conversation with his family. He feels he must always be "doing something." He must constantly be under some sort of stimulation, and when the radio or television is turned off he feels at a loss. Most often, unfortunately, he is not doing things—he is having things done to him; for his amusements increasingly tend to be passive. Of this type of man the saying of a great French writer, Blaise Pascal, is relevant: "I have discovered that all the unhappiness of men arises from one single fact, that they cannot stay quietly in their own chamber; men only seek conversation and entertaining games because they cannot remain with pleasure at home." Hence those great preservers of the state of matrimony, the pub, the radio, work, and football. Thus there is the man who can boast that he has "never said a cross word to his family," for the very good reason that he never has a chance to—the radio is turned on from the moment he gets back from work until the moment he goes to bed, and nobody is able to talk. This is equally true of the manager who "always has to work late" or of his employee, who, having eaten his supper, rushes off immediately to the local. Family life presents few difficulties, since it does not exist—at least for the husband. There are therefore two problems involved here: (1) the problem of education for leisure and how to use it to the best possible advantage; (2) the problem of supplying adequate accommodation, time and other facilities to allow those with the interest or ability to make the best use of their leisure.

There is nothing priggish in suggesting that one should make the best use of one's leisure. Nor is there anything wrong in going to pubs or football matches. But there is something undeveloped and childish about anyone who spends all his spare time in pubs, or in talking about or watching football. He is just like the man who listens uncritically to the radio: talks, music, variety are all the same to him so long as there is a background noise. If a hobby is to be anything better than a means of drugging the mind and preventing thought it has to be chosen and tested—not an activity which just happens to be ready to hand, but one which has been selected.

How much pleasure and talent is wasted can be seen any day in a hospital, where, when left with nothing to do, many patients find for the first time the happiness they can get from books, painting, or modelling. In order to avoid boredom one has to plan one's leisure as well as more serious activities. You will find some hints on the use of leisure, Q11.

Conclusions.—So far, then, we have tried to point out the main problems of modern life, and since the main pattern of the new way of living cannot be altered, we have seen that, to some extent, we must adapt ourselves to it. (This does *not* mean that adaptation is the one and only solution—in fact, many psychologists have overdone this theme—but it does mean that, living as most of us do, we can't pretend we are living on a desert island.) We have seen, too, that we can respond to the difficulties of modern life in three mistaken ways: by not knowing how to handle them (ignorance); by being faced with practical problems which arise from our surroundings but remain problems even when we understand what they are (environmental); and, lastly, and perhaps most uncomfortable of all, by having the sort of attitude to life which causes us to create our own problems (psychological). Let us deal with these sources of trouble one at a time.

IGNORANCE.

I said above that one of the main difficulties facing us today is the question of knowing what is true and what is not. We are being told so many things, and our heads are stuffed with so much information—much of it contradictory—that we really are in a much more unsatisfactory situation than more primitive people, who, even if they are wrong, can feel that they know what is what. When I first played golf one used to be given a small booklet which told one the rules of the club—what you could or couldn't do from the moment you entered the clubhouse. The booklet said nothing at all about the rules of golf, which you were supposed to know anyhow, but said only how you were expected to behave. But today we are often in the position of being on the course not only without knowing the rules of the club but without even knowing the rules of the game. The papers we read or the radio programmes we listen to are full of snippets of

information which taken together are more puzzling than informative: cigarettes are dangerous, cigarettes are not; milk is good for you, milk after forty makes you more liable to heart attacks; radio-active fall-out from bomb explosions is dangerous to the future of mankind, radio-active fall-out is practically harmless; fat people are jolly, fat people are likely to have shorter lives. So we don't know the rules of the game (and we can have a pretty shrewd suspicion that the experts don't always know either). But worse than this, we don't even know the club rules—that is, how to behave to other people; we know what our parent's attitude would have been about a teenage son or daughter having boy- or girl-friends, what our parents thought about telling the "facts of life," about "getting on," about colour or race problems in their personal aspects, about going to church and so on. But we know only that opinions have changed and ask ourselves whether we should change with them or not. Here is the most general problem about ignorance, and the first thing to understand is that for a new way of life one needs a new approach—an approach which does not reject new information, but is critical about it, which does not wholly believe but does not utterly disbelieve—in short, an approach which is logical, slightly cynical, and prepared on some subjects to keep an open mind. For example, it is highly improbable that the cough-mixture you hear about in advertisements is superior to the one supplied by your doctor (if he is a good doctor). You should, therefore, *prefer* your doctor's advice and prescription without being uncritical about either.

So, first, about the things that matter, you should choose the advice of someone you can trust and act on it. If you are dissatisfied, say so. Second, about the things that don't matter, you should keep an open mind. Thus, all the medical advice about smoking, milk, being fat, and so on, in my opinion is irrelevant to those who are healthy; for, if you took every precaution to live longer you would never do anything at all. Of course, if you have not yet started to smoke, it is better not to begin, and if your doctor advises you to, it is better to stop. Otherwise, why bother? Nothing good ever came from those who are always taking care. On the other hand, the hydrogen bomb is not just a medical problem but a moral one which concerns not only our own lives but those of other people. This is not one of the problems which do not matter, and since it concerns everyone, it should be thought out seriously by all responsible individuals, whatever conclusion their thoughts may lead them to.

So far as behaviour is concerned, we have to realise the hard fact that, although there are fundamental rules of behaviour, the more superficial ones are changing all the time. So you cannot apply the rules your parents applied to you directly to your own children. All one can say is that if you have brought up your children sincerely and with a genuine concern for their own interest (which is easier said than done), then you need have no reason to worry for them later. But to start worrying about them when they are in their 'teens is to start worrying too late. In another part of the section we shall have something to say about this matter.

Most problems, then, have their logical, moral, and personal aspects, all of which must be taken into account in making a decision. Here are some examples of the sort of things that bother people:

(1) **Unnecessary Fears** can be about anything, but are most often about medical, legal, or financial matters, and when I say "unnecessary," I do not mean that they are not real (although, of course, some are not). All that is meant is that, assuming them to be real, then either something can be done about them or it cannot. In the first case we have to do what is necessary, in the second case worry is useless.

When such fears exist it is essential to let nothing stand in the way of getting expert advice. Thus if you think you have cancer or any other disease go at once to a doctor—for you will feel pretty silly if, after months of worrying, you find there is nothing wrong, and if something *is* wrong, the sooner you have it dealt with the better. A disease won't go away just because you shut your eyes to it. If you think, as often happens, that what you have to disclose is embarrassing or shameful, go just the same; doctors, lawyers, psychologists, or any other experts used to dealing with these problems are quite unshockable, and the different forms taken by human wickedness or stupidity are small in number. Thus, in one of my less tolerant moods I am not morally upset because a patient is beating about the bush trying to tell me that he has (or thinks he has) venereal disease, or that she is (or thinks she is) an unmarried mother—I am simply bored that he, or she, will not get to the point when: (*a*) I have seen half a dozen similar cases on the same day, and (*b*) it is perfectly clear what they are going to say before they even begin. The expert is there to supply the information—that is what he is paid for—and your morals are not the slightest concern of his except in so far as they are going to influence his advice. A lawyer is there, too, to give advice, and if you really think that your misdeeds or marital quarrels or financial mistakes are surprising to him you are utterly mistaken. (*See* Q10 for the names of some organisations which may help you.)

Once you have got the advice, what you do will be influenced by your moral, religious, or other personal views. Thus, whether an unmarried mother decides to get married, keep the child, have it adopted, send it to a home, or (if she is physically unfit) agrees to have her pregnancy terminated will depend on her religious and moral views, and in the light of these she can discuss what to do with the doctor. Similarly, in a legal matter concerned with money the client has to consider both what, legally, he *has* to do and what morally he feels he *should* do.

Irrational fears differ from unnecessary fears in that they do not even appear to be sensible. Fears of open spaces, of leaving the house and walking outdoors, of being shut up in a small space (for example, in a railway carriage), of animals, of dirt or sharp objects are perhaps natural enough in their way. They are abnormal to the extent that they trouble you and keep you from leading a normal life; thus, it is reasonable to dislike dirt, but it is not reasonable to do so to such an extent that you have to wash your hands every five minutes. These are what a psychologist would describe as "phobias," and all that need be said about them is that nearly everyone has some phobia, and whether it requires to be dealt with by a doctor depends, as has already been said, upon how much it upsets you. You don't need to trouble about an irrational fear of heights unless you frequently have to be in high positions. Phobias are uncomfortable, but have no serious significance; they never lead to insanity.

(2) **Unnecessary Frustration.**—In talking about happiness, I mentioned the importance of having an aim in life. Now, just as with the problem of knowing what or who to believe, you have to be prepared to compromise about goals. We saw that, in matters of belief, it is necessary to make a delicate compromise between believing everything and believing nothing, and in the same way where goals are concerned you must compromise between what you want and what you reasonably can expect to have. If, for example, you are unhappy at your place of work the one thing *not* to do is just carry on and grumble, since this hurts nobody but yourself. You must either put up with what you have or pull up your roots and go elsewhere. But before you do either be careful to consider whether it is the job or yourself that is to blame—would you really be happier elsewhere? As already suggested, you can get a pretty fair idea of the answer to this by your previous experience—if you have always been somewhat of a misfit it would be better to see a psychologist than to go through the futility of getting another job no better than the one before.

Of course, it is only fair to say that many great men and women were profound misfits throughout a large part of their lives. Bernard Shaw produced little of value until he was nearly

forty, and Elizabeth Barrett Browning suffered from an entirely imaginary illness until she met Robert Browning at the age of thirty-nine. But, since few of us are geniuses, there is little use in departing from the general rule that the more "unsatisfactory" jobs you have had, the more it is likely to be something wrong with you rather than with the job. It is all very well to be idealistic, but it is merely silly to have ideals beyond your ability to achieve, or to blame your difficulties on "the system" or another person, because—and this is an obvious fact very few people seem to realise—in the real world it doesn't matter in the least who is to blame, all that matters is whether within your limitations you succeed or not. Telling others that you might have been the Lord High Everything Else had it not been for "the system" or your father, *whether or not it is true*, makes you only one thing—a bore.

What I have said about jobs applies equally to that very much overdone passion, romantic love. What matters in your choice of a mate is whether or not you can get on together, and romantic love is certainly no guarantee of this. In fact, there is good reason to believe that Bernard Shaw was not far wrong when he said that there would be just as many happy marriages if each of us married the first person he met on walking out of his house. But, whether you believe this or not, there can be little doubt that more "disappointments in love" are due to hurt pride than to genuine care for the loved one. For, if you really care for someone, you are concerned about their interests rather than your own, and by taking the attitude: "I want, I want . . ." you are telling more about your love for yourself than for the other person. A much more sensible attitude would be that of the seventeenth-century poet Sir John Suckling, who, finding himself in just this state of self-pity over the woman he had lost, wrote:

> "If of herself she will not love,
> Nothing can make her.
> The devil take her!"

The moral is: don't have ideals beyond your ability to achieve, since if you do, the only person to be sorry will be yourself. Try your best, by all means, but be realistic

(3) **Unnecessary Loneliness.**—This, on the face of it, appears to be mainly an environmental problem, and we have spent some time in discussing just why town life has made it increasingly a problem. Nevertheless, the personal side is just as important; for, although the normal person may feel at sea for a few weeks or so when he first arrives in a new area, he sooner or later finds his roots and makes friends. After all, even the most "unfriendly" town is full of churches, youth clubs, hobby clubs, and all sorts of institutes where the stranger would be welcome. My own experience is that most people are lonely because they are shy or timid, which is really just another way of saying that they don't like themselves. But behind this timidity there lurks a good deal of conceit, and the real attitude behind the embarrassment of a shy person entering the company of others is, "What are they going to think of me?" To which, fortunately or otherwise, the most common answer would be: "Nothing at all." If you really believe that you are the ugliest or the spottiest or the most peculiar-looking man or woman in the company, if you really suppose that you are more stupid or dull than the rest, what is this but colossal conceit? The fact is that you are much too anxious to create an impression, whereas the normal attitude should be, "I am what I am—take me or leave me."

And indeed you are what you are, so what is to be gained by pretending otherwise? Even if you are able to deceive your new-found company into thinking that you are knowledgeable about something you really know little about, you have gained nothing—on the contrary, you put yourself in the difficult position of maintaining a lie every time you meet them. So you had better assess your abilities more accurately or else find some real ones, although in reality the longer you live, the more you will find that few people are liked because of their abilities (more often they are resented because of them!), and liking and disliking are completely irrational processes. More people are liked in spite of their virtues than because of them.

So far as making friendships is concerned, the great advantages are not beauty, good looks, charm, or knowledge, but tolerance, being genuinely fond of others, and being able to forget yourself. (*See* C30–31 and Q11–12 for the names of various societies.)

ENVIRONMENTAL PROBLEMS.

Difference between Problems of Environment and of Psychology.—We have already seen that the difference between environmental and psychological problems lies in the fact that in the first case the person's surroundings or circumstances really are difficult; whereas in the second we can see that he has largely created the problems for himself by the way he looks at, or interprets, his surroundings, and, of course, by the way he responds to them.

No Problem is Entirely Environmental.—Although the distinction we have made is a useful one, no problem is entirely environmental, for the result always depends upon how the individual sees his situation, and what he does about it. It is "natural" to be unhappy in prison, but some people have been happy there; it is "natural" to be unhappy when one suffers from incurable disease, but, in fact, a large number of people with incurable disease find happiness and more peace of mind than those who are not sick. No, strictly speaking, there are no purely environmental problems—all your troubles are confined in a small area—your head. However, it is useful to make the distinction for practical reasons, for if you are trying to help an unhappy person, the first practical question to ask is: "Can I help him, or her, by getting him a new job, a new home, or new friends, or would he be miserable almost anywhere?" Of course, many people in trouble want to believe it is all the fault of others, of circumstances, of fate (in fact, the more it is their own fault, the more they like to believe otherwise). Some women, for example, assert that all their problems are due to the kind of house they live in, and five or six houses later they are still miserable. Some men are never able to find a "good" job, even after trying dozens. There are men and women who are always complaining of ill-health, but who would be desolate if some doctor were cruel enough to remove their only hobby—their real or imaginary illness and their absorbing interest in it. Although we may agree that all troubles are in the mind, it is necessary to distinguish between those that can be cured by a change of surroundings and those which require a change of oneself. The two overlap quite considerably. So, under the heading of "environmental problems," I am going to discuss such everyday matters as bringing up children, marriage, the problems of old people, and some general rules for leading a happy and useful life. You will have to decide for yourself where your own problem lies: are you an ordinary person in unhappy circumstances, or an unhappy person in ordinary circumstances? If you are seriously troubled, it would be a good idea to go to one of the bodies listed at the end of this section. Misery is not conducive to clear thinking, and it is always advisable to get the advice of others, particularly when they are experts in such problems.

Childhood.—Psychologists believe (and most sensible people have known for centuries) that the really significant time in life from the point of view of character building is the first five years. That is why it is so important for a child to have a proper start, as reflected in its early training. Some parents fuss and worry over their children in the late teens, when the fact is that if a child is not able to look after itself by that age, the parents must have made a sorry mess of their job

Detailed rules cannot be given about a subject such as this. It would almost be true to say: "It's not *what* you do—*it's the way that you do it.*" The only fundamental rule—and, of course, I am talking here about the child's character, not its bodily health—is complete, unconditional, and unpossessive love on the part of the parent. If you cannot give this, then all the rules in textbooks are of no avail.

The Spoilt Child and the Neglected Child.—The job of a father and mother, then, is to look after the child when it is unable to look after itself and bit by bit to give it as much freedom as it is fit to take.

When the first rule is ignored and the child is not looked after or is regarded as a nuisance we speak of a neglected child; when the second rule is ignored and there is no freedom we speak of a spoilt child. Both types are unfortunate, because the first grows up to regard itself as unlovable and the world as a hostile place, and the second grows up always depending on others and unable to make its own decisions. In neither case has wealth or social position much to do with whether a child is spoilt or neglected, and the popular notion that the spoilt individual usually comes from a wealthy home, the neglected one from a poor home is quite absurd. (As a matter of fact, if one were foolish enough to make a generalisation, it would probably be the reverse of the popular belief; for life in a public school is far tougher than in a council school, and the family atmosphere of the traditional upper class is ordinarily a good deal less demonstrably affectionate than in the working class.) It makes not the slightest difference to a child whether it is neglected because its mother goes out to work or because it is brought up by a "nanny" and its mother is always abroad or attending social events.

Possessiveness and spoiling are usually due to anxiety on the part of the parent—sometimes the mother who has lost her husband or is separated from him lavishes all her affection on her son and, not unnaturally, wants to hold on to him, sometimes the child is made a pawn in the conflict between husband and wife, and in yet another type of case the parent who has felt neglected in childhood tries to ensure that the same will not happen to her own family. But in each case the result is the same: the development of a suffocating, possessive, and unhealthy love. This is much less likely to happen in a large family, since the children are less dependent on their parents and more on each other. They have their edges rubbed off by having to learn to give and take; that is why, in the case of a single child or of a small family, it is a good idea to make use of a kindergarten or arrange associations with the children next door.

Children Learn by What You Do—Many parents have the pathetic belief that their disagreements pass unnoticed within the family. Unfortunately, they don't. Children, like other people who live more at the emotional than the intellectual level, know very well what is going on, and if there is some sort of conflict between father and mother they cannot but suffer thereby. How little some ostensibly affectionate parents really care can be seen by the numerous cases one reads of in the papers in which, following a divorce, the child is torn between one and the other quite regardless of its real interests.

No, like all sensible people, children are much more impressed by what you do than by what you say. Thus, if I find that Mr. Smith, who is allegedly too sick to do his quite light job, is able to work really hard in his own garden, then I don't believe Mr. Smith whatever he says. Similarly, a young boy I once knew who was crippled with infantile paralysis bitterly hated his mother, who, although poor, had spent much of her money on cures—some genuinely scientific, others carried out by quacks. He hated her because he knew that the real reason for her behaviour was that she was ashamed of his being a cripple, and he was quite right. The reason I know, too, is that she was my patient and she told me. Another mother was unhappy with her first husband and divorced him; they had one child, who, during the time of her unhappiness, was spoilt. She then married again, and, for reasons which seemed perfectly good to herself, sent the boy to a boarding school (the main reasons were that she had only a small flat, that her second husband wanted to be alone with her, and that she was getting somewhat scared of the amount of affection and possessiveness she had stirred up in her son). Now, in his twenties, the son is resentful of his mother, and although gifted, he finds it impossible to achieve anything; all he thinks about is having been "let down."

These are not unusual cases—on the contrary they are the material of everyday life, and to the statement that children have a pretty shrewd idea of what is going on we must add that what seems to a child to be a betrayal remains a betrayal no matter how good the *logical* reasons for it may appear to its parents. Children don't think—they feel.

Unconditional Love and Consistency.—Two things are necessary in order to rear happy children: unconditional love and consistency. Unconditional love means that, whether the child does right or wrong, it can feel that the parent's love is always there, that however much one dislikes the deed, one never ceases to love the child. Consistency means that there should not be too many rules, but the rules, once made, should in all circumstances be maintained. If you make too many rules, the child will lack character, since it is never free to choose and make its own mistakes; if there are too few, the child feels insecure because it never knows "what's what." In short, children should be as free as they are fit to be at any given age. The whole aim of a good upbringing is not that the father and mother should try to coerce their offspring according to their own parental ideals, but rather that father and mother should protect the children while they are growing into their true selves. After all, few people are such big successes in life that they are entitled to force their children into their own mould.

Mental Cruelty.—Most people in this country are, quite rightly, sensitive to the problem of cruelty to children—that is to say, obvious physical cruelty. But I doubt whether they are equally sensitive to the problem of mental cruelty. Take the example of the little girl or boy of three or four years old who is allowed to feel neglected upon the arrival of a new baby. Previously he has been in the centre of the picture, yet now he is suddenly left out of it, and assuredly his future happiness will not be helped thereby. Or the mother who would be shocked by the idea of hitting her child, but punishes it by saying: "Mother doesn't love you any more." "All right, go away, *we* don't care." Or the mother who said that she could always bring her little boy to heel by taking away his best-loved toy when he misbehaved. Or the mother who is always taking her child to a doctor at every slight ache or pain, and in front of the child tells the doctor: "Oh, doctor, I'm so afraid; his father had pains just like that and had to have a serious operation. He's never been the same since." Is this boy likely to grow up feeling a sense of security and having the courage to face life? What do children feel when the two people upon whom their whole security depends quarrel violently in front of them, or when they are always being left under the care of others while the parents go out? No, cruelty is not always physical, and I would even go so far as to say that the most devastating type of cruelty in its effect upon the child is the type of mental cruelty we have just been describing.

Child Guidance Clinics.—The infant is primitive, born without morals and only gradually comes to share the grown-up's views on sex, cleanliness,

and affection. If you get worried at such things as dirtiness or absence of shame you are revealing more about your own lack of emotional balance than about the child's naughtiness. There is a famous, and very true, saying, "There are no problem children, only problem parents," so if your child is a problem, ask first what mistakes you have made and remember that all psychological difficulties in childhood are due to lack of emotional security. When you notice such signs, take the child to a doctor and ask him to arrange an appointment at the local Child Guidance Clinic. Fortunately, the problems of children are much more easily dealt with than those of adult life. Danger signals which indicate that something should be done are: when the child is more noisy, aggressive, or destructive than the ordinary child; when it is too silent and unwilling to associate with other children; thumbsucking; bedwetting; nightmares or crying or screaming at night; frequent complaints of pain or sickness when your family doctor can find nothing organically wrong. Remember, the Child Guidance Clinics are there for the purpose of helping you, so there is no need to be hesitant in asking for their aid.

Marriage.—Most people nowadays seem to suppose that the only basis of a happy marriage is romantic love. Till fairly recent times marriage was as much to do with parents as with the bride and bridegroom and was regarded as a career for the woman—a career to be carefully prepared for by sex-instruction, and a training in cookery, child-management, and the running of a house. Today many girls rush into marriage from their work in a factory or office knowing considerably less about running a home, mending, or cooking than the man they marry, who may have been looking after himself for some years. Both men and women frequently share the most childish "romantic" notions, perhaps based upon the films they have seen. They seem to suppose that pleasure, rather than happiness, is the aim of life; that romantic love must last for ever; that marriage is the goal of life (whereas it is only the beginning of learning to adapt to a new way of life); that children are nice but a nuisance; that one's wife, or husband, should remain beautiful or handsome. And, of course, when one is disappointed, there is the final delusion: that divorce is always a solution.

Some General Points about Marriage.—Reading about problems is useful because it can show what is wrong and can give some degree of understanding. But full understanding comes only from experience and personal contact with others. So the points I want to make about marriage must be made quite briefly: First, many of the difficulties experienced by husband and wife are related to social problems peculiar to our times. Second, frustration is *in terms of what one expects and does not get*, not at all in terms of objective reality. In other words, if you expect too much, or if you expect different things from what you are going to get, you are bound to be disappointed no matter how "lucky" you appear to other people. It is not always life or "fate" that is to blame for human misery; very often it is the way the individual looks at life and his unrealistic demands upon it that cause the trouble. This point is so important, and so little understood, that it is worth while saying something more about it. When one says that every personal problem is also a social problem, what is meant is that the kind of problem we have to face is partly created by the society in which we live. It does not mean that we are the helpless playthings of fate; for the way in which we deal with the problems is very largely our own responsibility.

Divorce is sometimes the only solution to a marriage which has failed, but there are two dangerous things about divorce which should be taken into consideration. First, the fact that divorce is possible makes people think of it as the obvious answer when trouble arises instead of trying to do something when a marriage could still be saved. Second, just because failure in marriage is always due to the personal defects of both people, unless these defects are remedied the second marriages will be no better than the first.

Steps to Happy Marriage.—I could have occupied some space in this section telling you about the sort of behaviour which leads to a happy marriage: a spirit of give and take, tolerance, and so on. But, unfortunately, people either have these qualities or they do not, and you certainly cannot obtain them by reading about them. So, if your marriage is in serious difficulties, the proper thing to do is to go to a Marriage Guidance Clinic for help. However, here are some aspects which you can do something about, and most doctors and psychologists would agree with the following points:—

(1) Before marriage a woman should learn something about running a house, cooking, and bringing up children.

(2) Reflect upon the meaning of love. Although "love" is a word which is often talked about rather glibly, it can have a number of different meanings. *Romantic love* is based upon sentiment (often upon sentimentality), and its essential feature is an idealisation of the other person, so that one all too often sees in the beloved qualities which are not there. That may be a good thing, but it is certainly no guarantee in itself of a happy marriage, as the divorce courts make it painfully clear. Reflect carefully upon the nature of *possessive love*, based upon a desire to possess the other person regardless of his or her own best interests. One thinks here of the mother or father who unwittingly prevents children who have grown up from leading their own lives, or of the jealous wife or husband who will not let his or her partner in marriage go out or meet other people. Possessive love is not really love at all. True love is based upon mutual respect and a deep desire to further the other person's best interests whatever sacrifice one has to make oneself.

(3) Keep your good appearance. Both husband and wife should keep up appearances after marriage just as they did before; they should not lose their good manners, or dress carelessly, with the implied attitude that it no longer matters what the other partner thinks. In this sense marriage should be an eternal courtship in which one always goes on trying to please the other. True, this will not save a basically impossible situation, but lack of the observance of this rule may break up a marriage which well might have been saved.

(4) Lastly, two observations about children. First, a couple should never have a child with the sole intention of trying to prevent a marriage from going on the rocks. It is unfair to the child, and if a marriage is in such a bad way, having a child is unlikely to have the desired effect. Second (and this may be an unpopular statement), *every child needs the full care of its mother in the first five years of its life.* One of the reasons for the increase in juvenile delinquency in recent years is the failure of mothers to give the child full attention. The family has been called "the character factory of society," and character is formed in the first five years of life; without the mother the factory cannot work properly.

Sex.—It is often said that more marriages break down because of sexual difficulties than for any other single reason. As it stands, this statement is not true. Sexual difficulties come into two categories: those due purely to ignorance, and those basically due to *personality* problems between the two partners. The first kind are a straightforward medical matter, which can be solved by a family doctor, by a Marriage Guidance Clinic, or even by reading a good book on sex technique. The other kind are an entirely different matter: for here the sexual difficulty does not cause the trouble in the everyday relationship between husband and wife, but their unsatisfactory everyday relationship causes the sexual difficulty. For example, if the wife suspects

infidelity on the part of her husband, if she has had an unhappy home life with her parents which leads her to suspect men or fear sex or marriage, if she is afraid of having more children, or if she feels a latent resentment towards her husband over some matter quite unrelated to sex, these feelings may make her sexually frigid. With women, as contrasted with men, sexual happiness is impossible unless the total personal relationship between the partners is satisfactory. A list of books about sex is given on a later page, but where the problem lies in the sphere of personal relationships the help of a psychiatrist or the Marriage Guidance Clinic must be sought. We must, therefore, reverse the statement that sexual difficulties (except those due to ignorance) cause marriage difficulties; the truth is that difficulties in the everyday relationships between the partners cause sex difficulties.

Old People.—We live in a society which has the highest proportion of old people anywhere in the world, and the proportion will go on increasing. Old age is, of course, associated with a decline in physical and mental powers, but social and medical factors may hasten or slow down this decline. For example, the person who has led an active life often rapidly deteriorates when he has to retire or when he lives by himself and is thus cut off from human society; he loses interest, becomes untidy, and does not look after himself properly. He has, in fact, nothing to live for and shows it in his behaviour. In cases like this there is often a dramatic improvement when the old person goes to a Residential Home where he gets proper food and, above all, company and things to do. *A great deal of the appearance of deterioration in old age has to do, not with physical, but psychological factors:* lack of a goal, a feeling of being unwanted, loneliness, and all the things we have already seen to be so important for psychological health and happiness at all ages. The grumpiness, the interfering, the selfishness often associated with old age are largely due to circumstances rather than natural "cussedness"; they are the reactions of anyone who feels unwanted or useless, and many of the so-called problems of the aged would be removed if they were allowed to continue work under suitable conditions. The aged may be cared for:

(1) in their own home, living alone;
(2) in the home of their children or relatives;
(3) in an Old People's Residential Home;
(4) in the Geriatric Unit (for the sick and aged) of a Hospital.

Welfare of Old People.—In 1940 the National Council of Social Service sponsored the formation of the National Old People's Welfare Committee, which now co-ordinates the activities of voluntary organisations, seeks to bring about improvements in legislation, and, in general, studies the needs of the old. Some of the services provided by various bodies, information about which may be obtained from the secretary of the local Old People's Welfare Committee, are: Home Nursing Service, Health Visitor Service, Home Helps, Night Attendance, Physiotherapy, Chiropody, Meals Service (meals brought to the home or arranged in nearby centres or restaurants), extra foods, baths, free laundry service, mending service, coals and logs, and holiday schemes.

Attitude to the Old.—*Where* the aged are cared for depends primarily upon medical factors, which should be discussed with the family doctor. Obviously, a sick person cannot stay by himself at home, but, on the other hand, a healthy person cannot be sent to the Geriatric unit of a hospital. One must think of the other members of the family, and here the moral problems begin: should one look after one's aged relatives even if they are troublesome and a wholetime problem, or should there be a limit set to one's responsibilities in this respect? The answer must be personal, and one suggestion is that the old (and, in particular, our parents) are entitled to expect some attention from their children. But, on the other hand, nobody is entitled to expect another person to give up his whole life to this end. A parent is fully entitled to expect from son or daughter as much as the parent has done for them, and a parent will accept what son or daughter willingly chooses to do. But a parent must not demand the sacrifice of marriage, career, or happiness. If an unmarried daughter genuinely wishes to look after her father or mother, giving up all hope of any other career, she may, of course, do so; but to give up her whole life *unwillingly* to this end is not being self-sacrificing, but wrong. We have a duty to others, and particularly to our parents; but we also have a duty to ourselves. Such problems should be solved by considering the best interests of all those involved—the greatest happiness of the greatest number—and the younger the individuals concerned, the more consideration they are entitled to. One should help one's parents or parents-in-law, even at considerable sacrifice, but not to the extent of sacrificing the whole of one's life, the happiness of one's marriage or children.

The Sacred Rule of Non-interference.—No situation is more liable to cause trouble than the interference of one generation in the affairs of another. In particular, the older generation should never give unasked advice to the younger—especially concerning the upbringing of grandchildren. If your children are not capable of reasonable behaviour once they are adults, they are certainly not likely to be changed by unwanted advice. Nor should parents interfere in the quarrels of their married children; if any interference is called for, it should come from those who are less emotionally involved.

PSYCHOLOGICAL PROBLEMS.

We have seen that a psychological problem is one which is caused less by your surroundings than by the way you look at them. You should suspect that your problems are primarily psychological: (1) if the same situation in life keeps cropping up—love affairs always ending unhappily, jobs always being lost or given up, and so on; (2) if you have difficulty in getting on with your fellows; (3) if you are depressed, anxious, or unhappy without obvious reason; (4) if you have nervous symptoms, *e.g.*, irrational fears (of closed spaces, open spaces, or disease), sudden attacks of panic or anxiety, or pains for which the doctor can find no adequate explanation. These conditions, whether they masquerade as personal problems or as "nerves," have this in common; they are caused by a faulty attitude to life, and, in particular, to other people, originating in early training. *"Nerves," neurosis, and psychological problems in general are not diseases in the ordinary sense, and are always caused by fundamental misunderstandings in the sphere of human relationships.*

Many people have troubles of this sort, and doctors say that 60–70 per cent. of all their patients come into the category of people who are suffering from the "bad" emotions of hate, anger, resentment, fear, and anxiety—people who are ruining their own lives because of the past. Some of them create their own problems in everyday life, others suffer from "nerves," and yet others develop those physical illnesses due to prolonged worry and emotional stress: stomach ulcer, "fibrositis," high blood-pressure, heart trouble of certain types, headaches, some kinds of skin disease, and so on.

Most of us have such problems from time to time, and sooner or later they pass, but when such problems are persistent it is necessary to consult a psychiatrist. True, in most cases such states are not dangerous—men and women with "nerves" do not (as so many of them fear) go insane. But they suffer a lot of needless misery. If you are suffering from any of the problems mentioned above it would be a good idea to ask for expert advice at one of the bodies mentioned on the next page.

WHERE TO OBTAIN HELP ON PERSONAL PROBLEMS AND ON MARRIAGE AND HOME PROBLEMS.

The following are some of the principal organisations:—

Marriage Guidance Councils.—The National Marriage Guidance Council, 58 Queen Anne Street, Grosvenor Square, London, W.1 (MAYfair 2731/2) co-ordinates nearly 100 Marriage Guidance Councils in England, Wales, Northern Ireland and the Channel Isles. This headquarters will gladly give the address of any of the local Councils. Similarly the Scottish Marriage Guidance Council, 44 Queen Street, Edinburgh 2 (Caledonian 5006) co-ordinates 8 Councils in Scotland.

The local Councils offer skilled, kindly, and confidential help to those who want it before marriage and after. Particular help is given to engaged couples on all aspects of marriage and parenthood. This is done by private consultation and by informal discussions for small groups of engaged couples, as well as by sound publications on wedding etiquette, budgeting, sex, and all aspects of marriage.

Marriage counsellors—men and women volunteers most carefully selected and trained—offer help to all who seek it in any marriage difficulty. This help is given to more than 12,000 couples a year through private consultations and when necessary help is available from doctors, psychiatrists, lawyers, spiritual advisers, and other social workers.

The National Council's Bookroom issues a free list of recommended books and pamphlets available on request to 58 Queen Anne Street, London, W.1. Books are despatched by post in plain wrappers. Some of these books and pamphlets are referred to in the list given in this section.

The National Association for Mental Health, 39 Queen Anne St., London, W.1 (WELbeck 1272).—This voluntary body provides an advisory service for individual cases. It can help you to understand your children's problems; or (if you are a teacher) it can help with courses about the development of children and their intellectual capacities. If you have the care of old people it can help you to make the best arrangement for their care; and if you have a backward child it can help you about schools and special centres. The Association also has Homes for mentally handicapped children and for elderly ladies suffering from mild mental deterioration, and two Hostels for educationally subnormal school leavers. If you have a personal problem the Association can put you in touch with good advisers. It will help you to find the nearest Psychiatric Out Patients Clinic or Child Guidance Clinic. You may want to help mentally handicapped people, and if so the Association can advise you about training and can offer courses to qualify you for work with mentally handicapped children.

There are 20 voluntary Mental Health and Mental Welfare Associations under the ægis of this National Association throughout the country.

Family Planning Association (1930), 64 Sloane St., S.W.1 (Belgravia 7575).—*Objects*: (*a*) To advocate and promote the provision of facilities for scientific contraception so that married people may space or limit their families, and thus promote their happiness in married life and mitigate the evils of ill-health and overcrowding. (*b*) To advocate and promote the establishment of Family Planning Centres, at which, in addition to advice on scientific contraception, advice and, where necessary, treatment are given for any or all of the following—(i) involuntarily sterility; (ii) difficulties connected with the marriage relationship. (*c*) To encourage the production of healthy children who are an asset to the nation, provided that their parents have the health and means to give them a reasonable chance in life. (*d*) To examine such other problems as are relevant to the above, and to take such action as may be considered advisable.

The F.P.A. has 313 clinics throughout the country, many on local authority and hospital premises, and a sub-fertility investigation unit, and postal advice department, and pregnancy diagnosis service at its Headquarters. The Association is supported by voluntary funds. At some clinics fees are related to family income, at others there is a moderate fixed charge. No one is refused advice because of inability to pay.

Family Welfare Association, Denison House, 296 Vauxhall Bridge Rd., London, S.W.1 (Victoria 7334/8). The National Assistance, National Insurance, and National Health Service Acts have assured to the citizen the satisfaction of many basic needs, but many people still require certain forms of personal service which the State does not provide. It is here that the Family Welfare Association has its place.

The Casework Service of the Association is carried out in local offices, of which a list can be obtained. Many family difficulties can be resolved by comparatively simple forms of help. In addition to providing a casework service, the Association, in its local offices, gives practical training to students in family casework.

In addition, the Association sponsors: (1) the Old People's Homes Committee, which gives advice on suitable Homes for elderly people and problems of old age; and, (2) the Citizens' Advice Bureaux Service, in Central London.

The Family Discussion Bureau, 2 Beaumont Street, London, W.1 (WELbeck 5415).—The Bureau is a professional Marriage Counselling Service under the ægis of the Tavistock Institute of Human Relations serving the Greater London Area. It is staffed by a group of caseworkers with the relevant qualifications and professional experience who work in co-operation with psychiatric Consultants from the Tavistock Clinic. Interviews, which last for an hour, are arranged at weekly intervals. The period of attendance varies widely, and may extend over a considerable period. Although it is considered more advantageous if the two partners make a joint effort, cases are accepted in which only one is willing to attend. Those wishing to consult the Bureau or to refer cases are asked to telephone or write.

Family Service Units, 25 St. Mary's Grove, London, N.1 (Canonbury 6662).—There are 4 Units in London and other Units in Liverpool, Sheffield, Leicester, York, Manchester, Birmingham, Bristol, Stockport, Oldham, and Bradford, as well as in parts of Lancashire, Derbyshire, Surrey, and Middlesex. For addresses apply to above address.) This organisation provides a voluntary specialised service for "problem families." For this purpose "problem families" does not mean any family in difficulties, but families where conditions have been such as to lead to neglect of children. Sometimes parents are disabled or suffering from chronic illnesses. For the families' own welfare and that of the community they need help. Family Service Units exist to meet this need.

The National Association for Maternity and Child Welfare, B.M.A. House, Tavistock Square, London, W.C.1.—Gives enquirers much useful advice on these matters.

Maternity and Child Welfare Centres.—The address of the nearest Centre can be obtained from your doctor, a hospital, or the local council offices. The Local Education Authority provides Nursery Schools for children between two and five.

Other Useful Addresses.

The National Adoption Society, 47a Manchester St., W.1.

The National Children Adoption Association, 71 Knightsbridge, S.W.1.

The Royal National Institute for the Blind, 224/6/8 Great Portland St., W.1.

The National Institute for the Deaf, 105 Gower St., W.C.1.

SOME USEFUL BOOKS AND PAMPHLETS.

For Married and Engaged Couples.

The Art of Marriage. Dr. Mary Macaulay (Delisle, 7*s.* 6*d.*).

Modern Marriage. Dr. Edward T. Griffith (Methuen, 10*s.* 6*d.*).

The Sex Factor in Marriage. Dr. Helena Wright (Williams and Norgate, 7*s.* 6*d.*).

Modern Contraception. Dr. Philip Bloom (Delisle, 2*s.*).

Childbirth and Baby Care.

Childbirth Without Fear. Dr. Grantley Dick-Reid (Heinemann, 12*s*. 6*d*.).
Ante-Natal Illustrated. Dr. Grantley Dick-Read (Heinemann, 4*s*.).
Advice to the Expectant Mother. F. J. Browne (Livingstone, 1*s*.).
Baby and Child Care. Dr. Benjamin Spock (Pocket Books, 5*s*.).

Marriage Problems.

Any Wife or Any Husband. By "Medica" (Heinemann, 10*s*.).
Woman's Change of Life. Dr. Isabel Hutton (Heinemann, 6*s*.).
Change of Life: Facts and Fallacies of Middle Age. By "Medica" (Heinemann, 7*s*. 6*d*.).

Young People.

He and She. Kenneth C. Barnes (Darwen Finlayson, 10*s*. 6*d*.).
Youth Looks Toward Marriage. David R. Mace (Darwen Finlayson, 7*s*. 6*d*.).
Sex: An Outline for Young People. Dr. Helena Wright (Williams and Norgate, 8*s*. 6*d*.).

Parents.

The Mothercraft Manual. Mabel Liddiard (Churchill, 5*s*.).
Modern Parenthood. Dr. Dorothy Hudson (Pearson, 12*s*. 6*d*.).
Getting Ready for Parenthood. Dr. Mario Cortello (MacMillan, New York, £1 7*s*. 6*d*.).

Women.

Womanhood. Dr. Margaret Moore White (Delisle, 10*s*.).
A Woman Doctor Looks at Love and Life. Dr. M. Hilliard (MacMillan, 10*s*. 6*d*.).
The Sexual Responsibility of Woman. Maxine Davis (Heinemann, 15*s*.).

SOME HINTS ON LEISURE AND DETAILS OF ORGANISATIONS.

General.—The opportunities for intellectual and artistic pursuits (bringing both companionship and recreation are very varied, but for some readers living in remote places these opportunities may need a little search. When found they will be all the more valuable. You can get details of lectures, discussion groups, or classes from the Local Education Authority, and if you don't know where to write or call ask at your town hall or local library, or Citizens' Advice Bureau, or Post Office. If you are in a university town write to the Extra Mural Department. These departments of universities produce a most attractive and diverse range of courses and week-end schools; and you may be sure that whatever your interests, there will be something specially attractive to you. If you live in the country ascertain the nearest place to which the County Library periodically brings books.

The W.E.A. is wholly concerned with education and is non-party politically and unsectarian. Branch members organise their own programme of studies in the form of classes, week-end and day schools, visits to places of interest, concerts, films, and conferences on issues of the day.

The Central Office is 27 Portman Square, London W.1; and the following are the addresses of the District Secretaries:

Eastern: 7 Hills Road, Cambridge. Area covered: Essex (part), Suffolk, Norfolk, Northamptonshire, Huntingdonshire, Cambridgeshire, Bedfordshire, Hertfordshire (most of).
Northern: 51 Grainger Street, Newcastle-on-Tyne, 1. Area covered: Durham, Northumberland, Cumberland, Westmorland.
South-eastern: Merton, Castle Hill, Rochester Kent. Area covered: Kent and East Sussex.
West Lancs and Cheshire: Room 28, Burton Chambers, 38/40 Church Street, Liverpool. Area covered: West Lancashire and part of Cheshire.
London: 28 Woburn Square, London, W.C.1 Area covered: London, Middlesex, Surrey Essex (part) and Hertfordshire (part).
East Midland: 16 Shakespeare Street, Nottingham. Area covered: Leicestershire, Rutland, Lincolnshire (part), Nottinghamshire (part) and Derbyshire (part).
West Midland: 19 Calthorpe Road, Birmingham. Area covered: Herefordshire, Shropshire, Warwickshire, Worcestershire and South Staffordshire.
Southern: 19 College Place, Southampton. Area covered: West Sussex, Hampshire, East Dorset and Isle of Wight.
Berks, Bucks, and Oxon: 42 Wellington Square, Oxford. Area covered: Berkshire, Buckinghamshire and Oxfordshire.
North Staffordshire: Cartwright House, Broad Street, Hanley, Stoke-on-Trent, Staffs. Area covered: North Staffordshire.
Western: 7 St. Nicholas Street, Bristol, 1. Area covered: Gloucestershire, Somersetshire, Wiltshire and West Dorset.
North-western: 423 Oxford Road, Manchester, 13. Area covered: Parts of Lancashire, Cheshire and Derbyshire.
South-western: 1 Portland Square, Plymouth. Area covered: Devon and Cornwall.
Yorkshire North: Blenheim Institute, Blackman Lane, Leeds, 2. Area covered: The whole of Yorkshire, except that part included in Yorkshire (South) District, and part of Lincolnshire.
Yorkshire South: Campo Chambers, 26 Campo Lane, Sheffield, 1. Area covered: Parts of Yorkshire, Derbyshire, Lincolnshire and Nottinghamshire (including Penistone South to Chesterfield, and East via Barnsley to Scunthorpe, Chesterfield East via Retford to Gainsborough, thence North to Scunthorpe).
North Wales: 33 College Road, Bangor, N. Wales. Area covered: Flintshire, Anglesey, Merioneth, Denbigh, Montgomery, Caernarvon.
South Wales: 49 Charles Street, Cardiff. Area covered: Monmouthshire, Glamorgan, Pembroke, Carmarthen, Brecknock, Cardigan and Radnor.
West of Scotland: 177 Hill Street, Charing Cross, Glasgow, C.3.
North of Scotland: 36 Albyn Place, Aberdeen.
South-east Scotland: 13 Abercrombie Place, Edinburgh, 3.
N. Ireland: 56 Dublin Road, Belfast, N.1.

The Townswomen's Guild.—The address of the National Union is 2 Cromwell Place, London, S.W.7. It comprises eighty-nine Federations in which there are 1,909 Guilds. The object of these Guilds is to encourage the education of women to enable them as citizens to make their best contribution to the common good; and to serve as a common meeting ground for women irrespective of creed and party, for their wider education, including social activities. Townswomen are thus interested in anything and everything which touches women's place as citizens. There are Guilds throughout Great Britain, and they meet monthly. Craft classes, Drama, Music, and Social Studies groups meet in the intervening weeks. Each Guild is self-governing.

The Women's Institutes.—Women of every age belong to Women's Institutes, and to each her membership means something different. Perhaps to the young girl a chance to act, to the bride cookery classes, to the mother a course on home management, to the older woman an opportunity for public service. But to all of them it means companionship, friendship, and an interest outside the home, beyond the family circle. Courses of classes or discussions are arranged, and many Institutes have their own choirs and drama groups. There are now well over 8,000 Institutes. The address of the National Federation is 39 Eccleston Street, London, S.W.1. Any Women's Institute member is eligible to apply to attend a course at Denman College near Abingdon, Berkshire, and these range from practical everday interests—cooking, dress-making, home management, craft work—to drama production, music, literature, art, and history.

Art Exhibitions, Art Films, and Entertainments.—You should enquire what possibility there is of seeing, near your home, one of the exhibitions produced by the Arts Council of Great Britain. There are major exhibitions of important works both historic and contemporary; and also quite modern exhibitions, sometimes of reproductions instead of original works, which can be shown in places where there is no public gallery. The Council circulates widely each autumn and winter a programme of films on art, in co-operation with the British Film Institute.

Enquiries may always be addressed to Arts Council Headquarters or to the Scottish or Welsh Offices:

Headquarters: 4 St. James's Square, London, S.W.1.
Scotland: 11 Rothesay Terrace, Edinburgh 3.
Wales: 29 Park Place, Cardiff.

Drama and Music.—There is a whole realm here of delight and enrichment and excellent bodies to help you. Particulars are given below of the Britsh Drama League and other bodies. Many libraries lend music records and sets of plays (for play reading).

The British Drama League, 9 Fitzroy Square, London, W.1, is the national voluntary body devoted to the art of the theatre. Its library contains 5,000 complete sets of plays available for reading and rehearsal. Staff tutors travel all over the country to give courses. Its Information and Advice Bureau assists societies in the running of plays. It has recently constituted the Junior Drama League to encourage young people in the art of the theatre.

There is a British Drama League in Australia, New Zealand, and Canada. The League in London runs a Full-time Course for students from overseas. For a modest subscription advantage can be taken of the Overseas Service whereby members get the League's magazine *Drama* and the right to personal advice by correspondence. The Study Box on Drama is widely used throughout the world, and has been the basis for the first steps in dramatic activity in several countries.

National Federation of Music Societies, 4 St. James's Square, London, S.W.1, assists music societies by information, advice, and in other ways. It publishes a catalogue with practical details of some 500 choral works.

National Operatic and Dramatic Association, 1 Crestfield Street, London, W.C.1, has a library of musical scores and dramatic works.

Workers' Music Association, 17 Bishops Bridge Road, London, W.2, aims to provide opportunities for developing musical instincts and tastes. It believes that genuine art has moved people to work for the betterment of society and will continue to do so. It organises classes, lectures, week-end and summer schools Correspondence courses can be taken in Harmony, Counterpoint, and Orchestration.

Folk Dancing

English Folk Dance and Song Society, 2 Regents Park Road, London, N.W.1.
Royal Scottish Country Dance Society, 12 Coates Crescent, Edinburgh, 3.
Welsh Folk Dance Society, Epworth, Abergele.

The Holiday with a Purpose.—At home there are the field centres of the Council for the Promotion of Field Studies (Ravensmead, Keston, Kent); and the great variety of schools for week-ends and summer schools for holidays (see especially the *Calendar of Residential Courses* published by the National Institute of Adult Education, 35 Queen Anne Street, London, W.1).

There is a wealth of information about holidays abroad with a purpose. A book published by UNESCO, called *Vacations Abroad*, lists 800 study tours, summer schools, and work camps in sixty-four countries. This costs 4*s*. 6*d*. from UNESCO Publications, H.M.S.O., P.O. Box 569, London, S.E.1. The United Nations Association (International Service), 25 Charles Street, London, W.1, also arranges works camps at home and abroad. The Central Bureau for Educational Visits and Exchanges, Hamilton House, Bidborough Street, London, W.C.1, also supplies details of work camps and vacation courses abroad. Remember also the Travel Department of the National Union of Students, 3 Endsleigh Street, London, W.C.1.

Mountaineering and Recreation.—The young person is better catered for than ever before. In recent years a number of organisations have been founded to encourage mountain climbing and to provide special "adventure courses."

The Mountaineering Association, 102A Westbourne Grove, London, W2, runs training schools for climbers at all stages in Britain and abroad; and also runs evening classes on rock climbing in conjunction with education authorities.

The White Hall Centre for Open Country Pursuits, Manchester Road, near Buxton, Derbyshire, holds courses by the Derbyshire Education Committee for those between thirteen and twenty plus on hillcraft, rock climbing, camping, ski-ing, and canoeing.

Outward Bound Trust, 123 Victoria Street, London, S.W.1, runs schools in Wales and the Lake District to train boys—with a few courses for girls—through sea, mountains, and other natural elements how to face hazards and hardships of all kinds.

The Central Council of Physical Recreation. Addresses are:

England: 6 Bedford Square, London, W.C.1.
S. Wales: 18 Windsor Place, Cardiff.
Northern Ireland: 45 Arthur Street, Belfast.
Scotland (Scottish Council): 4 Queensferry Street, Edinburgh 2.

The Man at Sea.—It is possible that this book will come into the hands of a seafarer in the British Merchant Navy or Fishing Fleets; and he will probably feel cut off from all the sources of intellectual pleasure we are describing. But he is not overlooked. The Seafarers' Education Service and College of the Sea described below are ready to satisfy his hunger for books, study, and hobbies.

The Seafarers' Education Service aims to provide a first-class library service to ships, and no charge is made for the loan of the books themselves. Through a department called the College of the Sea it also lends books to the serious reader personally, and gives tutorial help by correspondence courses in all general subjects to those who want it; and it helps with all hobbies. The address of the Head Office is 207 Balham High Road, London, S.W.17, and at Liverpool, the Library and Information Centre is at Corinthian Buildings, South Castle Street. There is surely no man afloat who does not appreciate the work of this Service, which has been working unobtrusively for thirty-five years.

II. BIRTHS, MARRIAGES AND DEATHS

BIRTHS: HOW TO REGISTER (ENGLAND AND WALES)

1. Notification of Birth to Medical Officer of Health.—Within 36 hours after the birth of a child, notice must be given to the district Medical Officer of Health by the father of the child, if he was residing on the premises where the birth took place, or by any person who was in attendance upon the mother at the time of the birth or within six hours afterwards. Generally this duty is discharged by the doctor or midwife attending the mother, but if the birth occurs at the home of the parents and the mother receives no medical atten-

tion, then the responsibility for notification rests upon the father of the child. This notification to the health authorities must not be confused with the registration of the birth, which is an entirely separate procedure.

2. Registration of a Birth.—Within forty-two days after the birth of a child in England and Wales, information for the registration must be given to the Registrar of Births and Deaths for the sub-district in which the birth occurred. The duty of giving this information and of signing the birth register rests primarily upon the parents, or, failing them, on the occupier of the house or institution where the birth occurred, or a person present at the birth, or the person having charge of the child. As a rule the registrar will expect either the father or the mother to attend and give him the information, but in the case of an illegitimate child the father is not qualified to give information alone, but he can attend with the mother and sign the birth entry jointly with her.

The information recorded in the register includes the date and place of the birth, the name and sex of the child, the name, surname, and occupation of the father, and the name, surname, and maiden surname of the mother. However, if the child is of illegitimate birth, no particulars relating to the father will be inserted in the entry unless both he and the mother request it and both sign the register.

No fee is payable when a birth is registered within three months after its occurrence, but after three months have elapsed an informant wishing to effect the registration must do so in the presence of the superintendent registrar of the district, and must pay fees amounting to 7*s*. 6*d*.

If twelve months have passed since the birth occurred, then it can be registered only on the authority of the Registrar General, to whom applications should be addressed. If registration is authorised, a fee of 15*s*. will be payable.

Instead of giving the information directly to the registrar of the sub-district in which the birth occurred, an informant may attend before any registrar in England and Wales (or before any superintendent registrar if three months have elapsed since the birth) to make a written declaration of the particulars which have to be registered. This will be sent on to the appropriate registrar, who will then make the entry in his register. A fee of 3*s*. is payable for this service.

When a birth has not been registered within forty-two days after its occurrence, the registrar may issue a formal requisition to a qualified informant, requiring him to attend before him to discharge his statutory duty to give information for the registration of the birth and to sign the register. The failure of a parent to register the birth of a child or of any qualified informant to comply with a registrar's requisition is a punishable offence.

3. Re-registration of Birth of Legitimated Person.—If the parents of an illegitimate person marry each other subsequent to the birth, and if the father is domiciled in England or Wales at the time of the marriage, then that person is legitimated by virtue of the marriage. Further, if the legitimated person was born in England or Wales, the parents have a duty to apply to the Registrar General for the re-registration of the birth within three months after the date of the marriage. If application is made within this time, re-registration, if authorised, will be effected free of charge, but if application is made later a fee not exceeding 10*s*. may be payable. The new birth entry will be similar to that for a legitimate child.

If application is not made by *both* parents, re-registration cannot be authorised unless the original birth entry was signed jointly by both parents, or the paternity of the child was established by an affiliation order, or a declaration of legitimacy has been obtained in the High Court or in a County Court.

4. Birth Certificates.—Birth certificates relating to the child may be obtained from the registrar as soon as the birth has been registered. A full copy of the entry can be supplied at the time of registration for a fee of 3*s*. 9*d*., but if application is made at a later date a search fee will normally be payable in addition. This will be 1*s*. 6*d*. if the applicant goes personally to the register office or to the General Register Office, Somerset House, or 3*s*. 9*d*. if he applies by post. Birth certificates required for certain statutory purposes are obtainable from the registrar of the sub-district where the birth occurred, or from the district superintendent registrar, at special fees of 6*d*. or 1*s*.

A shortened form of birth certificate is obtainable for a fee of 9*d*. This gives no information about parentage, but states only the name, sex, date and place of birth of the person concerned. Short birth certificates are now in general use throughout the country, and are acceptable on almost all occasions when a person needs to prove his age.

5. Registration of Still-births.—A still-born child is a child which has issued forth from its mother after the twenty-eighth week of pregnancy, and which did not at any time after being completely expelled from its mother breathe or show any other signs of life. As in the case of a live birth, the duty of giving information for the registration of the birth of a still-born child rests primarily on the parents or, failing them, on the occupier of the house or institution where the still-birth occurred, or a person present at the birth. There is no provision for the registration of a still-birth before any registrar other than the one for the sub-district in which the birth occurred, and he will require evidence that the birth was indeed a still-birth. This evidence should take the form of a certificate from the doctor or midwife who was in attendance at the birth or who has examined the body of the child, but if such a certificate cannot be obtained, then the informant will be required to make a declaration as to the facts.

6. Adopted Children Register.—An adoption Order granted by a court in England and Wales under the Adoption Act, 1958, contains a direction to the Registrar General to make an entry recording the adoption in the Adopted Children Register.

When the entry has been made, a full certificate containing the name, surname, date and country of birth of the adopted child, and particulars of the adoptive parents is obtainable from the General Register Office under the same conditions and for the same fee for a birth certificate.

A short certificate at a fee of 9*d*. may also be obtained. This bears no reference to the fact of adoption, and states only the child's name and surname, sex, date and place of birth.

DEATHS: REGISTRATION AND ARRANGEMENTS FOR BURIAL OR CREMATION (ENGLAND AND WALES)

1. Registration of a Death.—Every death taking place in England and Wales must be registered by the registrar of the sub-district in which the death occurred. Except in a case where a coroner's inquest has been held, information for the registration must be given personally to the registrar by a qualified informant within five days, or within fourteen days if an informant has sent a written notification of the death to the registrar. Qualified informants include relatives, any person present at the death, the occupier or inmate of the house or institution where the death occurred, or the person responsible for the arrangements for burial or cremation.

If the deceased person was attended during his last illness by a registered medical practitioner, then it is the duty of that doctor to sign and send to the registrar a medical certificate of the cause of death, and at the same time to give to a qualified informant of the death a notice that he has signed the certificate. This notice should be handed to the registrar by the informant when he attends to register the death.

If the death has been referred to the coroner, it cannot be registered until he has completed his investigations. When an inquest is held the registrar will register the death without the attendance of any informant on the authority of a document issued to him by the coroner.

The information recorded in the register includes the date and place of the death, the name, sex, age, and occupation of the deceased, and the cause of death.

2. Arrangements for Burial.—The body of a deceased person may not be buried until an

authority for the burial has been issued by the coroner or the registrar. A registrar will normally issue his authority after the death has been registered, but a certificate for burial can be obtained from the registrar *before* the registration of the death provided that he has received written notice of the death and a medical certificate of cause of death. If a death is being investigated by a coroner, a registrar cannot issue any authority for burial until those investigations have been completed.

3. Arrangements for Cremation.—The body of a deceased person may not be cremated until an authority for cremation has been issued by the coroner or the registrar. The coroner may issue his certificate for cremation or, after the death has been registered, the registrar may issue his authority, but neither of these documents in itself is sufficient authority to allow a cremation to proceed. Final authority for cremation must be given by a medical referee at the crematorium.

Cremation may not take place if the deceased has left written directions forbidding that form of disposal.

4. Removal of Bodies out of England and Wales.—Any person wishing to remove the body of a deceased person out of England and Wales must give notice to that effect to the coroner for the area within which the body is lying. The body may then be removed after the expiration of four clear days from the day on which the notice was received by the coroner, or earlier if the coroner states in his acknowledgment of the notice that no further enquiries by him are necessary. Forms for the purpose of giving notice to the coroner may be obtained from any Registrar of Births and Deaths.

5. Death Certificates.—Death certificates may be obtained from the registrar as soon as the death has been registered. A certificate can be supplied at the time of registration for a fee of 3*s.* 9*d.*, but if application is made at a later date a search fee will normally be payable in addition. This will be 1*s.* 6*d.* if the applicant goes personally to the register office or to the General Register Office, Somerset House, for the certificate, or 3*s.* 9*d.* if he applies by post. Death certificates required for certain statutory purposes are obtainable from the registrar of the sub-district where the death occurred, or from the district superintendent registrar, at a special fee of 1*s.*

MARRIAGES: PRELIMINARY FORMALITIES (ENGLAND AND WALES)

1. General.—In England and Wales, marriage may be celebrated between persons aged sixteen or over according to the rites and ceremonies of the Church of England after appropriate preliminaries, or according to any other rites or before a superintendent registrar after the appropriate civil preliminaries have been observed. A marriage may be solemnised at any time between 8 a.m. and 6 p.m.

2. Marriage According to the Rites of the Church of England.—The preliminaries to a Church of England marriage may be the publication of banns, the issue of a common licence, the issue of a special licence, or the issue of a superintendent registrar's certificate (see "Civil Preliminaries" below).

(a) *Banns.*—Application for the publication of banns should be made to the clergyman of the parish in which each party resides. The banns must be published on three Sundays preceding the solemnisation of the marriage, which should take place within three months after the completion of the publication of the banns.

(b) *Common Licence.*—Application for a common licence dispensing with the necessity for banns should be made to the Diocesan Registrar or any Surrogate for granting Marriage Licences in the Diocese, or a Surrogate of the Vicar General or of the Master of the Faculties. A common licence is void if the marriage is not solemnised within three months of its issue.

(c) *Special Licence.*—A special licence granted by or on behalf of the Archbishop of Canterbury enables a marriage to be solemnised according to the rites of the Church of England at any time and place. Such a licence is issued only in grave emergencies or very exceptional circumstances.

(d) *Superintendent Registrar's Certificate.*—A marriage according to the rites of the Church of England may be solemnised with the consent of the clergyman of the church on the authority of a certificate of a superintendent registrar instead of after the publication of banns (see "Civil Preliminaries" below).

If any further information is required concerning marriage according to the rites of the Church of England, application should be made to the clergyman of the church in which it is desired that the marriage shall take place.

3. Civil Preliminaries.—Marriage after civil preliminaries may be on the authority of a superintendent registrar's certificate without licence, or of his certificate and licence, and may be solemnised in a register office, in a registered building (*i.e.*, a place of worship which has been registered for the solemnisation of marriages), or according to the usages of the Jews or Quakers. A summary of the legal requirements before notice of marriage can be given is set out below. More detailed information can be obtained from the superintendent registrar of the district in which either party resides.

(a) *Superintendent Registrar's Certificate without Licence.*—When both parties reside in the same registration district each party must have had his or her usual place of residence within that district during the seven days immediately preceding the giving of the notice to the superintendent registrar. The notice may be given by either party.

If the parties reside in different districts, notice must be given to the superintendent registrar of each district. Each party may give notice in his or her district, or either party may give both notices, but notice cannot be given until the seven days' residential qualification has been completed.

Generally speaking, the building in which the marriage is to take place must be in the district of residence of the parties or of one of them, but there are certain exceptions to this.

On the request of the party who gave the notice, the superintendent registrar may issue his certificate, provided that a period of twenty-one days has elapsed since he entered the notice in his marriage notice book. The marriage may then take place in the building specified in the notice at any time within three months from the day on which the notice was entered in the book.

(b) *Superintendent Registrar's Certificate and Licence.*—Only one notice is required, whether the parties reside in the same or in different registration districts, and the notice may be given by either party, but both parties must be in England or Wales on the day notice is given. One of the parties must have resided in the registration district in which notice is given for fifteen days immediately preceding the giving of the notice, and the marriage must (with certain exceptions) take place in that district. If both parties have resided for fifteen days in different districts, the notice may be given to the superintendent registrar of either district, but the marriage must (with certain exceptions) take place in the district in which the notice was given.

On the request of the party who gave the notice, the superintendent registrar may issue his certificate and licence, provided that one clear day (excluding a Sunday, Good Friday or Christmas Day) has elapsed since he entered the notice in his marriage notice book. The marriage may then take place in the building specified in the notice at any time within three months from the day on which the notice was entered in the book.

4. Registration of Marriages.—A marriage in a church of the Church of England is registered by

the clergyman solemnising the marriage. A marriage in a Nonconformist church may be solemnised in the presence of an authorised person (*i.e.*, a person authorised by the trustees or governing body to be present at the solemnisation of marriages in that building), in which case the marriage is registered by that person, or in the presence of a registrar of marriages, who will register the marriage. A marriage according to the usages of the Society of Friends (Quakers) is registered by a registering officer of that Society; in the case of a Jewish marriage, registration is effected by the secretary (for marriages) of the synagogue to which the husband belongs. A marriage in a register office is registered by the registrar of marriages.

The particulars recorded include the date and place of the marriage, the names, ages, marital condition, and occupations of the parties, and the names and occupations of their respective fathers. The entry is signed by both parties to the marriage and two witnesses.

5. Marriage Fees.—(a) *Marriage According to the Rites of the Church of England.*—Generally, fees for a marriage after banns amount to £1 2*s.* if the parties live in the same parish or £1 12*s.* 6*d.* if in different parishes. Fees for a marriage on a superintendent registrar's certificate amount to £1 13*s.* if the parties live in the same registration district and £1 16*s.* if they live in different districts. Fees for a marriage by ecclesiastical licence amount to between £3 and £4. The fee payable for a special licence is £20.

(b) *After Civil Preliminaries.*—The following fees are payable in respect of the civil preliminaries to a marriage :—

	Superintendent Registrar's certificate.		Superintendent Registrar's certificate and licence.
	Notice in one district.	Notice in two districts.	
	s. *d.*	*s.* *d.*	£ *s.* *d.*
Entry of notice .	1 6	3 0	1 6
Superintendent Registrar's certificate	1 6	3 0	1 6
Superintendent Registrar's licence	—	—	2 5 0
Attendance of registrar of marriages (if required by law)	7 6	7 6	15 0
Total . . .	10 6	13 6	£3 3 0

In the case of a marriage in a registered building, however, further fees may be found to be payable to the Minister or the authorities of the building in regard to the solemnisation of the marriage. An additional fee will be payable if a marriage certificate is required.

6. Marriage Certificates.—Marriage certificates may be obtained from the person registering the marriage immediately after the ceremony for a fee of 3*s.* 9*d.* If application is made at a later date to the person having the custody of the register, a search fee will normally be payable in addition. Marriage certificates required for certain statutory purposes are obtainable from the person having the custody of the register at a special fee of 1*s.*

III. HOW TO BUY A HOUSE

1. INTRODUCTION.

The following guide has been compiled to help those who want to buy a house, especially young people founding a home. For many of us the need to buy a house comes but once in a lifetime; or, at any rate, so seldom that we have little experience to guide us. Many people, therefore, pick up such knowledge as they can at the last moment as they go along. That they tumble unawares into pitfalls is not therefore surprising. It is to save the house-seeker from those mistakes, which can be so costly and worrying to him, that the following guide is offered.

The guide has two main parts: first, how to make sure that the purchase is a sound one; and second, how to obtain the necessary funds. In addition, there is an explanation of the rates and income tax on a house and what reliefs can be obtained.

The advice may well seem more complicated, at first sight, than the newcomer to the problem expected. But when he reads it the main points will be found to be simple and clear, and the advice will repay careful study.

In addition to an explanation of how to select a house and get the money for it, information is offered on important subsidiary matters, such as how the purchaser may assure his family if he dies before a mortgage is paid in full. It is also explained how grants can be obtained for conversions and improvements.

The figures quoted in this section are those ruling at the time of going to press.

2. THE ESSENTIAL QUESTIONS TO ASK.

The Nature of the Property.—There are certain preliminary points which you need to get clear before entering into any commitments. You should think most carefully over the general position of the site; the nature of the soil; handiness to shops; what daily transport is available and what schools there are in the neighbourhood. You should ascertain the exact nature of what is being sold. Is the land leasehold or freehold? If it is leasehold, your ownership will be only for a stipulated number of years, often ninety-nine, sometimes more and sometimes much less; rent will be payable; and there are likely to be restrictions on its use. Though freehold usually means outright ownership of the land, freehold may also carry restrictions, such as debarment on use for business purposes or conversion into flats, or there may be limitations on the type of structure or size of house which can be built.

The Nature of the Neighbourhood.—Next comes essential information about the neighbourhood as a whole. Is it already zoned, or likely to be zoned, for industrial or other non-residential development? Are developments in hand, or possible, near enough to be inconvenient or liable to affect the amenities or value? The local Planning Authority (whose address you can find from the local council office) can usually give guidance on all these points. Equally essential is to find out if the land is subject to any rights of way, or other "easements" as they are legally termed.

Services and Roads.—Handiness to main drainage and gas, electricity and water supplies must be considered; installation may be costly, if any or all of these services have to be carried some distance. If roads have not been made up or adopted by the council, it should be found out when they will be built or adopted, where they will run, and the probable liability in road charges.

Local Bye-laws and Planning Clearance.—Assuming a clear bill up to this stage, local bye-laws and planning rules must be taken into account if a new house is to be built. Not any kind of building can be put up. It must conform to local standards of construction and safety. Its outward appearance and the facing materials used must also be approved by the local Planning Authority. An architect is the best adviser on these points. Once bought or built, owners cannot do anything they wish with houses. In addition to any restrictions going with the land, as mentioned above, the local Council and Planning Authority may have a definite say in all proposals. For example, their approval is necessary before a house can be converted to flats or for business purposes, or put to any other use.

The Need for a Surveyor and a Solicitor.—A qualified surveyor should be called in to report on

the condition and value of an existing house in which you are seriously interested. You will thereby know exactly what it is you are thinking of buying, and you will know within limits what you ought to pay. Various legal points must also be considered, and a solicitor should be consulted at the earliest stage of negotiation, to look after matters such as the title to the property, restrictions on use, conveyance and, a complicated matter calling for expert advice, the likelihood of the land being lost by compulsory purchase. On written application to the local council it must state whether, so far as it knows, the land is liable to compulsory purchase within five years.

The Golden Rule, is therefore: Obtain professional advice at the earliest stage—from a surveyor and a solicitor acting for you and independent of another party to the transaction. Where necessary, as, for example, when building a house, you should also consult an architect. The safe rule is not to enter into any commitment off your own bat. But if you do make any undertaking make sure that you introduce into your undertaking the words "subject to contract." Thus if you pay a deposit to a house agent as stakeholder state, in writing, that the payment is "subject to contract."

3. HOW TO BUDGET.

Stamps and Fees.—Sufficient money must be available to cover every need. You will, of course, remember that expenditure does not stop at the cost of the property itself. You will need to have money for stamp duties, legal charges, and expenses on the conveyance (or transfer) of the house if it is being bought, or on the land only if it is being built to plans; stamp duties, legal and inspection fees, and expenses in connection with the mortgage if money is being borrowed; and a fee for the surveyor who examines before purchase. All are payable by the purchaser. The actual amounts depend on the purchase price of the property or land and the amount of any mortgage advance. Stamp duty, payable to the Inland Revenue, as from August 1, 1958, is nil up to £3,500; ½ per cent. up to £4,500; 1 per cent. up to £5,250; 1½ per cent. up to £6,000; thereafter the full 2 per cent. Legal charges are at a set scale related to the purchase price. For example, if the land is unregistered the scale is 2½ per cent. on the first £1,000, 1½ per cent. on the next £2,000, and ¾ per cent. on the next £7,000. If the land is registered at H.M. Land Registry, fees are less, rates being 1½ per cent. on the first £1,000, 1 per cent. on the next £2,000, ½ per cent. on the following £1,000, and so on; but Land Registry fees will be payable at the rate of £3 15*s*. for the first £1,500 and 2*s*. 6*d*. for each extra £50 or part of £50.

Total Expense for the Conveyance.—A reasonable estimate of the maximum total expenses for *conveyance*, including incidental expenses and stamp duties, is, therefore, say, 2–2½ per cent. on the purchase price—less, of course, if the land is registered. Further, though smaller, sums will be payable if a mortgage has to be arranged. The whole set of expenses can add as much as 3–3½ per cent. to the outlay.

Other Monetary Needs may include: removal expenses; cost of fitting, curtains, and new carpets; structural alterations, decorating, etc.; new or additional furniture; and laying out a garden, including the cost of tools. The total will depend on circumstances and particularly whether you are moving to a new house or setting up home for the first time. The total amount can be substantial, and it is important that before entering into any commitments, you should draw up a budget of what capital you need; and if insufficient capital is available you should ascertain the amount which can be borrowed on mortgage. How to obtain a mortgage is explained in the next paragraphs.

4. HOW TO RAISE A MORTGAGE.

Who Lends Money?—Building Societies, Insurance Offices, and Local Authorities all lend money to enable people to own their homes. Banks also lend money and, subject to membership conditions, Trade Unions and Friendly Societies. While details may vary, some broad general rules apply to most methods. They are: (1) The property must be freehold or, if leasehold, must have a life of 20–30 years more than the repayment period of the mortgage. (2) The property must, in many instances, be constructed of brick, stone, or concrete—timber-built or half-timbered houses will not be entertained by some lenders. (3) The loan will be calculated on the value as decided by the lender's surveyor or the purchase price, whichever is the lower. (4) Normally, only a proportion of the price or value will be advanced, the amount usually depending on: (*a*) the age, condition, size, and situation of the house; (*b*) the lending policy of the mortgagee; and (*c*) the age, financial position, prospects, and family circumstances of the borrower. A useful general guide to (*c*) is that, in order to avoid taking on financial commitments which might become burdensome, mortgage repayments, rates, and a fair allowance for repairs should total not more than around one-quarter of the borrower's income.

How Much is Lent?—The percentage advanced varies widely, and depends partly on the method of borrowing. But a broad indication for freehold or long leasehold properties for owner-occupation costing not more than, say, £3,500–£4,500 is: new, up to 85 per cent.; reasonably modern older types, up to 80–85 per cent. On higher priced, large or pre-1918 houses the amount may be anything from 66⅔ to 75–80 per cent. Where the price is substantially below current market value, such as may happen if a rent-controlled house is being bought at a favourable figure by a sitting tenant, most lenders will advance a larger proportion; though, on the reasonable stipulation that the owner should have some cash stake in the property, probably not more than 95 per cent. of the cost. Likewise, as explained in later sections, larger loans may be made when suitable guarantees or additional security can be provided.

Loans for Houses Being Built.—Special considerations apply when building one's own house. Loans are not normally made on bare land; but if its purchase and commencement of building are a more or less continuous operation, an advance may be made on the land if its value is: (*a*) high in relation to the total cost of the completed property, and (*b*) more than the borrower will have to find himself. For example, if the land costs £750, building, etc., £2,250, and a loan of 80 per cent. will be made on the total of £3,000, a sum of £150 would be advanced on the land itself. In every case, however, the amount lent will be based on the surveyor's valuation of the completed property. This will take into account the cost of the land, building, and architect's fees, which latter are properly reflected in the value. It is possible in most cases to have the advance in up to three or four instalments as various stages of building are completed. Whatever the nature of the property, the borrower has to pay out of his own resources the costs of conveyance of the house or land, as mentioned earlier, plus legal and other charges in connection with the mortgage. As explained before, the two sets of expenses can add up to a further 3½ per cent. to the cash outlay.

Three Points for the Future.—Make sure when arranging the advance that lump sums can be paid off at any time, with a proportionate reduction in the interest payable. You can ask the Building Society if an extra loan will be possible should money be required at some future date to pay for additions, improvements, or heavy repairs. Finally, if for any reason whatever, it is difficult to keep up repayments, discuss the problem with the lender at the earliest stage—a temporary reduction in payments will probably be made to tide over the difficult period.

5. HOW A BUILDING SOCIETY HELPS.

The Need for Early Consultation.—Building Societies encourage prospective owners to discuss their propositions with them at the earliest moment. By finding out how much you can borrow you can be saved a lot of disappointment

and loss of money by way of deposits and survey fees.

Surveyor's Inspection.—Inspection of the property by the society's valuer is the first step after the preliminary discussion. A typical scale of fees is £2 on a purchase price up to £500, with additions of 10*s*. for every extra £250 up to £2,000 (at which level the fee is thus £5) and 4*s*. per £100 thereafter up to £10,000; plus travelling expenses over a certain distance. The valuer's report is confidential to the society, and is not available to the applicant. A decision to offer an advance is made normally within a day or two of the receipt of the report. In the case of new houses built to individual design preliminary arrangements and the offer of an advance are made on the basis of architects' plans and builders' estimates.

How Much Will Be Lent?—Societies, when a substantial loan is wanted, make the figure as large as possible commensurate with the security offered, the ability of the borrower to meet repayments, and their individual policy. Normal maximum amounts are 75–85 per cent. on reasonably modern and new properties costing up to £3,500–£4,500 and less on more expensive ones. Increased proportions may be arranged, however, if additional security is provided. Up to 95 per cent. may be considered if the borrower himself can provide extra security in the form of Trustee Securities, National Savings Certificates, another property, or a life-assurance policy with a sufficient surrender value. Up to 90–95 per cent. may also be arranged if a third party of financial substance will put up good security to cover part of the loan.

Guarantee Schemes.—Building Societies offer guarantee schemes in conjunction with insurance companies. One special plan provides for 90–95 per cent. advances to approved applicants on houses valued at not more than, say, £3,500–£4,500. A single insurance premium, which is usually added to the loan, is charged on the amount of the extra advance. There is also a Government–Local Council scheme for advances of up to 95 per cent. on new and *old* property.

Methods of Repayment.—Optional methods of repayment are offered by most Building Societies. The *Monthly Repayment* system is the most widely used and popular. Equal calendar (or lunar) monthly instalments paid throughout the term of the mortgage cover both interest and repayment of principal. Typical *calendar* monthly payments on each £100 borrowed for various periods and different interest rates are:

Number of Years	*Interest Rate*					
	5%		5½%		6%	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
5	38	6	39	1	39	7
10	21	7	22	2	22	8
15	16	1	16	8	17	2
20	13	5	14	0	14	7
25	11	10	12	6	13	1

While repayments can be arranged over any lesser number of years, the normal maximum is twenty to twenty-five, though some societies may arrange longer terms in particular circumstances. The advantage of this system is the even spread of the outgoings. In the early years the greater part of each payment represents interest, which, however, falls steadily as the load is reduced. The society usually reserves the right to increase—or reduce—the rate of interest on giving due notice. Increases are applied in ways giving the minimum inconvenience to the borrower, often by extending the repayment period.

6. HOW LOCAL COUNCILS AND BANKS HELP.

Local Authorities, including County Councils can, if they wish, advance money for home ownership under various Acts. Applications for details of mortgage facilities available for the area in which the property is situated should be made to the Treasurer or Clerk of the appropriate local Council. These facilities apply to property of any value and, though not always available, up to 100 per cent. may be lent. Interest is generally charged at ¼ per cent. above the rate at which the Council itself borrows from the Public Works Loan Board, which fixes its rates in accordance with money-market conditions and the term of repayment. The interest is, as a rule, fixed for the whole period of the loan, though some Councils have taken powers of variation. There is, of course, no life-insurance protection; but, as explained in the Life Assurance section, this may be arranged by taking out a reducing term, or mortgage protection, assurance.

Loans can be made by Local Authorities for the conversion of buildings into houses or flats and for the alteration, enlarging, repair or improvement of dwellings. (See paragraphs below on Improvement and Conversions.)

Bank Loans.—Banks are generally prepared to help within certain limits, the main considerations being that: (1) the borrower is an established customer of good standing; (2) the advance can be reduced steadily and repaid entirely over a relatively short period of, say, eight to ten years at the outside; and (3) no more than two-thirds to three-quarters of the value is to be lent, or additional security such as marketable investments, other property, or life assurances with surrender values can be put up. A bank loan is subject to half yearly or annual renewal, and may therefore have to be repaid on due notice, though this is given only in exceptional circumstances. Likewise, bank loans are subject to restrictions such as credit squeeze or Government financial policy.

Private Mortgages, up to two-thirds or three-quarters of the value, may also be obtained, mostly through mortgage brokers, solicitors, and estate agents. Interest may be ½ to 1 per cent. more than on building society advances. Repayment may be by instalments, but is more usually in one sum at the end of an agreed term, which calls for the accumulation of funds. This private field is often the best one for raising a second mortgage when it is impossible to obtain enough in the normal way on a first charge. Second mortgages, in view of the risk involved, generally have to be repaid over a comparatively short period of, say, two to three years and the interest ranges up to 7 or 8 per cent.

Bridging between One House and Another.—It may be necessary to bridge a gap between payment for the new house and receipt of the proceeds of sale of the old. If the present house is not mortgaged and no loan, or only a relatively small one, is needed on the new property, the bank may be able to help. If the present house is mortgaged, consult the lender. Arrange the financial side well before entering into any contracts or commitments on the new transaction. Established mortgage brokers and insurance brokers can be of help in the arrangement of mortgages, especially where it is desired to link the loan with endowment or mortgage protection assurance; or it is difficult to obtain the full amount required through the direct channels.

7. RATES.

Rates, levied by Local Authorities, are payable on all occupied house property—by the owner if he is also the occupier and often by the tenant if a house is rented. The amount depends on: (*a*) the rateable value, and (*b*) the rate in the £ levied by each Council. The latter varies widely Council by Council, and is liable to annual or even half-yearly change.

Rateable Value.—Under a comprehensive revaluation completed in 1955 all dwellings have been reassessed on a common basis laid down in the Valuation for Rating Act, 1953. The starting point is the *Gross Value*, which is the rent at which the property might reasonably have been

expected to let at end-June 1939, with: (*a*) the tenant paying all usual tenant's rates and taxes (but excluding income tax); and (*b*) the owner meeting the cost of repairs and insurance. A *Repairs Allowance* is next given at fixed scales. The net figure left is the RATEABLE VALUE, and it is the one on which rates are paid. The new values came into effect as from April 1st, 1956. Ratepayers may appeal for reductions in the gross value at any time during the currency of the rate. This right is particularly important when a new house is first valued. An appeal must first be made to the local Inland Revenue Valuer, whose address is obtainable from the town hall or council offices.

If the valuer's decision is unfavourable the appeal can be carried to the local Valuation Court. A final appeal can be made to the local Land Tribunal, which, however, may entail certain costs. A qualified rating valuer should be consulted in complicated cases.

8. INCOME TAX.

Net Annual Value.—Income Tax assessments on property, made separately by the local Commissioners of Income Tax, also start with a *Gross Value*, which can be defined as the fair rental value with the tenant paying rates and the owner repairs and insurance. (The income-tax figure, it should be noted, is not necessarily the same as the rating gross value.) A repairs allowance (automatically given) is based on the gross annual value, as under:—

G.A.V.	*Repairs Allowance*
Up to £40	One-quarter of the G.A.V.
£40–£50	£10.
£50–£100	One-fifth of the G.A.V.
Over £100	£20, plus one-sixth of the G.A.V. over £100.

The balance, known as the *Net Annual Value*, is the amount on which Schedule A, or Property Tax, is assessed.

Appeals.—An appeal for a reduction in the gross annual value can, as with rating valuations, be made by the owner at any time. When a new house is assessed for the first time an appeal must be made within forty-two days of receipt of the notice. All appeals should first be made to the local Inspector of Taxes and, if no satisfactory agreement can be reached, taken next to the local General Commissioners of Income Tax.

Relief for Repairs.—Rebates may be claimed for repairs when actual expenditure over specified periods exceeds the fixed allowance. The normal basis for making what is called a *Maintenance* (*or Excess Repairs*) *Claim* is the *average* spent over five consecutive years, generally ending March 31st. After making the initial claim, subsequent claims are made year after year by dropping out the expenditure for the earliest year and adding that for the newest, until the five-year average drops below the fixed allowance. One useful exception to this general rule may apply where a property has been owned for less than five years and a lot of money has been spent on it. If the previous owner's expenditure is known it can be included with such outlays to arrive at the five-year average. Alternatively, it may be possible to arrange with the Inspector of Taxes to work on actual yearly expenditure until a full five years' figures are available. All claims must be supported by receipted and detailed bills, which should always be kept. The cost of insuring the house—but not the contents—should be included. Money need not be spent each year; it is the five-year average which matters. Claims must be made *by the owner* within six years of the end of the relative tax year to the local Inspector of Taxes.

How the Owner Pays Income Tax.—When it comes to calculation of the income-tax liability on a house the net annual value is taken into account as part of the owner's income. Tax, if any, is then payable at the rate or rates applicable to the total income from all sources after deduction of personal and other allowances and reliefs. The owner obtains relief, in addition to any maintenance relief, in respect of the annual interest paid on a mortgage or loan on the security of the house. If the interest is paid to a building society, local council, certain insurance companies or a bank, relief will be given normally by setting off as much as possible against the assessment on the house and the balance, if any, against other income. But if the mortgage is the type where income tax is deducted from each interest payment such tax will have to be paid over to the tax collector and the assessment, or part of it, will remain. Though this seems to be a complicated way of doing things, the net effect is the same and full relief is given. All queries about property tax assessments should be addressed to the local Inspector of Taxes.

9. GRANTS FOR IMPROVEMENTS AND CONVERSIONS.

What Grants Cover.—Grants towards the cost of certain types of improvements and for conversions can be made to property owners by Local Authorities. *Improvement* for this purpose means work, other than ordinary repairs, necessary to bring a dwelling up to reasonable modern standards of convenience and comfort. Grants are now of two kinds. A *Standard* grant may be claimed *of right* to instal five amenities: bath or shower in bathroom; wash-hand basin; hot-water supply; water closet; satisfactory food storage—of up to one-half of the approved cost but subject to specified maximum payments. A *Discretionary* grant can be made for a much wider range of improvements, and for *conversions*, though qualification for assistance is decided solely by the Council and the cost of approved work must exceed £100; up to one-half may be granted, with a maximum of £400 for each dwelling. *Conversion* work includes the division of a suitable house or group of houses into flats or other self-contained dwellings.

Conditions of Grant.—To qualify for a grant council approval must be obtained *before* any work is started. The property must be brought up to certain defined standards and usable life. Fees for professional help and advice may be included in the approved cost.

10. PROTECTION OF DEPENDANTS AND HOME BY ASSURANCE.

Freedom from Debt in Case of Death.—Life assurance can be linked with house purchase in various ways to provide not only finance, but protection for dependants and, perhaps, a fund for meeting major expenditure some way ahead. A popular method is a loan from a life insurance office repayable by means of an endowment assurance. It is a two-way transaction. The insurance office makes a fixed loan for an agreed number of years. Simultaneously, the borrower takes out an endowment assurance for at least the same amount and the same period. Thus—which is the great merit of this method—if he dies at any time after paying the first premium the endowment pays off the mortgage and leaves the house free of debt. The maximum maturity period of the endowment assurance is normally twenty to twenty-five years or age sixty-five, whichever is the shorter term.

Home Protection Insurance.—A growingly popular and cheaper method of "insuring" reducing types of loan is, however, a reducing-term insurance, more popularly called "mortgage protection," "home protection" insurance, and so on. Though a number of variations are available, the basis is similar—the amount assured falls annually as the mortgage is reduced. Under the simplest form the insurance provides enough to repay the balance of the mortgage if death occurs before its complete repayment, but the borrower obtains no cash benefit if he lives to the end of the term. Premiums, payable for only a limited number of years, vary according to the age of the borrower and rates for younger age groups are no more than a few pounds per £1,000 original loan. The need to insure your house and contents is explained in Part IV.

IV. A GUIDE TO INSURANCE

It is simple prudence to secure the benefits of insurance. You should ask yourself not whether you ought to insure but which pattern of insurance suits you best. Life assurance will give you confidence and your dependants too; and this will promote that trust which makes for happy relationship. Moreover, life assurance is a form of systematic saving against the inevitable rainy day. And there is a special word of advice for women, who are naturally especially concerned about financial security.

The figures quoted are those ruling at the time of going to press.

Life Assurance: Who may Insure.—You may insure your life and thus provide for your family in the event of your early death. A husband may take out an insurance on the life of his wife, and vice versa. It is a condition of the grant of a life policy that the person effecting it should have an interest in the life to be insured, known as an insurable interest. Every adult person has an unlimited insurable interest in his or her own life. A husband has an unlimited insurable interest in the life of his wife, and vice versa. These are, however, exceptions to the general rule, which is that the interest must be pecuniary, *i.e.*, measurable in terms of money. Relationship in itself does not constitute an insurable interest. Thus a parent as such has no insurable interest in the life of his child, nor a child in the life of its parents. It is to be noted that provided the insurable interest subsists at the time the policy is effected, the interest may be reduced or disappear entirely during the term of the policy without invalidating the contract.

"With" and "Without Profit" Assurance.—Both whole-life and endowment assurances can be obtained either with or without the right to participate in profits, termed bonuses, a larger premium being charged for participation. A policy-holder's share in the profits is usually added to the sum assured. It is known as a reversionary bonus, and is payable with the original sum assured at the time of claim. These bonuses may, if desired, be surrendered for immediate cash without disturbing the original assurance, but the cash value, is, of course, considerably less than its reversionary value as an addition to the sum assured. The bonus may be calculated as a "simple" bonus on the sum assured or as "compound" bonus on the sum assured and any bonuses already added.

Whole Life Assurance.—The first contract should provide life assurance for as long as it can possibly be needed, which generally means a whole of life policy. The premiums may be payable throughout the lifetime of the assured, or can be limited to a fixed term of years, when, if the life assured survives beyond the fixed term, the policy continues in force without further payments of premiums. A whole-life policy under which premiums are payable throughout the life of the assured, and which does not participate in profits, is the cheapest form of permanent life assurance because it provides the maximum sum assured with the minimum premium outlay. A whole-life policy, either with or without profits, and preferably with premium payments ceasing not later than retirement age, should form the backing of every well-planned scheme of life assurance. At age 25 a whole-life "without profit" policy for £1,000 will cost around £15 a year subject to rebate of income tax, or, say, £17 a year if it be arranged for premiums to cease at age 65. If effected on the "with profit" plan, a whole-life policy for £1,000 with premiums payable throughout life will cost about £22 at age 25, or around £24 a year if premium payments cease at age 65.

Endowment Assurance.—In its simplest form an endowment assurance secures a stipulated sum upon the survivance of the life assured to a stated date, or upon his death should that occur earlier. The most important advantage of endowment assurance is provision for old age. Where adequate assurance has already been effected as a provision for dependants, a short-term endowment assurance is often the best means of making provision for school expenses or providing a child with a start in life. But apart from special circumstances of that kind, the best form of endowment assurance in the great majority of cases is a policy maturing at the prospective age of retirement. Many men, of course, come under a pension scheme, but the pension will by no means equal their earnings, and may die with them. Their wives may enjoy the protection of a widow's pension, but this is likely to be a modest amount and perhaps inadequate, even allowing for an amount under the National Insurance scheme. There is therefore no better object for your savings than an endowment assurance maturing at 65. It provides a reasonable amount for dependants in the event of early death, while if the assured survives to 65 he receives a capital sum, when he can convert the policy moneys into a pension for himself, or himself and his wife.

Endowments by Instalments.—The proceeds of an endowment assurance may be payable by instalments over a period of, say, 5, 10, or 15 years free of income tax. The person assured would, of course, have an option to take a lump-sum payment at maturity instead of payment by instalments, and his representatives could make such a choice in the event of his death during the policy term.

Optional Endowments.—An option to convert to an endowment assurance can always be attached to a whole-life policy, so that if at the end of, say, five or ten years an endowment would better suit the assured's needs, the change can then be made. The option is with the assured, and if ill-health has overtaken him since effecting the whole-life assurance, he will no doubt prefer to retain the cheaper form of policy. This freedom of choice is of great value whether the policy is intended as a complete provision in itself or whether it is to be used in combination with other policies.

"Income" for Dependants.—The "family-income" type of policy has been devised because it is when the family is young that it needs the most support. There is a plan to suit every need and every purse. Although some offices assure "income" independently of "capital" provision, the most beneficial plan is where the income benefits form part of a whole-life or long-term endowment assurance, to which the income benefits may be added at any time. At age 30 next birthday, an annual premium around £22 payable during the first 20 years and then reducing to around £17 will provide, in the event of death of the assured within 20 years, a tax-free payment of £150 per annum by monthly instalments for the remainder of that period, and, in addition, a cash sum of £1,000 at the end of the income benefit period. If death occurs after 20 years from the commencement of the policy, a cash payment of £1,000 is made at death. There are various varieties of this principle.

Financial Security for Women.—An increasing number of women are effecting policies, both as provision in the event of death as well as for old age. The woman following a career can provide for retirement at 55, or, at the latest 60, by an endowment assurance, or by what is known as a double-endowment assurance, or by the purchase of a deferred annuity. The two former have the advantage of tax rebate not allowable on premiums under a deferred-annuity contract. For a young women the problem is: "If I marry, a policy on my husband's life is important. If I do not marry, a pension for myself is necessary." For this situation a number of special assurance schemes have been devised. Under one such scheme a single woman assures her own life for a sum payable, either with or without bonus additions, at 55 or 60, and has the option, should she marry, to exchange the assurance for one on the life of her husband. By another, she has the option on marriage to take a small cash payment and, subject to her husband's not having reached 45, can exchange the policy for an assurance on her husband's life. In both cases the substituted policy remains for her absolute benefit, and is

issued without medical examination of the husband or other evidence of his health.

Retirement Annuities.—A self-employed person, or an employee not in pensionable employment, may under the provisions of the 1956 Finance Act effect an "approved" deferred annuity to provide a pension commencing not later than at age 70 and not earlier than age 60, and obtain full tax relief on the annual premiums paid. The benefit, however, must be in the form of a pension and, excepting a possible return of premiums at death before retirement, no cash payment is provided. The annuity acquires no loan or surrender value, and does not of itself provide adequately for dependants. By reason of these limitations an endowment assurance as previously outlined is in many cases the more suitable choice.

Assurances for Children.—The cost of education can be met by an endowment assurance on the life of the parent or guardian. There are special assurances available with the sum assured payable at *termly* intervals over a period of years. In the event of premature death of the parent or guardian premiums cease at once, and the education fees provided for would then commence, or, alternatively, fees of the original period of the assurance. The ordinary rebate of income tax can be claimed on the premiums of these policies.

Child's Deferred Assurance.—A popular form of policy for the benefit of a child on reaching maturity is the child's deferred assurance, which becomes the property of the child on becoming 21 or 25, when a number of valuable options may be exercised. The most valuable option permits the assurance to be continued on a whole-life or endowment basis—with or without profits—at the same low premium, irrespective of the state of health of the child at that time, and without regard to occupation, travel, or foreign residence. The policy may thus be said to provide insurance against uninsurability, and this possibility is a very real one. The policy sometimes carries a special educational option at, say, 15, to meet school fees. Varying schemes of this nature are offered at comparatively small premiums, often no more than £10 per annum, or £1 per month. A small extra premium, which varies with the age of the parent, will provide that, if the parent dies, all premiums cease up to the option age. No loss can be sustained under this class of assurance, for all premiums paid are returned should the child not survive to the agreed "option age."

Life Assurance and House Purchase.—No man should buy a house on mortgage without making sure that, in the event of his death before the mortgage has been paid off, his wife and family will be free from any liability in connection therewith. The only way to safeguard one's dependants is through life assurance, and particularly by means of a life policy specially adapted to the purpose. Enquiry should be made as to the various kinds of assurance for this purpose.

Loan, Surrender, and Paid-up Values.—Both whole-life and endowment assurances acquire a surrender value after a minimum number of annual premiums (usually two or three) have been paid. Alternatively, either type of contract can be converted into a paid-up policy, *i.e.*, the payment of future premiums is dispensed with, but, of course, a reduction is made in the sum assured. The surrender value of a whole-life or endowment assurance increases as time passes, and provided that premiums are regularly paid, policies form good security for a loan either from the office itself or from a bank. This may prove very valuable in the event of temporary financial embarrassment. Policies acquiring a surrender value are in general subject to special conditions of considerable value to the policy-holder in the event of premiums not being paid when due. Under what are termed "non-forfeiture regulations" the accrued surrender value is applied automatically to keep the assurance in force. The non-forfeiture period lasts so long as there is a surrender value sufficient to cover the unpaid premiums.

Income-tax Allowance.—Under existing legislation relief of income tax may be claimed on the amount of the premiums paid for life assurance effected by a person on his own life or on the life of his wife subject to the following conditions:

1. The amount on which relief is allowed is not to exceed one-sixth of the total income.
2. No allowance will be made in respect of that portion of any annual premium which is greater than £7 for each £100 assured if the annual premiums are £25 or more.

Subject to the above conditions, an allowance of income tax is granted as under, calculated at the highest rate of tax paid, *i.e.*, 2*s.* 3*d.*, 4*s.* 9*d.*, 6*s.* 9*d.*, or 8*s.* 6*d.* in the £ (in border-line cases the allowances will be partly at one rate and partly at another):

(*a*) When premiums eligible for relief do not exceed £10 annually, tax allowance is made on the actual premiums paid.

(*b*) When premiums exceed £10 but do not exceed £25 annually, tax allowance is made on £10 only.

(*c*) When premiums exceed £25 a year, tax allowance is based on two-fifths of the premiums paid.

Fire—Burglary—Accident—Personal Liability.—The householder can incur heavy losses through fire, burglary, storm, flood, and burst pipes, or maybe Common Law liability to servants or temporary and occasional employees about the house, or, as owner or occupier, to members of the general public. The householder should therefore effect an insurance on both building and contents against these and other risks under an appropriate comprehensive policy. A comprehensive policy—whether on buildings or contents or on both—gives a wider cover and is cheaper than separate policies. A liability with the possibility of heavy loss is that of a house-owner to the public arising out of accidents resulting in bodily injury or damage to property, for which the comprehensive insurance grants indemnity up to £25,000, with costs and expenses incurred additional. The normal comprehensive rate is 2*s.* 3*d.* per cent. on the full value of the building and 5*s.* per cent. on the value of contents.

Accident and Sickness Insurance.—Accidents mean lost earnings during incapacity, and often even in these days of the Welfare State, medical and surgical expenses. Personal accident and sickness insurance is therefore of undoubted value. Various schemes are available with premiums ranging from, say, £2 a year, according to the cover granted and the occupation of the proposer. The main types of cover are:

(*a*) an accidents only policy;
(*b*) an accidents and specified diseases policy;
(*c*) an accidents and all-sickness policy;
(*d*) a permanent sickness and accident policy.

These schemes are year-to-year contracts, renewal each year being at the option of the company. A permanent non-cancellable sickness and all-accident policy is available under which the company guarantees continuous cover to a given age whatever the sickness record may be. A permanent contract of this nature is particularly suited to the professional or business man, who, whilst able to command a substantial income so long as he is physically fit, would suffer considerable loss of earning power, and perhaps complete loss of income, in the event of a prolonged breakdown in health. The non-cancellable form requires a somewhat higher premium than the year-to-year contract, and is only issued by certain specialist companies after the proposer has been proved in good health by medical examination.

Personal Liability.—In daily life individuals may incur legal liability in many circumstances. If the individual is negligent, and through his negligence some other person suffers injury or damage to property, the negligent party may be responsible and have to make redress. Instances of this nature have increased considerably in recent years. Even where negligence is not proved, the cost and worry of defending a claim is something to be avoided by the layman. The proposal form of personal liability insurance is very simple, often requiring no more than the name, address, and signature of the proposer.

Cookery

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Cookery

By Good Housekeeping Institute

I. COOKING EQUIPMENT

Soundly constructed and well-designed cooking-utensils add immeasurably to the pleasure and ease of cooking. Careful and selective buying is well worth the trouble, and should result in a well-equipped cupboard that does not require constant replacements. The following points are among those to be observed :

1. Good cooking-utensils should be easy to clean. Look for a smooth interior, but avoid one that is too highly polished, as foods tend to stick and burn on an excessively high finish. Lids should fit well and be free from crevices.
2. Examine the handles to see that they are firmly fixed and sufficiently insulated to stay cool when in use.
3. Sharp angles where the base and sides meet are to be avoided, as they make cleaning difficult.
4. For cooking on solid electric or other flat hot plates utensils must have a reasonably heavy machined base to ensure quick transfer of heat and eliminate waste. For non-solid plates thinner gauge pans are suitable, though too lightly made ones should be avoided, as they soon tend to lose their shape.
5. Avoid buying unnecessary gadgets without being certain of their ultimate usefulness. They should be easy to store and clean, and should be simple and effective to use.

SPECIALISED COOKING-UTENSILS

Pressure Cookers.—These are becoming increasingly popular, largely because of the time and fuel they save. Pressure cookers are specially constructed pans, usually of aluminium, with a special fitting lid, a pressure weight, or spring-loaded valve, and some type of safety device. The modern pan type is reasonably light and simple to handle. Manufacturers' instructions for cooking must be followed closely, and when buying a cooker the choice should lie between those of reliable manufacture which have passed standard tests. The size should be chosen according to the number in family, and the cooker must have a base suitable for the type of hot-plate or burner on which it will be used.

Steamers.—For large households the tiered steamer is a most useful item of kitchen equipment. As a rule there are three separate pans which fit on top of each other over a base pan. One or more tiers can be used at a time, and the steam to each compartment can be separately controlled. Aluminium is the most suitable metal for this type of pan, and the handles and knobs should, of course, be insulated.

A simpler steamer, for small households, is a pan with a perforated base designed to fit over another saucepan. These are usually aluminium or enamel, and should have a well-fitting lid.

Preserving-pan.—Fairly heavy gauge aluminium is a good choice for a preserving-pan. It should have a fairly wide top to allow for the necessary evaporation during jam-making. The handles must be sturdy. Tinned copper pans are also satisfactory. Unlined brass and copper pans are suitable for jam-making only, and must be avoided for pickles and chutney, as vinegar reacts with them to form traces of a poisonous salt.

Electric Mixers.—A good electric mixer can save considerable time and energy, especially in large households. A reliable machine that is easy to operate and simple to adjust is essential.

Most electric mixers are primarily designed for making cakes and puddings, and for all whisking processes. Some have attachments for mincing, coffee-grinding, grating, blending, liquidising, juice extracting, dough-making, potato peeling, etc. Success in using a mixer depends largely on the careful following of directions. Best use can be obtained from a mixer if it has a permanent position in the kitchen where it can always be ready for use.

Knives.—It is really essential to have a good set of cooking-knives—

Vegetable Knife.—A small pointed knife with a blade 3 to 4 inches long. Some types have a serrated edge, and these are useful for slicing purposes.

Cook's or French Knife.—This knife is used for cutting up and chopping food, and has either a long or medium blade tapering to a sharp point.

Round-ended Knife.—A general-purpose tool.

Carving-Knife.—There are various different shapes and sizes of carving-knives. For ordinary joints a knife with a long and fairly broad blade, slightly curved and sharply pointed, is satisfactory. For game and poultry, a pointed knife with a shorter blade is necessary. For ham, tongue, etc., a long, thin, even-bladed knife without a pointed end is usually preferred.

CARE OF COOKING UTENSILS

Aluminium Saucepans.—Wash in hot water using a stiff brush. Avoid using scratchy abrasives and soda, even if the pan is discoloured This typical discoloration is quite harmless, and is due to traces of iron in the water or commercial metal. It can be removed, if desired, by boiling water with a weak acid, such as vinegar or fruit parings, in the saucepan. The outside of aluminium pans can be polished with fine dry steel wool.

Baking-tins.—Wash in hot soapy water, rinse and dry in a warm oven, or on the rack of a closed stove. Discoloured greasy tins should be stewed for an hour in water to which soda has been added in the proportion of 1 oz. to 1 gallon.

Casseroles.—Steep earthenware casseroles in cold water and then wash in hot soapy water, using a stiff brush.

Enamel Ware.—Soak immediately in cold water, and clean in hot soapy water. Salt can be used to remove any stains, but scratchy abrasives must be avoided, as they damage the surface.

Frying and Omelet Pans.—Pour off any grease and wipe the pan with a pad of absorbent paper. Wash only occasionally. New pans which are inclined to stick should be heated with a little fat. Remove from the heat and add a handful of salt. Wipe round vigorously with an old cloth or paper. Do not repeat this treatment too often, or the surface of the pan will be damaged.

Glass Ovenware.—Soak in cold water. Wash in hot water and soapless detergent, using a pad of fine steel wool or a cloth dipped in borax to remove any obstinate stains. Rinse well.

Kettles.—In hard-water districts kettles need to be defurred occasionally. Pour in a little vinegar, heat slightly, and leave to stand for an hour or two, when it will be easy to remove the fur. Rinse very thoroughly before using again.

Mincer.—Take to pieces and remove all scraps of food, using a skewer if necessary. Wash in hot, soapy water, rinse and leave in a warm place to dry thoroughly. Reassemble before putting away.

EQUIPMENT REQUIREMENTS

The following is a comprehensive list of cooking-utensils sufficient for two people setting up house. Those considered essential are marked with an asterisk.

Saucepans and Kettles, etc.

*6 saucepans (assorted sizes : 2 large, 2 medium, and 2 small)
Double boiler
3-tiered steamer
*1 shallow frying-pan
Deep-fat pan and basket
*2 kettles (1 large, 1 small)
Pressure saucepan or cooker (optional)

Baking-tins, etc.

- *12 patty pans (or 2 sets bun tins)
- 2 sandwich tins
- 2 pie plates
- *Baking-sheets
- Swiss-roll tin
- Flan ring
- *Set of pastry cutters
- *3–4 cake tins (assorted sizes)
- 2 wire cake-trays
- *Meat tin
- *Trivet for meat

Utensils for Food Preparation

- *Colander
- *Whisk
- Grater and shredder
- Potato masher
- *Pointed strainer
- Lemon squeezer
- Funnel
- *Pastry Board
- *Rolling-pin
- *Flour dredger
- *Pastry brush
- Salad shaker
- *Fish slice
- *Graduated measure
- *¼-, ½-, and 1-pint measures or one graduated measure
- Standard measuring-cups and spoons
- *Mincer
- Hair sieve
- Wire sieve
- *Chopping-board
- Vegetable and icing forcing pipes

Cutlery and Small Tools

- *Set of kitchen knives (round-edged, cook's, vegetable, palette, and saw-edged)
- *3 or 4 forks (large, small, and two-pronged)
- *2 or 3 wooden spoons (assorted sizes)
- *Kitchen spoons (cook's, perforated, scoop)
- *Potato-peeler
- Apple-corer
- Bottle-opener
- Tin-opener
- *Kitchen scissors
- *Knife-sharpener

China, Heatproof Ware or Enamel

- *Mixing bowl
- *4 pudding basins (assorted sizes)
- *2 or 3 pie dishes (assorted sizes)
- *2 or 3 casseroles (1 will suffice at first)
- *3 or 4 plates
- *3 or 4 jugs
- 1 soufflé case
- *2 jelly moulds (1 will suffice at first)

Other Equipment

- *Kitchen scales
- *Store jars and containers
- *Bread bin
- Sugar thermometer
- *Flour bin
- *Cake and biscuit tins
- Preserving-pan
- Small refuse bin

II. BASIC COOKERY METHODS

BAKING

This is a method of cooking foods by dry heat in the oven. It is a suitable way of cooking many foods, and nutritive loss other than that of Vitamin C is low. Times and temperatures, of course, require to be regulated according to the type of food.

Vegetables

Not all vegetables bake satisfactorily, as a moist heat is often required to soften the cellulose. The following, however, bake well, although (with the exception of potatoes) it is necessary to add a little fat, milk, or water to provide some moisture—potatoes, carrots, parsnips, turnips, Jerusalem artichokes, onions, and marrow. Beetroot bake extremely well when placed in a greased casserole and cooked until tender at about 300° F. Peel and serve hot or cold, either sliced or diced.

Times for Baking Vegetables.—*Potatoes.*—¾–1½ hours, according to size.

Artichokes and Parsnips.—1 hour.

Onions.—¾–1 hour.

Beetroots.—1–2 hours.

Macedoine in Stock.—¾-1 hour.

Fruit

Most fruits can be baked very successfully, with the addition of a little water to prevent shrivelling. Cook slowly in a covered dish, and at the start of cooking add sugar to taste.

Meat

Meat baked in the oven is usually referred to as roasted (S6 (2)).

Fish

This is a very suitable way of cooking fish. The fish should be weighed and wiped, and then placed in a greased fireproof dish. Sprinkle with salt, pepper, a little lemon juice, and then add a little milk or water. Dab with shavings of butter or margarine and cover with greaseproof paper.

The temperature required for baking fish is about 400° F. Allow 6–10 minutes to the pound and 6–10 minutes over, according to the thickness. Thin fillets take about 15 minutes. When the fish is cooked the flesh will appear white and firm, and will come away easily from the bone. A curd forms between the bone and the flesh.

Whole fish or round cutlets such as hake or cod can be stuffed before baking. The stuffing is placed in a cavity where the entrails have been removed. In the case of whole fish, the scales and eyes should be removed, but the head left. For plaice, sole, etc., using a sharp knife cut the flesh right down the back bone and loosen it away from the bone as far as the fin. Place the stuffing in the cavity.

A suitable stuffing is forcemeat (S23 (1)). Garnish with tomato, lemon slices, fennel, olives, or grapes, serve with parsley, fennel, egg, or anchovy sauce.

Cakes and Pastry

These are practically always cooked by baking. Times vary according to type and size of cake or pastry involved. It is important not to disturb cakes or pastry by opening the oven door too often while cooking. The following table will serve as a general baking guide :

Cakes, etc.	Temperature.	Time.
Plain Cakes :		
Small (*e.g.*, Rock Cakes) .	Hot (450–475° F.)	10–15 minutes
Large	Moderately hot (400° F.) lowering to Moderate (350° F.)	Approx. 1 hour per 1 lb. of mixture (varying with depth of tin)
Rich Cakes :		
Small (*e.g.*, Queen Cakes).	Moderately hot (400° F.)	15–20 minutes
Sandwich Cake . . .	Moderately hot (375° F.)	30–40 minutes (depending on depth)
Large (*e.g.*, Madeira) . .	Moderate (350–375° F.)	Approx. 1 hour per 1 lb. (varying with depth of tin)
Large (*e.g.*, Fruit) . . .	Moderate (325–350° F.)	1–1½ hours per 1 lb. of mixture (according to amount of fruit)
Scones	Very hot (475° F.)	8–10 minutes
Biscuits	Moderately hot (400° F.)	15–20 minutes

TEMPERATURES AND TIMES FOR BAKING PASTRY

Type of pastry and dish.	Temperature.	Time.
Shortcrust:		
Fruit pies	425–475° F.	35–40 minutes
Jam tarts	450–500° F.	10–15 minutes
Cornish pasties (with cooked meat)	450–500° F.	30–40 minutes
Flaky Pastry:		
Meat pies (with cooked filling)	425–475° F.	30–40 minutes
Patties	475–500° F.	10–20 minutes
Puff and Rough Puff:		
Flan cases	475–500° F.	10–20 minutes
Choux Pastry:		
Eclairs	450–475° F.	30–40 minutes
Potato Pastry:		
Vegetable pies	450–500° F.	30–40 minutes
Hot-water Crust:		
Pork pies	350–400° F.	1 hour
Suet Pastry:		
Jam roll	350–400° F.	1–1½ hours

For recipes and methods of making each see S23–26.

BOILING

The essence of boiling is the immersion of food in boiling water, and it is the simplest process in all cookery. In actual fact many so-called boiled foods are cooked at slightly below boiling point (212° F.) and are, therefore, strictly speaking stewed or simmered.

Boiled Meat and Poultry

Weigh the joint, wash or wipe it, and then tie or truss it according to type. Plunge into boiling salted water, having just sufficient water to cover the joint. Boil rapidly for about 5 minutes, and then reduce the heat and maintain the water at simmering point until the meat is cooked.

The preliminary fast boiling coagulates and sets the proteins so that a casing is formed, and the flavour and some of the juices are retained in the joint. Fast boiling must not be prolonged over the five minutes, or shrinkage and toughness will result. Simmering temperature is indicated by gentle bubbles rising up the side of the pan.

Vegetables and herbs can be added to the water for flavour. Salt meat should be soaked for several hours before cooking. Place it in cold water and bring slowly to the boil, skim and simmer the required time. Ham and bacon which is to be served cold should be cooled in the liquor.

Joints of Meat Suitable for Boiling.—*Beef.*—Brisket (fresh or salted), silverside (salted), flank, ox tongue.

Pork.—Leg, loin, best end of neck, belly (salted), hand and spring, head (fresh or salted), tongue and brains.

Lamb or Mutton.—Leg, breast, tongue, brains.

Veal, Calves' feet.

Ham and Bacon.

Fowls.

Times for Cooking.—For fresh meats allow 20 minutes to the lb. and 20 minutes over; for salt meats allow 25 minutes to the lb. and 25 minutes over.

A young fowl should be boiled for ¾ hour, and an old one for 2–3 hours.

Cooking Times for Tongues.—Sheep's tongues, 1½–2 hours; calves' tongues, 1½–2 hours; ox tongue, 4½–6 hours; ox tongue (pickled), 2½–3 hours.

Boiled Fish

This method is suitable for large whole fish, or thick cuts of white fish or salmon. Small fish are better steamed.

To prepare a whole fish, wash quickly in cold water, remove the guts, scales, fins, and eyes, and rub off any black skin from the inside of the fish, using a little salt. Thick cuts of fish only need wiping or scaling. Have sufficient water in the pan to cover the fish, and add a teaspoonful of salt to each quart of water, or for white fish a teaspoonful of vinegar. Draw the pan off the heat, place the fish in the water, and cook very gently for the required time. As fish is very tender and breaks easily, it is best to cook it at just under simmering point.

Times for Cooking.—For a large fish allow 10 minutes to the pound and 10 minutes over. Cook small fish until the flesh is firm and will leave the bone quite clean (10–15 minutes).

Vegetables

Boiling is a very satisfactory way of cooking vegetables, as it softens the cellulose, but in order to retain the maximum amount of nutriment the "conservative" method should be followed. Allow sufficient water to just cover the vegetables —for green vegetables approximately ½ pint water to 1 lb. greens. Add salt in the proportion of 1 teaspoonful to 1 pint water. Bring the water to the boil, and retaining boiling point throughout, add the vegetables a handful at a time. The outside leaves of green vegetables should be added first, followed by the medium green ones, and lastly the heart. Place a well-fitting lid on the pan to prevent steam escaping, and shake two or three times during cooking.

Times for Cooking.—*Green Vegetables.*—Shredded, 7–10 minutes; brussels sprouts, 10–15 minutes; spinach, 15–20 minutes; peas, 10–15 minutes; beans, 20–30 minutes; beans (runner), 15–20 minutes.

Root Vegetables.—Diced, 20–25 minutes; sliced, 30–35 minutes; quartered, 30 minutes or more, according to age.

Puddings

With the exception of suet puddings, it is more satisfactory to steam, rather than boil, puddings. Boiled puddings tend to become waterlogged. A suet pudding should be wrapped in a scalded cloth which has been well floured on the inside. Place the pudding in rapidly boiling water, and keep boiling gently for the required time.

Time to Allow.—A meat or fruit pudding for 4 people, *i.e.*, ½ lb. flour, will take about 2 hours.

Cereals and Pulses

Oatmeal, rice and macaroni, pulses such as peas, beans, and lentils all boil well.

Oatmeal Porridge.—Bring 1 pint water to boiling point, and sprinkle in 2 tablespoonfuls medium oatmeal, stirring well. Continue to stir until boiling point is again reached, and boil for a few minutes, then allow to simmer, in a double saucepan if possible, for ½–2 hours, according to the size of the grains, until the oatmeal is well swollen and tender. More boiling water may be added if necessary, to make the porridge of a good pouring consistency. Salt to taste.

Commercially prepared oats or rolled oats can be cooked very quickly, according to the directions on the packet.

Rice (To Serve as a Vegetable or Garnish).—Allow about 2 oz. rice for each person. Wash thoroughly and put into a pan with plenty of boiling salted water. Boil rapidly without a lid for 15–20 minutes, until the grains are tender but not crushed. During boiling the grains of rice should dance about in the water. Drain the rice through a sieve, saving the water for soups, then hold under the running cold tap to rinse the rice thoroughly. Spread the rice on a cloth, turn the edges over and keep in a warm place to heat through and dry off. At intervals fork the rice, so that every grain is dry and separate.

Macaroni.—Allow a quart of salted water to 4 oz. macaroni. Place the macaroni in fast-boiling water and boil rapidly, stirring occasionally to prevent sticking, for 20–30 minutes. Some proprietary brands cook quicker—see directions on packet.

Pulses (Dried Peas, Beans, and Lentils).—Soak for 12–24 hours in warm water, with a good pinch of bicarbonate of soda. Place the pulses in a pan of fresh salted water, and simmer for 2–3 hours, or until tender; lentils take only ½–1 hour.

GRILLING

Grilling is one of the simplest and quickest methods of cooking. The grill should be well heated before use. The heat can be adjusted during the cooking by raising or lowering the grill pan. This can be done either by an adjustment in the pan itself or in the fitting in which it slides. Failing either of these facilities, raise it by placing a suitable tin under the pan.

Re-heating Foods under the Grill.—When serving vegetables *au gratin* or similar dishes, heat the vegetables in the sauce in a pan, and then empty into a hot fireproof dish, choosing a shallow one if possible. Sprinkle the top with grated cheese, breadcrumbs, etc., and immediately place under the grill, keeping the surface of the food directly under the heat until evenly brown. The dish should be fairly close to the heat, and it may be necessary to raise your grill pan by putting a tin or plate under it.

Choice of Meat.—Only tender and juicy cuts of meat are suitable for grilling, and the piece of meat you choose must be well hung, otherwise it will be tough and stringy when cooked. Fresh, underhung meat will never grill satisfactorily. Rump and fillet steak, chump chops, cutlets, tender liver, and kidneys, all make delicious grills.

Preparation and Cooking.—Wipe the meat with a damp cloth, cut steak into portions if necessary, leaving where possible a rim of fat; remove the spinal cord from chops; wash and wipe liver and kidneys, cutting them in half and removing the core. Brush all meat with oil or melted fat before placing on hot grid.

The heat should be intense to begin with, so have the grill red-hot. Place the meat on the greased grid and heat quickly, so that the surface juices coagulate and form a skin, keeping in the flavour and goodness. Allow about two minutes for the "sealing," until the meat has changed colour. As soon as one side of the meat has been sealed, turn and treat the other side in the same way. Do not wait too long, or the surface will become hard and overcooked. Thick chops or steaks require 10–15 minutes, and during this time they should be turned four or five times. Turn the meat with two spoons, taking care not to pierce the flesh, or the juice will run out.

Choice of Fish.—Herrings, mullet, mackerel, cod and salmon cutlets, plaice and soles, are all suitable for grilling.

Preparation.—Wash whole fish, remove scales, score with a sharp knife in three or four places, and brush with melted fat. Place on the hot greased grid and cook rather slowly, so that the fish is thoroughly cooked without any fear of burning. Turn once or twice, but handle the fish very carefully, as the flesh breaks easily. Insert the back of the knife next to the bone to see when the fish is cooked. Serve with lemon-juice and chopped parsley sprinkled over the fish.

Cutlets of Fish.—Tie the cutlets, to keep them a good shape; brush with fat, place on the greased grid and grill on both sides until the fish is cooked —about 10 minutes. Salmon cutlets are grilled in the same way.

Grilled Bacon or Ham.—Place the rashers or ham on the grid, place under the grill and cook for two or three minutes, or longer if the rashers are thick. As soon as the fat is transparent on one side, turn and cook on the other side. If eggs are cooked in the grill pan, the grid should be removed and the egg broken carefully into the fat and cooked until set.

Sausages.—Prick sausages, arrange on the grid, and place under the grill. Cook rather slowly until well browned all over, turning them frequently.

Times for Grilling Meat.—The following table gives approximate times which vary according to thickness of the meat:—

Steak: under-done	10–15 minutes
well done	15–20 minutes
Lamb or mutton chops	10–20 minutes
Pork chops	25 minutes
Veal cutlets	15–20 minutes
Liver	5–10 minutes
Kidneys	10 minutes
Bacon rashers	2–3 minutes
Ham	10–15 minutes
Sausages	10–15 minutes

FRYING

There are two main methods of frying, shallow frying and deep frying.

Shallow Frying

This is suitable for foods like chops, sausages, bacon, fish, pancakes, eggs, cooked potatoes or vegetables, which only require sufficient fat to prevent them from sticking to the frying-pan, or made-up dishes, such as fish cakes or rissoles, which need sufficient fat to half-cover the food.

Heat the fat until just smoking hot in the pan before putting the food in. Cook the food quickly on both sides until the surface is lightly browned. Reduce the heat and finish cooking gently. When cooked lift from the pan, allow fat to drain off, and then place on a crumpled piece of kitchen paper to finish draining; arrange on a hot dish, and serve at once. Any remaining fat should be strained into a bowl for further use. Fat used for frying fish should be kept separately. It is important to avoid over-heating of the pan and fat when shallow frying, or particles of food may become burnt and spoil the flavour of the dish.

Special Directions

Bacon.—Cut the rinds off the bacon, then put these and the rashers in a cold frying-pan, place over a gentle heat and cook until the bacon fat is transparent and the rashers just begin to curl. Remove from the pan, then, if convenient, use the fat for frying potato cakes, cooked sliced potatoes, or an egg. When frying an egg remember to baste it with the hot bacon fat in order to cook the top surface properly.

Sausages.—Heat about a tablespoonful of fat in the pan. Prick the sausages with a fork and put them in the hot fat and fry over very gentle heat, turning them until they are lightly browned on all sides. The secret of cooking sausages is to cook them very slowly—but they must be thoroughly done and nicely browned.

Fish.—*Fillets.*—Wipe and dip in seasoned flour. Have a small quantity of fat smoking hot in the pan and place the fillets in this. Fry until lightly browned, then turn and fry on the other side. Cook gently until the flesh is white and firm. As fish breaks easily, it must be handled carefully.

Herrings.—Very little fat is required for frying herrings, as they are a naturally oily fish; in fact, it is quite possible to fry herrings without any fat in a really strong iron frying-pan. Scale, clean, wash, and dry the herrings. Sprinkle the pan with salt and heat gently at first, shaking occasionally. Continue heating until the pan is almost red hot, then lay in the herrings. Fry on each side until golden-brown and crisp—3 to 4 minutes each side. Serve piping hot.

Chops and Steaks.—Wipe the meat and place in a little hot fat in the pan. Fry quickly on both sides until lightly browned, then reduce the heat and cook very gently until the meat is tender. (Test with a thin skewer if necessary.) Remember when once the outside surfaces are brown the heat must be reduced, otherwise the meat will be dry on the outside and unpleasantly raw inside. The time for cooking chops and steaks depends on the thickness and texture of the meat, but a thin chop or steak will take about 10–12 minutes.

Liver.—Slice the liver across the grain in pieces ¼ in. thick, toss in seasoned flour, and fry as for chops and steaks.

Deep Frying

This is suitable for made-up dishes such as croquettes, rissoles, fritters, fish coated with batter or egg and bread-crumbs, whitebait, doughnuts, etc. For this method a deep-fat frying-pan is used with a fitted wire basket, and there must be sufficient fat to allow the food to be completely submerged, *i.e.*, about three-quarters filled. Suitable fats are olive oil, lard,

block suet, or clarified dripping. All food cooked in deep fat, with the exception of potatoes and pastry, must be coated with egg and bread-crumbs or batter; flour is not a suitable coating for deep-fat frying. Heat the fat until a faint blue smoke rises from it. Any excess bubbling or spitting is due to moisture in the fat, and the pan must be heated very gently until this ceases. The prepared food should be placed in the basket, and the pan of fat drawn to the side of the heat. Lower the basket into the fat and replace over the flame or hot-plate. If the food is added while the fat is over the heat it may bubble over and catch on fire. Cook the food until it is golden-brown, lift the basket and drain off surplus fat. Turn the food on to crumpled kitchen paper to finish draining, and finally arrange in a dish and serve very hot. When large quantities of food are to be cooked, fry a little at a time to avoid lowering the temperature of the fat.

Should the fat accidentally catch on fire, turn off the current or burner immediately, and place a lid quickly over the pan of fat.

The used fat can be strained into a container for further use.

The temperature for deep-fat frying is very important. If it is not hot enough the food becomes sodden with grease, and if too hot the outside will be burnt. Average temperatures vary between 395° and 350° F., according to different foods.

If a thermometer is not available the temperature may be tested as follows: put one or two 1-in. cubes of bread into the hot fat; if they take 60 seconds to brown, the fat is about 350–365° F.; if they take 40 seconds, it is about 365–382° F.; if they take only 20 seconds, the fat is about 382–390° F.

Special Directions

Egging and Crumbing.—This is suitable for fillets of fish, cutlets, rissoles, fish cakes, and croquettes. First coat the food lightly with seasoned flour. Have some beaten egg on a plate, and taking one piece of food at a time, brush it all over with the beaten egg, using a pastry brush. Have ready some fine bread-crumbs on a piece of kitchen paper. Lift the coated food on to the crumbs, carefully draining off any excess egg. Holding the sides of the paper, toss the crumbs so that they cover the food. Pass from one hand to the other to remove any loose crumbs, then place in the frying-basket.

Coating Batter.—Batter is a suitable coating for fritters (fruit or vegetable), fillets of fish, kromeskis, etc. Any good batter recipe can be used—it should be mixed to the consistency of thick cream. Place the food to be cooked, a piece at a time, in the batter, allow any excess batter to drip off, and place immediately in the smoking fat. When golden brown and cooked through, drain carefully and dish.

Chipped Potatoes.—Special care must be taken when frying potatoes in deep fat. They must be thoroughly dried, otherwise when they are placed in the fat will splutter and an accident may be caused.

First peel the potatoes and cut them into chips, straws, or scallops. If they have to be prepared in advance leave in cold water. Just before frying drain off the water, spread them out on a clean dry cloth, rub them carefully with the cloth so that all surfaces are dry, then place in the frying-basket. When lowering the basket into the fat take great care that the fat does not froth over.

Chipped potatoes take about 20 minutes to cook. To ensure they are not sodden cook them until tender, but not crisp, then lift out the basket and reheat the fat. When at smoking point, replace the basket in the fat and cook until brown and crisp. Drain carefully, and sprinkle with salt before serving.

To Render Down Fat

Any pieces of meat fat can be used to prepare frying-fat. Cut the fat into pieces about ½ in. square, removing any scraps of meat or gristle, put into a pan, cover with water, and allow to boil slowly for several hours until the water is driven off and the pieces of fat are fried and shrivelled. Strain off the fat.

Another method is to place the cut-up fat in a tin and cook it in a slow oven to extract the fat. This method is easier but is more wasteful of fat, as much of it is left in the particles of skin when drained.

ROASTING

This is one of the most popular ways of cooking meat, poultry, and game. There are two different methods of roasting; one for good-quality and tender joints, the other for poorer-quality meats. In either case the preparation of the meat is the same.

Wipe and weigh the meat, tie in shape if necessary, and stand on a trivet in a shallow roasting-tin. Always place the meat fat side up to allow it to melt, and baste the meat as it does so. A tablespoonful or so of fat should be placed on the meat, and a piece of fat bacon on lean meats, such as game or veal. Basting is not necessary. Small joints such as breast or loin of lamb or veal can be boned and stuffed. Prepared vegetables should be placed round the joint. When the joint is cooked, it should be taken out of the oven and the gravy made in the tin. Remove the meat and vegetables from the fat, and place on a dish to keep warm. Pour off the dripping, leaving the sediment in the bottom. Add to it sufficient flour to soak up the fat—about 2 teaspoonfuls to every 1 pint of gravy needed—mix with the sediment and then place over the heat and stir until the flour is a golden brown. Pour on liquid, which should be stock or vegetable water. Bring to the boil and season. It may be necessary to add a few drops of gravy browning. Gravy should be of a thin pouring consistency, and free from grease.

If a covered roasting-tin is used the top should be removed 30 minutes before the meat is done, in order to brown the outside.

Times and Temperatures for Roasting Meat

Method 1.—Place the joint in an oven heated to 425° F. Reduce the temperature to 400° F., and allow the following times for cooking: beef, 15 minutes to the lb. and 15 minutes over; beef, thick cut or rolled, 30 minutes to the lb.; mutton, 25–30 minutes to the lb.; mutton, stuffed, 30–35 minutes to the lb.; veal and pork, 30–40 minutes to the lb.

Method 2.—Put joint into a cold oven, raise the temperature to 300–350° F. and allow: beef, 25–35 minutes to the lb.; beef, thick cut or rolled, 30–40 minutes to the lb.; mutton, 30–40 minutes to the lb.; mutton, stuffed, 35–45 minutes to the lb.; veal and pork, 40–50 minutes to the lb.

Bird	*Time*
Chicken	1 hour
Duck	1–1½ hours
Goose	1½ hours or longer
Guinea Fowl	30–45 minutes
Pigeon	20–30 minutes
Turkey	15 minutes per lb. (weight after dressing) for birds up to 14 lb.; 10 minutes per lb. for larger birds
Pheasant	30–60 minutes according to size
Grouse	½–¾ hour
Partridge	25 minutes

POT ROASTING

This is a particularly suitable method for tough joints, and is also an alternative to roasting when no oven is available.

Rub the meat over with seasoned flour. Melt some dripping, allowing about 1 tablespoonful to each lb. of meat, in a saucepan with a well fitting lid. Brown the meat on all sides, and add about a ¼ pint of water. Slip a trivet under the meat, cover tightly, and leave to cook gently until tender, turning the joint from time to time. The average joint takes 1½–2 hours. Vegetables such as diced carrot, turnip, or onion can be added to the pot an hour before serving. Herbs can be used for flavouring.

STEAMING

One of the most economical methods of cooking food, and one which has the advantage of retaining mineral salts which otherwise may be dissolved out when food is boiled in water. The chief points to remember are that the steamer must never be allowed to boil dry and the water must not be allowed to go off the boil.

Methods of Steaming

1. *In a Steamer with Perforated Base Placed over an Ordinary Saucepan.* The steamer must fit the saucepan well. Soups or a vegetable can be cooked in the bottom of the steamer, a pudding with some vegetables round it can go in the top, and if required fish can be steamed on a plate on top of the steamer.

2. *In a Tiered Steamer.* This is an extremely useful utensil, but care must be taken to see that the steam enters all compartments, and the regulator knobs should be checked each time it is used. Different dishes can be cooked in each tier without any fear of flavours becoming mixed.

3. *In Jam-jars, Basins, or Moulds in a Pan of Boiling Water.* The water should reach half-way up the jar or basin. For a delicate dish, such as a soufflé, the mould or tin should be placed on an upturned saucer, pastry cutter, or tin. The water in the pan may be replaced by soup, or vegetables can be cooked in the water and different foods in each jam-jar.

4. *In a Compartment Steamer–Saucepan.* These pans are sold with several compartments fitted into the saucepan, and are useful for small families. The method is the same as when using pudding-basins.

5. *In a Double Saucepan.* This is a suitable way of cooking sauces, stews, porridge, etc. They take longer, but there is no fear of their boiling or burning, and sauces do not need constant stirring.

Meat.—Any joint of meat can be steamed. Allow twice as long as for boiling. Soak salted meat for 3 hours beforehand.

Poultry.—The time depends very much on the size and age of the bird. A good way of cooking an old fowl is to steam it until it is tender, then to brown it in a hot oven (450° F.) for ½–¾ hour.

Fish.—Prepare the fish as for boiling. Place large cuts or whole fish directly in the steamer. Small fillets or thin cutlets will cook satisfactorily if laid on a greased plate with a tablespoonful of milk and seasoning. Cover with a lid, then lay the plate on top of the steamer or pan.

Time for Steaming

Fish.—For a large fish allow 15 minutes to each lb. and 15 minutes over. Cook fillets until the flesh is firm—about 20 minutes.

Vegetables.—Steaming is only suitable for root vegetables, as in green vegetables the loss of vitamins and mineral salts is too high, and flavour and colour are likely to be impaired. Potatoes can be scrubbed and steamed in their jackets. Other root vegetables should be peeled. Sprinkle the prepared vegetables liberally with salt. Allow half as much time again as for boiling.

Puddings.—To keep out the moisture caused by condensation, the pudding should be covered with greased paper or a cloth dipped in hot water and floured. A basin-cover or string should be tied round the basin, so that it may be easily lifted out of the steamer.

Suet puddings need 3 hours or longer. Sponge puddings in small dariole moulds cook in 20 minutes; larger puddings take ¾–2 hours, according to the size. Allow plenty of room in the basin for the pudding to rise.

Custards.—The water should be only just boiling for these, as they curdle if the temperature becomes too high. Remove as soon as they are set (about ½ hour.)

STEWING

A long, slow method of cooking in a liquid kept just below simmering point. A good strong pan with tightly fitting lid should be used, or alternatively a casserole, steamer, or double boiler. Stewing can be done either in the oven or over a low heat. It is important not to raise the temperature above boiling point, or the food becomes tough or broken up.

Stewed Fruit

Preparation.—Peel, core, or stone and, if necessary, cut up into neat pieces.

Cooking.—To keep individual pieces of fruit whole and of good shape (*e.g.*, to serve as stewed fruit, for fruit in jelly, fruit trifle, and so on) stew them gently in a syrup made from sugar and water. The proportions will vary with the juiciness and sweetness of the fruit, but ¼–½ pint water and 2–4 oz. sugar to 1 lb. fruit is the average. Lift out the fruit, simmer the juice until it is slightly syrupy, and pour over the fruit.

If the fruit is required stewed to a mash to make into a purée (for fruit fools, creams, and so on), it is better to cook it without sugar and in the minimum of water until tender, and then to sweeten it, since the addition of sugar to the raw fruit toughens the skin and may prevent it mashing properly.

Some fruits are improved by the addition of other flavouring. Apples may be flavoured with lemon juice, grated lemon rind, cloves, cinnamon stick, or marmalade (remove cloves or cinnamon before serving), pears with cloves or cinnamon stick. Plums may be flavoured with their kernels or a few sweet almonds, rhubarb with root ginger, cinnamon stick or strip of lemon rind; remove before serving.

Stewed Dried Fruit

Wash ½ lb. fruit, such as prunes, very thoroughly, add ½ pint water, and allow to soak for at least 12 hours. Put the fruit in a saucepan with the water and 1–4 tablespoonfuls sugar, according to fruit, and bring to the boil, simmer gently until tender. Remove the fruit, boil the juice for a few minutes, until syrupy, then pour it over the fruit. Alternatively, the fruit may be steamed until tender—it will take at least half as long again as stewed fruit.

Meat Stews

Brown.—For this type the meat, vegetables, and flour are fried before stewing. Stewing steak is commonly used for brown stews, but other meats such as oxtail, kidney, and liver may be used.

White.—Mutton, veal, or rabbit is generally used for white stews, and the meat and vegetables are not fried first. Irish stew is an example of a thin white stew, while a fricassee is a thickened white stew.

The cheaper and coarser the meat, the longer it takes to cook. Most types of stew require at least 2 hours, and some varieties, such as oxtail and brisket, may take 3 or even 4 hours. Herbs, spices, and vegetables should be added in moderation to give flavour and interest to the stew.

For recipes see following chapter.

PRESSURE COOKERY

By cooking foods in specially designed pressure cookers it is possible to cook at temperatures above the normal boiling point of 212° F. This is a particularly valuable method of cooking foods which normally require long, slow cooking, such as stews, soups, root vegetables, tough joints of meat, etc. Considerable time and fuel can be saved.

There are many varieties of pressure cooker now on the market, in each case the manufacturers' instructions should be carefully followed, and the directions for sealing the cooker and controlling the pressure thoroughly understood.

With most cookers the prepared food is placed in the pan with the required quantity of liquid. The lid is fixed into position and the pan is placed over a high heat, and the contents brought to pressure point. The heat is then reduced, and the cooking time is calculated from that point.

The following points should be remembered:

1. The cooker should never be filled too full—not more than two-thirds full for solid foods and half-full for liquids, cereals, and preserves.

2. The times given in the charts should be followed, but there will probably be slight variations due to the thickness and quality of the food, especially meat and poultry, etc.

3. Always allow pressure to drop to normal before attempting to open the pan; either reduce pressure immediately by running cold water over the side, or in the case of milk puddings, cereals, dried vegetables, and stewed fruit, allow the cooker to cool slowly for 5–10 minutes at room temperature.

4. After use the cooker should be carefully washed. Store with the lid off so that the air can circulate.

Times for pressure cooking cannot be guessed. The following tables will serve as a guide, though fuller instructions should be followed from the manufacturers' or other special recipe book.

Pressure-cooking Time-table for Meat or Bird

Meat or bird.	Water.	Cooking time (at 15 lb. pressure).
Beef—Boil	1 pt.	9–10 minutes per lb. plus 10 minutes
Roast—pre-fry	¼–½ pt.	" " " "
Mutton, Lamb, and Veal—Boil	1 pt.	10–12 minutes per lb. plus 10–12 minutes
Roast—pre-fry	¼–½ pt.	" " " "
Pork—Boil	1 pt.	12 minutes per lb. plus 12 minutes
Roast—pre-fry	¼–½ pt.	" " " "
Chops (Veal, Pork, Mutton, and Lamb)—pre-fry	¼–½ pt.	5–6 minutes according to thickness
Young Chicken, Duck, Guinea Fowl, Pheasant, and Grouse	"	6–8 minutes
Partridge and small birds such as Snipe and Woodcock	"	15 minutes in all
Old Fowl (approx. 3 lb.)	1 pt.	30–35 minutes, according to age

Pressure-cooking Time-table for Steamed Fish

Fish.	Water.	Cooking time (after 15 lb. pressure is reached).
Bream, Halibut, Fresh Haddock, Hake, Skate, Turbot	¼–½ pt. water or to level of rack, but extra water when fish is in greaseproof paper	3–4 minutes for cutlets; 4–5 minutes per lb. for whole fish
Cod	" " "	3–4 minutes for cod steaks; 4 minutes per lb. for whole fish
Haddock (dried)	½ pt. milk and water	3–5 minutes, according to size
Herrings, Trout, Mackerel	¼ pt. water	Melt a small knob of fat at bottom of cooker, dip fish in seasoned flour and cook rapidly on both sides in hot fat. Lift on to rack and add ¼ pt. water, and continue cooking as above, allowing 4–6 minutes according to size
Plaice or Sole	¼–½ pt. water or to level of rack, but extra water when fish is in greaseproof paper	Whole fish, 2–4 minutes per lb. according to size. Fillets, 2–3 minutes
Salmon Steaks	" " "	6–7 minutes, according to thickness. Be sure to wrap fish in well-greased paper
Scallops	" " "	4–5 minutes

Pressure-cooking Time-table for Vegetables

Vegetables.	Water.	Cooking time (at 15 lb. pressure).
Artichokes (Jerusalem)	¼–½ pt. or to level of rack	8–10 minutes
(Globe)	" "	10 minutes
Asparagus	" "	2–3 minutes
Beans (Broad)	" "	3–4 minutes
(French)	" "	3 minutes
(Runner)	" "	2–3 minutes
Beetroot	" "	10–35 minutes, according to size and age
Brussels Sprouts	" "	3–4 minutes
Cabbage, Spring Greens	" "	2 minutes
Carrots (diced)	" "	2–3 minutes
(whole, young)	" "	3–5 minutes
(large)	" "	8 minutes
Cauliflower (sprigs)	" "	2 minutes
(whole)	" "	5–6 minutes
Celery	" "	2–3 minutes
Corn on the Cob	" "	4 minutes
Leeks	" "	3–5 minutes
Onions (whole)	" "	10 minutes
(sliced)	" "	3–4 minutes
Parsnips	" "	As for carrots
Peas	" "	1–2 minutes
Potatoes (new)	" "	10 minutes
(old)	" "	8–10 minutes
Spinach	" "	1–2 minutes
Swedes	" "	5 minutes
Turnips	" "	5 minutes
Vegetable Marrow	" "	3–4 minutes

Pressure-cooking Time-table for Dried Vegetables

Vegetable (4 oz.).	Water.	Cooking time (after 15 lb. pressure is reached).
Butter and Haricot Beans (soak 2 hours)	½ pt.	15–20 minutes
Lentils	"	20–25 minutes
Peas (soak 2 hours)	"	15–20 minutes
Split Peas	"	10–15 minutes

Pressure-cooking Time-table for Cereals

Cereal (4 oz.).	Water.	Cooking time (at 15 lb. pressure).
Macaroni	1 pt.	5–8 minutes
Noodles	"	4–6 minutes
Spaghetti	"	6–8 minutes
Rice	"	5–7 minutes
Pearl Barley	"	20–25 minutes

Pressure-cooking Time-table for Fresh Fruit

Fruit (1 lb.).	Water.	Cooking time (at 15 lb. pressure).
Apples (sliced)	½ pt.	1–2 minutes
Blackberries	"	2 minutes
Black-currants	"	2 minutes
Cherries	"	2 minutes
Gooseberries	¼ pt.	2 minutes
Pears (hard cooking)	"	6–7 minutes
Plums	¼ pt.	3 minutes
Raspberries	"	Merely bring to pressure
Rhubarb	"	2 minutes

Pressure-cooking Time-table for Dried Fruit

Previously soaked for 12 hours

Fruit (1 lb.).	Water.	Cooking time (at 15 lb. pressure).
Apple rings	½ pt.	5–6 minutes
Figs	1 pt.	10–15 minutes
Prunes	½ pt.	6–10 minutes
Apricots and Peaches	½ pt.	6–10 minutes

III. DIRECTIONS AND RECIPES FOR TYPICAL DISHES

SOUPS

The basis of all good soup is stock, and it should be used when available. Stock can be made from any scraps of meat, bones—cooked or uncooked—and root vegetables. Fish stock must be made separately and used only for fish soup.

Bone Stock.—Use a large pan with well-fitting lid and place the bones in it with pieces of root vegetable, and a *bouquet garni* (bunch of herbs). Cover with cold water, season, and simmer for 2–3 hours. If there is any fat with the bones strain off the liquid, allow to cool, and skim off the fat. Stock should be boiled up every day with additional bones and vegetables. The pot must be emptied and cleaned about every third day.

Vegetable Stock.—Cut up a variety of vegetables, being careful to avoid including too much of a strong-flavoured variety such as turnip. Cover with cold water and flavour with seasoning, a bay leaf, clove, a blade of mace, and herbs. Simmer until a good flavour is obtained. Use fresh.

Fish Stock.—Put fish bones and skin with herbs, spice, and seasoning into a pan. Cover with water and simmer for 1 hour. Use same day.

Soups can be divided into the following groups: purées, thickened soups, clear soups, or consommés, broths, and fish soups.

Purées are made from puréed vegetables and seldom require additional thickening.

Thickened Soups are made from vegetables and other ingredients simmered in stock. They are usually sieved and then thickened according to their ingredients.

Clear Soups or **Consommés** consist of good stock carefully cleared, and entirely free from fat, and served with a garnish which has been cooked separately. Sherry can be added if desired.

Broths are made of stock, diced meat, and vegetables. They are thickened with barley or rice, and are never sieved.

Fish Soups are made from a foundation of fish stock.

Consommé

½ lb. lean beef	12 peppercorns
1 small carrot	2 cloves
1 small onion	A blade of mace
A piece of turnip	The whites and shells of 2 eggs
A small stalk of celery	Salt, if necessary
2 quarts best-quality (or first) stock	A little sherry
A bouquet garni	

Shred the meat very finely, put it into a bowl with enough cold water just to cover, and allow it to soak for about ½ hour. Prepare the vegetables and cut each into four. Put the stock, from which all trace of fat has been removed, into a deep, lined saucepan, add the meat and the water in which it has soaked, the vegetables, herbs, and spices. Lastly, add the whites and crushed shells of the eggs. Put over gentle heat, whisk continuously and bring almost to boiling point; a thick froth should form on the top of the liquid. Stop whisking and continue heating until the froth rises in the pan, then reduce the heat and allow the soup to simmer for a few minutes. Tie a clean white cloth to a jelly stand or to the four legs of an upturned chair and scald with boiling water, then gently pour in the soup. When the consommé has dripped through, strain it a second time—passing it through the frothy egg-whites, etc., to make it clear and sparkling. If necessary, the consommé may be strained a third time.

Reheat the consommé, add salt if necessary, and a little sherry to improve the flavour, but add nothing that would make it cloudy.

Tomato Soup

1 lb. tomatoes	2 oz. margarine
1 pint vegetable water	Seasoning
2 onions stuck with cloves	2 teaspoonfuls sugar
4 oz. breadcrumbs	1 pint hot milk or milk and water

Cut up the tomatoes and put them into a saucepan with all the other ingredients, except the milk. Bring to the boil and simmer with a lid on for 20 minutes, then strain and rub through a sieve. Return to the pan and reheat, then add the milk. Serve with croûtons of toast.

Potato Soup

6 potatoes	½ pint milk
2 small onions	A small bunch of watercress
1½ pints water or stock	Seasoning
1 tablespoonful flour	

Cook the potatoes and onions in the water until tender. Strain, then press through a sieve. Return to the saucepan, add the flour, blended with the liquid, and bring to the boil, stirring continuously. Wash and chop the cress, and add this to the soup, together with the seasoning. Boil for 3 minutes and serve.

Lentil Soup

¼ pint lentils	A pinch of herbs
1½ pints water	½ oz. flour
1 onion	¼ pint milk
1 carrot	Salt and pepper
½ oz. dripping	Chopped parsley
A clove of garlic	

Wash the lentils, and if possible soak overnight in the water. Fry the onion and carrot in the dripping, add the lentils and water in which they were soaked, the crushed garlic, and the herbs. Bring to the boil, simmer gently until soft, and pass through a sieve. Blend the flour and milk, add to the purée and season, bring to the boil, and boil for a few minutes to cook the flour. Sprinkle in the chopped parsley and serve.

Artichoke Soup

1½ lb. Jerusalem artichokes	2 pints stock or water
1 stalk of celery	Salt and pepper
2–3 bacon rinds	1 oz. flour
A little fat if required	½ pint milk
	Chopped parsley

Peel and slice the artichokes, chop the celery and sauté them in the fat from the bacon rinds, adding a little more fat if necessary. Add the liquid and seasoning, bring to the boil, and simmer until the vegetables are tender. Pass through a sieve and return to the saucepan. Add the flour, blended to a smooth cream with the milk, bring to the boil, and cook for 2–3 minutes, re-seasoning if necessary. Add the parsley.

Green Pea Soup

2 lb. peas	1 oz. flour or ½ oz. cornflour
1 quart stock or water	½ pint milk
A sprig of mint	
Seasoning	

Shell the peas and wash the pods in several waters. Place the pods in a pan, cover with the stock or water, and allow to simmer gently for about ½ hour, to extract flavour and colour. Strain off the stock, return to the pan with the peas, mint, and seasoning, and simmer until the peas are tender. Pass through a sieve. Blend the flour or cornflour with the milk, add to the soup, re-boil, stirring all the time, and serve.

Celery Cream Soup

Outside stalks of 1 large head of celery	Salt and pepper
1 medium-sized onion	A bouquet garni
½–1 oz. fat	1 oz. flour
2 pints stock or water	½ pint milk
	Chopped parsley

Prepare and slice the celery and onion, and sauté in the fat for about 10 minutes. Add the stock or water, seasoning, and bouquet garni, bring to the boil and simmer until the vegetables are quite tender. Pass the soup through a sieve and return to the saucepan. Stir in the flour, blended to a smooth cream with the milk and allow to boil for a further 2–3 minutes. Re-season if necessary, and add the freshly chopped parsley just before serving.

Pot au Feu

2 lb. lean beef	2 small leeks
2½ quarts water	2 stalks celery
Salt	A bouquet garni (including a small blade of mace, 12 peppercorns, and 2 cloves)
1 carrot	1 oz. seed pearl tapioca or semolina
1 turnip	
1 onion	
1 parsnip	
1 small cabbage	

Tie the meat into a neat shape, put into a large saucepan, add the water and 1 teaspoonful salt

and simmer for 2 hours. Prepare the vegetables, cut each into quarters, with the exception of the cabbage, and add to the broth with the bouquet garni. Continue to cook for another 2 hours. Cut the cabbage in two, but tie together so that it does not break whilst boiling, put into the pot and boil until tender. Serve the meat on a dish with some of the liquor; garnish with the vegetables. If liked, the cabbage may be dished separately.

To make soup from the liquor sprinkle in the seed pearl tapioca or semolina, cook for 15 minutes and serve.

The meat and broth may be served separately or together, whichever is preferred.

Simple Minestrone

1 lb. carrots	A bouquet garni
A small piece of turnip	2 tablespoonfuls macaroni
2 stalks of celery	A little ketchup
½ lb. artichokes	2 tablespoonfuls chopped parsley
1–2 onions or leeks	Grated cheese to serve separately
1 oz. fat	
2 pints stock	
Seasoning	

Prepare the vegetables and cut into small, neat pieces. Melt the fat, and sauté the vegetables in it for 5–10 minutes. Add the stock, seasoning, and bouquet garni. Cover and simmer for about ½ hour, then add the macaroni and continue cooking for a further ½ hour, or until the vegetables are quite tender. Re-season and add a little ketchup to taste. Just before serving remove the bouquet garni and add the finely chopped parsley. Serve with grated cheese handed separately.

Scotch Broth

1–1½ lb. lean beef, either runner or topside	1 turnip
2 quarts water	1 medium-sized onion
Salt and pepper	2 leeks
1 carrot	1½ oz. pearl barley
	1 dessertspoonful finely chopped parsley

Put the meat into a pan, add the water and salt, bring to boiling point slowly, then simmer gently for 1½ hours. Add the vegetables, previously cut into dice, and the barley. If you do not want the broth to be cloudy it is advisable to blanch the barley before adding it to the stock; to do this, put the grain into cold water and bring it to boiling point, strain, and add to the soup. After adding the barley and vegetables continue to simmer until both are cooked—this will take approximately 1 hour. Serve the meat separately on a dish with a little of the broth. Put the chopped parsley into the soup tureen and pour in the broth. (If the parsley is cooked it loses its green colour.) Should any fat appear on the surface of the broth it must be removed with a spoon or by gently passing a piece of clean unglazed kitchen paper over the top.

Chicken Broth

1 chicken	1 dessertspoonful seed pearl tapioca
Cold water to cover (approx. 2 quarts)	1 heaped teaspoonful chopped parsley
Salt	
1 onion	

If using a whole chicken, cut in half, after usual preparation, wash thoroughly, and remove any fat or grease, but retain the skin. Put into a pan and add the water and salt to taste. Peel the onion, cut in half, and add to the contents of the saucepan. Simmer slowly for 3½–4 hours, and if the water boils away, add more. Strain, stand aside until cold, and remove any grease that may have settled on the top of the stock. If time will not permit waiting for the stock to get cold, the grease may be removed by passing a sheet of kitchen paper over the top of the broth. Return the stock to the saucepan, bring to the boil, add the seed pearl tapioca, previously blended with a little of the cold broth, and cook for 10 minutes. Put the chopped parsley in the bottom of a soup tureen and pour the broth over it.

This is an excellent method of utilising an old chicken; if a young one is used, the breast and wings can be removed beforehand and used for grilling or frying.

Oxtail Soup

1 oxtail	1 bay leaf
2 onions	2 cloves
1 carrot	6 peppercorns
2 stalks of celery	Salt and pepper
1 oz. butter or dripping	1 oz. flour
3–4 pints stock	A little port wine if liked
1 oz. lean ham or bacon	Squeeze of lemon juice or a little ketchup
A bouquet garni	

Wash the oxtail, then joint it, and dry the joints. Prepare and cut up the vegetables. Melt the fat in a saucepan, and sauté the jointed oxtail and the prepared vegetables in it for a few minutes. Well cover with stock and bring to the boil. Add the ham or bacon, the herbs, and seasoning, then cover and simmer gently for about 4 hours, or until the tail meat is tender, skimming occasionally. Strain the soup, remove the meat from the tail joints, cut it up neatly and replace it in the strained liquor. Return to the saucepan, stir in the flour, blended to a smooth cream with a little water or port wine. Bring to the boil, stirring, and cook for about 5 minutes. Add more seasoning, if necessary, and a squeeze of lemon juice or ketchup to taste.

Court Bouillon

To each quart of water (or water and white wine mixed) allow:—

1 onion	A small clove
1 clove of garlic	1 tablespoonful vinegar
1 carrot	1 teaspoonful salt
Small stalk celery	Freshly ground black pepper
A bunch of herbs	

Put ingredients into a pan, cover, simmer for ½ hour or longer, strain, and use for cooking fish.

Fish Cream Soup

1 cod's head	A bouquet garni
1½ pints water	Salt and pepper
A small carrot	½ pint white sauce
¼ of a turnip	1 tablespoonful chopped parsley
½ an onion	
1 stalk of celery	

Thoroughly wash the cod's head, place in a saucepan, and add the water; bring slowly to the boil and skim well. Prepare and chop the vegetables and add with the bouquet garni to the cod's head and water. Add salt and simmer for about 1 hour. Strain, remove any flesh from the head, and cut into neat pieces. Make the white sauce or re-heat it and blend with the fish stock. Season well and add the fish and chopped parsley just before serving.

Soup Garnishes

Bacon.—Cut into small strips or dice and fry lightly.

Cheese.—Grate the cheese (preferably Parmesan or dry Gruyère), and if desired mix it with either chopped parsley or watercress; hand it separately or sprinkle it on the soup just before serving.

Cheese or Herb Dumplings.—Mix together breadcrumbs and grated cheese in equal proportions. Season with salt, pepper, mustard, and mixed herbs, and bind with beaten egg, adding a few drops of piquant sauce if desired. Form into small balls and poach in the soup 15–20 minutes before serving.

Fried or Roasted Croutons.—Cut bread into slices ¼ in. thick, and then into triangles or fancy shapes; bake until golden-brown and crisp, or fry in smoking hot fat, drain, and serve hot. Alternatively, the slices of bread may be toasted first and then cut up.

Leek.—Chop and fry.

Macaroni, Spaghetti, Noodles, Shells, etc.—Break into short lengths if necessary, and add to the soup about ½ hour before serving.

Mushrooms.—Cut into thin slices and fry.

Onions.—Slice into rings or chop finely and fry.

Rice.—Add dry-boiled rice and freshly chopped parsley or chives just before serving the soup. Rice may also take the place of barley in mutton broth.

Vegetables.—Cut raw carrot, turnip, etc., into "matchsticks" or small balls, shred cabbage and slice celery, and cook them separately for 10 minutes in some stock; alternatively, tie them in muslin, to keep them together, and cook them in the soup. Sprinkle the pieces into the individual soup plates or cups before serving.

Watercress.—Float leaves on cream soups.

FISH

For success in cooking fish good-quality fish in a fresh condition is essential. This should have firm flesh, bright eyes, red gills, clear markings, and be free from unpleasant smell. Sea-water fish is divided broadly into two categories, white fish, such as cod, sole, plaice, haddock, whiting, etc., and oily fish, such as herring or mackerel. Fresh-water fish and shell-fish are more expensive, and usually require special attention for cooking and serving.

Most fish can be steamed, poached, baked, grilled, or fried as directed on S3–7. Fish should always be carefully prepared by washing under cold water, removing the head or scales, and trimming the fins and tail. Sole and plaice may be skinned or filleted.

Fish Pie

1 lb. cooked fish	Salt and pepper
1½ oz. margarine	1 tablespoonful parsley
1 oz. flour	Squeeze of lemon
½ pint milk	Creamed mashed potato

Skin and bone fish and flake finely. Melt 1 oz. fat, stir in flour and cook for a few minutes without browning. Stir in milk and bring to the boil. Add seasoning, parsley, lemon juice, and the fish, put in a fireproof dish and cover with mashed potato. Dot with margarine and heat in a moderately hot oven (400° F.) for about 20 minutes.

Fish Cakes

Flour	About 1 lb. boiled potatoes
⅛ pint milk	½ lb. cooked fish
⅛ pint fish stock	2 teaspoonfuls chopped parsley
Salt and pepper	Fat for frying
A knob of margarine or butter	Egg and bread-crumbs if required
¼ teaspoonful mustard	
A few drops of vinegar	

Blend 1 tablespoonful of flour to a smooth cream with the milk, add the fish stock and bring to the boil, stirring. Cook for 2–3 minutes, then season with salt and pepper and beat in the knob of fat and the mustard, blended with a few drops of vinegar. Mix well and cool slightly.

Mash the potatoes, rubbing them through a sieve if necessary, and mix them with the flaked fish and chopped parsley. Bind with the sauce, adding more seasoning if required, then spread the mixture on a plate and allow to cool. Divide into 6–8 portions and shape into flat cakes or croquettes. Dust with flour and fry in a little hot fat until well browned and crisp on both sides, or coat with egg and crumbs and fry in deep fat. Serve with a good sauce, such as parsley, mustard, or anchovy sauce.

Fried Fish with Tomatoes

8 fillets of flat fish	Button mushrooms
1 egg	Tomato lilies
Brown breadcrumbs	Lemon butterflies
Fat for frying	Parsley

Coat the filleted fish with egg and breadcrumbs. Heat the fat, fry the fish to a golden colour, drain thoroughly, and keep hot. Fry the mushrooms, grill the tomato lilies, put them round the fish and garnish with lemon and parsley. Alternatively, halve the tomatoes and fry them to serve with the fish.

Baked Curled Whiting

4 medium whiting	Browned breadcrumbs
Fat	Carrot balls
Seasoning	Parsley and lemon

Prepare the fish and remove the eyes. Curl each whiting round, the tail in the mouth or through the eye-sockets. Brush with melted fat, sprinkle with seasoning and fine breadcrumbs. Dot with fat and bake in a greased tin in a moderate oven (350° F.) for about ½ hour. Garnish with carrot balls, parsley, and lemon, and serve with tomato sauce.

Baked Stuffed Sole

1 large sole	Lemon butterflies
Fish forcemeat	Cucumber cones
A little fat	Duchesse potatoes

Trim the fish, make an incision down centre back and loosen flesh close to the bone on each side. Stuff with good fish forcemeat and put on a greased baking-tin. Cover with greased paper and bake 20–30 minutes in a moderately hot oven (400° F.). Lift on to a hot dish and garnish with the lemon butterflies, cucumber cones, and duchesse potatoes.

Baked Stuffed Haddock

1 fresh haddock	Flour
Savoury stuffing	Shavings of margarine

The head of the fish may be removed or not, according to individual taste. If it is left on, the eyes should be taken out. Wash and trim the fish, then dry and stuff it, sewing or skewering the opening to keep the stuffing in place. Curl the fish to form an "S" and put into a greased tin. Dredge lightly with flour, dot with margarine, and bake in a moderately hot oven (400° F.), basting occasionally for about 30 minutes.

Creamed Fish au Gratin

¾ lb. white fish	2 tomatoes
¾ pint milk and water	1 oz. margarine
1 small onion	1 oz. flour
A bunch of herbs	2–3 oz. cheese
Salt and pepper	Chopped parsley
1 lb. boiled potatoes	

Place the fish in a saucepan with the liquid, sliced onion, herbs (tied in muslin), and seasoning, and simmer gently for 10–15 minutes, or until the fish is cooked. Lift out the fish, remove any bones and thick skin, and place in flakes in a fireproof dish lined with a layer of sliced, boiled potatoes. Skin and slice the tomatoes and arrange in a layer on the fish, sprinkling with salt and pepper.

Melt the margarine and add the flour to make what is called a "roux." Add the liquor in which the fish was cooked (making up to ½ pint if necessary) and bring to the boil, stirring continuously. Boil for 2–3 minutes, then add half the cheese, season with salt and pepper, and pour over the fish. Sprinkle with the remainder of the cheese and place in a moderate oven (350° F.) to heat through and brown the top. Before serving garnish with chopped parsley.

Grilled Salmon Steaks

Salmon steaks about 1 in. thick	Lemon
Oil or melted fat	Maître d'hôtel or anchovy butter
Seasoning	

Wipe the steaks, brush with oil or melted fat, and sprinkle with seasoning. Cook under a hot grill for 10–15 minutes, until the flesh comes away from the bone when tested with a skewer. Serve garnished with lemon and a pat of maître d'hôtel or anchovy butter on top of each steak.

Grilled Trout

Clean and dry the fish, split them open and remove the backbone. Brush the trout over with melted fat or olive oil, and season with salt, pepper, and lemon juice. Lay them on a hot grill and cook for 5–10 minutes on each side. Serve at once with cut lemon and watercress, or peas.

Oysters au Naturel

Fresh oysters	Bread and butter
Salt	Lemon and parsley or cress to garnish
Cayenne pepper	
Lemon juice or vinegar	

Serve the oysters very cold, opened, and on the deep shell. Sprinkle with salt, a touch of Cayenne, and a squeeze of lemon juice or a little best-quality vinegar. Serve with thin slices of bread and butter or with rolls, and garnish with lemon and parsley or cress.

Fried Oysters (Pigs in Blankets)

Cut thin rashers of bacon in half. Wrap each oyster, previously dried, in a slice of bacon, and fasten together with a tiny wooden skewer. Lay on a towel till the last minute to get entirely dry, and brown very quickly in a hot frying-pan. Place two "pigs" on a square of hot toast, and serve with a little of the liquid from the pan poured over; garnish with parsley and serve at once.

Dressed Lobster

Twist off the claws and the legs and crack each one carefully, using either a hammer or heavy

weight. Hold the lobster firmly and bend it in order to separate the body from the tail section. Using scissors, then a sharp knife, cut the tail in half lengthways from underside. Remove dark cord. Remove bony part from the body; discard the "dead men's fingers" and stomach, found in head. Leave the tail meat in the shell. Mix the rest with a little mayonnaise, salt, pepper, and a squeeze of lemon juice. Pile on to a bed of lettuce, and serve with watercress, sliced tomato, and cucumber. Garnish with some of the small claws and coral, if present. If preferred, the large claws may be served already cracked so that the flesh can be easily removed.

Lobster au Gratin

1 lobster	¼ pint milk and stock mixed
2–3 mushrooms	Salt and pepper
1 onion	1 teaspoonful browned breadcrumbs
½ oz. fat	Watercress
½ oz. flour	

Cut the lobster in half lengthwise, remove the meat and divide into neat pieces. Peel and slice the mushrooms, and peel, slice, and chop the onion roughly; fry both lightly in the fat. Add the flour, mix thoroughly and pour in the liquid, stirring until the sauce boils and thickens. Season, simmer for several minutes until the onion and mushrooms are tender, then add the lobster meat and a little of the grated cheese. The mixture should be of a thick, creamy consistency. Re-heat the meat in the sauce, pile into the two halves of the lobster shell, sprinkle with the remaining cheese and the breadcrumbs, and brown quickly under the grill or in a hot oven (450° F.) on the top shelf. Serve immediately, garnished with watercress.

Creamed Shrimps

½ pint shrimps	Seasoning
½ pint white sauce (hot)	Breadcrumbs
1 oz. cheese	

Put the picked shrimps in the white sauce, grate the cheese and add half of it, with seasoning, to the mixture. Place in small fireproof ramekin dishes, sprinkle with the rest of the cheese and a few bread-crumbs, and heat through in a hot oven (425° F.) for about 10 minutes. Serve very hot, garnished with hot shrimps.

Prawn Cutlets

4 oz. shelled prawns	A few drops vinegar
1 oz. margarine	A pinch of nutmeg
1 oz. flour	Egg and breadcrumbs
½ pint milk	Fat for frying
Salt and pepper	Whole prawns to garnish

Chop the prawns. Melt the fat, add the flour, and make a roux. Gradually add the milk and cook the sauce thoroughly. Add all the seasoning, then spread the mixture on a plate and allow to cool. Shape into eight cutlets, and egg and crumb them. Fry in smoking hot fat until golden-brown. Garnish with whole prawns, and serve either hot or cold.

Crab Salad

1 cooked crab	1 lettuce
Salt and pepper	Tomatoes
Salad cream	Watercress

Remove the meat from the crab shell, keeping the dark and white meats separate. Season with salt and pepper and add a little salad cream. Arrange the lettuce on a glass dish, put the dark meat in the centre and the white meat around. Garnish with sliced tomatoes, the watercress and the crab legs.

Mussels à la Marinière

2–3 dozen mussels (cooked)	½ pint mussel liquor
1 oz. butter	½ pint milk or wine
1 small onion	1 teaspoonful chopped parsley
1 tablespoonful flour	Pepper and salt

Heat the mussels. Melt the butter in a saucepan, add the onion (very finely chopped), and cook slowly for a few minutes. Stir in the flour and allow it to cook, then add the mussel liquor and milk or wine, and stir until boiling. Allow this sauce to simmer slowly for at least 5 minutes, add the parsley and seasoning and pour over the mussels.

Stewed Scallops with Cheese

6 scallops	1 oz. grated cheese
Salt and pepper	Toast snippets and lemon to garnish
Lemon juice	
½ pint white sauce	

Wash and drain the scallops, discard the beard and the black part, and cut the remainder into quarters. Put into a greased pan, sprinkle with salt, pepper, and lemon juice and pour over the white sauce. Simmer very gently for about 10–15 minutes, until tender, and stir in the cheese. Serve garnished with toast snippets and lemon.

Herrings in Oatmeal

2 herrings	½ teaspoonful salt
1 oz. medium oatmeal	¼ teaspoonful pepper
1 teaspoonful dry mustard	1 oz. dripping

Clean the herrings and split them open, removing the backbone. Mix the oatmeal and seasonings together. Brush the herrings with melted dripping and coat with seasoned oatmeal. Fry or cook under the grill for 5–6 minutes.

Soused Herrings

Wash and trim the herrings. Season and roll up from head to tail. Place in a pie-dish and cover with vinegar and water (equal quantities), spiced with 2 cloves, 1 bay leaf, and seasonings. Bake in a slow oven (300° F.) for ¾ hour. Serve hot or cold.

MEAT

Roasting is the most popular method of cooking meat, but it should be reserved for good-quality and good-sized joints. Poorer-quality joints braise or pot roast well, while the cheaper cuts of meat are better stewed. Small cuts of meat like chops, fillet steak, cutlet, liver, etc., are usually grilled or fried.

Directions for roasting are given on S6, but the following accompaniments can be served with roast meat:

Beef.—Yorkshire pudding and horseradish sauce.
Mutton.—Red-currant jelly or onion sauce.
Lamb.—Mint jelly or mint sauce.
Veal.—Forcemeat balls and bacon rolls.
Pork.—Sage-and-onion stuffing and apple sauce.

Mixed Grill

This consists of a selection of foods suitable for grilling, such as a chop, kidney and sausages, or a steak, liver and sausages, served with grilled halved tomatoes, mushrooms, chipped potatoes, and maitre d'hôtel butter (S21). Prepare the various items for grilling, and season all meats on both sides with salt and pepper and a little lemon juice, if liked. Brush all the pieces over with melted fat, and start by grilling the foods which require the longest time, so that they are all ready at the same time.

Grilled Lamb Chops and Peas

Lamb chops	New carrots
Oil or melted fat	Mint sauce
Green peas	

Skin the chops and trim away any excess fat. Brush them over with oil or melted fat and put them under a hot grill. Cook for a few minutes on one side, then turn the chops over, using two wooden spoons or a palette knife, and cook the other side. Continue to cook, turning them occasionally, and allowing about 8–10 minutes altogether. Decorate the end of each chop bone with a cut paper frill and serve them on a hot dish with green peas and new carrots, and mint sauce served as an accompaniment.

Pork chops must be grilled for 20 minutes at least, and are delicious served with fried apple rings or apple sauce.

Pork Chops Baked and Stuffed

Flatten the chops and trim them if necessary, lay them on a baking-dish and cover the lean part of each chop with a layer of sage-and-onion stuffing. Cover with greased paper and bake in a moderately hot oven (400° F.) until the lean is well cooked and the fat crisp and brown—about ½ hour. Serve with baked tomatoes and apple sauce.

Boiled Leg of Mutton and Caper Sauce

½ leg mutton
Boiling water
Salt and pepper
4 medium-sized carrots, turnips, and onions
Caper sauce

Wipe the meat. Have ready sufficient fast-boiling water to cover the joint completely, place it in the pan, and when the water again reaches boiling point, allow it to boil for a few minutes. Then add the seasoning and the vegetables, cut into quarters. Simmer gently until the joint is cooked, allowing 20 minutes to the lb. and 20 minutes over. When cooking is almost complete, prepare the caper sauce, using the liquid from the pot. Serve the meat on a hot dish, put the vegetables round and pour over the caper sauce.

Brown Stew

¾–1 lb. stewing steak
1 onion
2–3 carrots
A piece of turnip
A stick of celery
1 tablespoonful dripping
1 oz. flour
1 pint stock or water
Seasoning
A bouquet garni
Gravy browning, if necessary

Wipe the meat and cut into neat pieces. Peel the onion and cut into thin rings. Prepare the other vegetables and cut into rings or dice. Melt the dripping in a pan, place half the meat in the fat and fry quickly until it is lightly brown, then turn and fry on the other side; fry the rest of the meat. (If all the meat is put in the pan at once, it will cool down the fat and the frying will be very slow.) Lift the meat out on to a plate, re-heat the fat, add the onion, and fry for a few minutes until lightly coloured. Remove from the fat, then add the flour and fry until browned. Add the liquid gradually, season and bring to the boil. Put in the meat, vegetables, and bouquet garni, cover and simmer gently for about 2–2½ hours. If stewing in the oven, turn the contents of the pan into a casserole and allow to cook gently in a slow oven (325° F.) for 3–4 hours. Before dishing, remove the bouquet garni, re-season and, if necessary, add a few drops of gravy browning to colour. If fat meat is used, the stew sometimes becomes greasy; this can easily be rectified by blending 1 teaspoonful of flour with a little cold water, stirring it into the stew and re-boiling; the flour will then absorb the excess fat.

Brown stew can be varied by: (1) adding potato dumplings; (2) adding 1 tablespoonful of piquant sauce and a clove or garlic to sharpen the flavour. Potatoes can be cooked in the same pot as the stew; they should be peeled and placed whole on top of the stew and cooked for at least an hour. If available, 2–3 mushrooms, a few tomatoes, or a cupful of cooked beans may be added to enrich the flavour.

Irish Stew

1 lb. middle neck of mutton
2 lb. potatoes
2 large onions
Salt and pepper
Cold water
Chopped parsley

Prepare the meat by wiping thoroughly, removing the marrow and cutting into neat pieces. Cut the potatoes and onions into rings and place alternate layers in a pan, finishing with a layer of potato. Add salt and pepper and sufficient water to half-cover. Bring to the boil and simmer gently for about 2 hours, or until the meat and potatoes are tender.

Pile the meat, gravy, and some of the potatoes in the centre of a hot dish, placing the rest of the potatoes at either end of the dish. Sprinkle with a little chopped parsley.

Beef Olives

1½ lb. thick beefsteak
Veal forcemeat
Diced mixed vegetables
Seasoning
1 pint stock
Mashed potatoes
1 oz. flour

Cut the meat into slices about ¼ in. in thickness, and then into oblongs of about 2½ by 3 in. Spread with the veal forcemeat, roll up, and tie with string. Braise on a bed of vegetables in the seasoned stock until tender—about 1½–2 hours. Remove the string and serve the meat on mashed potato with some of the gravy (thickened flour) poured over.

Dry Curry of Beef

1 lb. frying steak
1½ oz. dripping
2 onions
1 small apple
1 dessertspoonful curry powder
1 tablespoonful chutney or other pickle
1 teaspoonful red-currant jelly
A squeeze of lemon juice
Rice

Cut the beef into even-sized pieces. Melt the fat and fry the chopped onions, apple, and curry powder. Add the meat, chutney, jelly, and lemon juice. Mix thoroughly and cook very slowly with the lid on until the meat is tender, stirring frequently. Serve with a border of rice.

Steamed Meat Roll

Suet-crust pastry
1 lb. beefsteak
1 onion or leek
1 carrot
Salt and pepper
Stock

Make the suet-crust pastry and roll it out. Mince the meat, onion or leek, and the carrot, season with salt and pepper, and moisten with a little stock. Spread this mixture on the pastry, moisten the edges with a little cold water, and roll up. Tie in a floured pudding-cloth, allowing room for the roll to swell, and steam for 3 hours. Serve with a good brown gravy sauce.

Cooked meat and vegetables may be used in the same way, and instead of steaming the roll it may be baked in a moderately hot oven for about 45 minutes and served with gravy sauce.

Sausage-meat Galantine

1 lb. sausages
1 or 2 rashers of bacon
Any pieces of cooked meat, etc. (if available)
1 tablespoonful chopped parsley
2 teaspoonfuls chopped onion or leek
½ teaspoonful mixed herbs
Pepper and salt
Stock or water

Skin the sausages and mince the bacon, and meat if used. Mix with the herbs and seasonings and moisten with a little stock or water. Form into a roll and tie in a floured cloth. Boil for 1 hour. Serve hot, with a good brown sauce and green vegetables. Serve cold, rolled in browned crumbs, with a green salad.

Braised Ham

½ a ham, either bottom or knuckle end
½ a carrot
1 turnip
1 onion
A bouquet garni
1 quart stock
3 sliced tomatoes
Mushrooms, if liked
½ pint rich brown sauce

Soak the ham for 12 hours at least, longer if possible. Place in a large pan with the carrot, turnip, onion, and herbs. Add just sufficient water to cover and simmer for 2½–3 hours, according to the size of the joint, then remove from the saucepan and peel off the brown skin. Place the meat in a braising-pan or strong deep saucepan, add the stock, tomatoes, and a few mushrooms, if available. Place in the oven, put on the lid, which should be tight-fitting, and cook for 1–1½ hours, the time depending on the size of the ham. Dish up, strain the stock, and reduce it to half-glaze by boiling. Then brush over the top. Add the brown sauce to the remainder, boil for a few minutes and serve as gravy.

Meat-and-bacon Roll

4 oz. minced raw meat
2 oz. minced bacon
2 oz. minced onion or leek
½ teaspoonful mixed herbs
1 teaspoonful chopped parsley
Salt and pepper
A little stock or gravy
8 oz. suet-crust pastry

Mix together the minced raw meat, bacon, and onion. Add the herbs and season well with salt and pepper, then moisten with a few tablespoonfuls of stock or gravy.

Make the pastry in the usual way. Roll into an oblong ¼ in. in thickness and spread to within ½ in. of the edge with the prepared filling. Moisten the edges and roll up as for jam roly-poly. Roll in greased paper. Tie in a cloth and steam for 2–3 hours. Serve with gravy or a good sauce.

Steak-and-kidney Pudding

8 oz. self-raising flour	¾ lb. stewing beef
½ teaspoonful salt	2 kidneys
3 oz. suet or cooking-fat	1 tablespoonful seasoned flour
Water to mix	

Grease a pudding-basin. Sieve the flour and salt and add the chopped suet (if cooking fat is used, rub into the flour until the consistency resembles that of fine breadcrumbs); mix with sufficient water to bind, and roll out into a round large enough to line the basin and cover the top. Prepare the meat by cutting into neat pieces and dipping in seasoned flour. Fill the basin, pour in a little water, damp the edges of the pastry, and draw up over the meat. Cover with a floured cloth or several layers of greaseproof paper, and boil or steam for 3–4 hours.

To dish, wrap the basin in a clean table napkin, and add a little boiling water to the pudding just before serving.

Blanquette of Veal

1 lb. veal (neatly cut up)	2 egg yolks
2 onions	2 tablespoonfuls cream
A bouquet garni	Juice of 1 lemon
White stock or water	Chopped ham, lemon, and parsley to garnish
2½ oz. butter	
2 oz. flour	

Put the veal, onions, and herbs in a stew-pan with enough white stock or water to cover. Simmer very gently until tender—1½ hours. Strain and keep the meat hot. Make a sauce with the butter, flour, and 1 pint of the stock. Cook well, then add the egg yolks, beaten with cream and lemon juice, and reheat carefully, but do not re-boil. Pour over the veal and garnish with chopped ham, lemon fans, and chopped parsley.

Veal Cutlets (or Escalopes)

1 lb. fillet of veal	¼ pint brown or tomato sauce
Lemon	Rolls of bacon or cooked green peas to garnish
Seasoning	2 oz. butter or dripping
Egg and breadcrumbs	
Mashed potatoes	

The meat should be cut in slices about ¼ in. in thickness. Trim it and cut it in neat rounds or oval-shaped pieces, beating it out if too thick in parts. Rub each piece over with a cut lemon and sprinkle lightly with pepper and salt. Then egg and breadcrumb the cutlets, pressing the crumbs well on with a broad-bladed knife, and re-shaping the cutlets neatly on a board. Lay them on a tin or dish with a double fold of kitchen paper under them, and let them rest for a short time to dry.

Meanwhile, prepare ¼ pint of brown or tomato sauce and some nicely mashed potatoes. Also make ready a few little rolls of thinly sliced bacon, fix these on a skewer, and cook them in the oven or under the grill for a few minutes.

To cook the cutlets, melt the fat in a frying-pan. When smoking hot, place in the cutlets. Fry them rather slowly, first on one side and then on the other, until they are well browned. Allow from 10–12 minutes for the cooking, as veal must not be underdone; lift out and drain on the paper. Arrange the potato in a circle on a hot dish, and place the cutlets along the top, one leaning against the other. Fill up the centre with the rolls of bacon, or with nicely cooked peas if preferred, and pour the sauce round. Serve cut lemon separately.

Brain Cakes

1 calf's brain	Salt, pepper, and nutmeg
1 oz. butter or margarine	1 egg yolk
1 oz. flour	Egg and breadcrumbs for coating
¼ pint milk	Fat for frying
½ teaspoonful chopped parsley	Parsley to garnish
2 oz. breadcrumbs	White sauce

Cover the brain with cold water, add a teaspoonful of salt, and bring to the boil. Skim, then boil gently for 10 minutes. Strain, leave to get cold, and then cut into small pieces. Melt the butter, stir in the flour, gradually add the milk, then stir until the mixture boils and thickens. Add the yolk of egg and stir for a few minutes over a low heat without boiling. Let the mixture get cold, then divide it into little cakes: sprinkle these with flour, brush with beaten egg, and toss in breadcrumbs. Fry in smoking hot fat until crisp and golden-brown, garnish with parsley and serve with white sauce or other good sauce.

Stuffed-liver Casserole

½ lb. liver	¾ pint stock or water
2 oz. fat bacon	Seasoning
½ oz. flour	

For the Stuffing

8 oz. mashed potatoes	½ oz. margarine
½ teaspoonful chopped parsley	Seasoning
	1 small finely chopped onion

Wash and dry the liver and cut into thin slices. Cut the bacon into slices slightly larger than the liver pieces. Blend the flour with the liquid and season well.

Make the stuffing by thoroughly blending all the ingredients together. Place a little stuffing on each slice of liver and roll up, then roll this in a piece of bacon. Place the rolls in a greased casserole and half-cover with the blended flour and stock. Cover and bake in a moderately hot oven (400° F.) for ¾–1 hour, until the liver and bacon are tender. If desired, the lid may be removed 10 minutes before cooking is completed, to brown the bacon.

Stewed Ox-tail

1 ox-tail	About 1 quart stock or water
1 oz. dripping	Salt and pepper
Flour	2 oz. flour
1 onion	A few drops of lemon juice or vinegar
Flavouring vegetables (carrot, celery, turnip)	Diced carrot and turnips to garnish (optional)
Herbs, cloves, peppercorns	
1 meat cube	

Cut the tail into pieces and trim off any excess fat. Melt the dripping, lightly dredge the pieces of tail in flour, and fry them and the onion until golden-brown. Add the flavouring vegetables cut into small pieces, the herbs and spices tied in muslin, the meat cube, and stock or water to cover. Season, cover closely, and simmer gently until tender (about 3–4 hours, or longer if necessary). Remove the bag of herbs and skin off all fat; if preferred, leave to stand overnight and remove the fat when cold.

Blend 2 oz. of flour with a little stock and add it to the stew, stirring while it comes to the boil. Add more seasoning, if necessary, and a few drops of lemon juice or vinegar. Arrange the meat and vegetables on a hot dish and strain the sauce over, garnishing, if liked, with diced carrot and turnip cooked separately.

Boiled Ox Tongue

To Prepare and Pickle: Wash and scrape the tongue thoroughly until all slimy substance is removed. Rinse in cold water and dry. Cut off some of the gristle and root part. Rub all over with coarse salt and leave overnight to drain. Prepare a wet pickle as follows:

1 lb. block salt	1 oz. saltpetre
6 oz. brown sugar	1 gallon water

Boil for 5 minutes keeping the surface skimmed, then drain into a large basin and leave until cold. Strain over the tongue, completely covering it with the liquid. Allow to soak for at least a week.

Soak the pickled tongue in cold water for several hours. (If a smoked tongue is used, it will need 12 hours soaking.) Wash the tongue, skewer into shape, put into lukewarm water, bring slowly to the boil, and skim. Add flavouring vegetables and peppercorns, and simmer the tongue very gently until tender: a 6-lb. tongue will need to simmer for 3–4 hours. When tender, take out the tongue, plunge into cold water so that the skin will come off easily, and skin it very carefully. Slip out any bones in the root and cut off remaining gristle. Roll the tongue while still hot into a round cake-tin, fitting it in tightly. Add a little jellied stock, put a weighted cover on top and leave to set for several hours.

Fried Sweetbreads

1 sweetbread	Fat for frying
Stock or water	Lemon and parsley to garnish
Salt and pepper	
Egg and breadcrumbs	

First wash the sweetbread and soak in cold water for 1–2 hours, changing the water occasionally. Put into a pan and blanch, then cover with cold water and remove with the fingers any veins, fat, or skin that will come away without damaging the sweetbread. Put into a pan with a little stock or water and simmer gently for 25–30 minutes. Drain and press between two plates until cold. Slice the sweetbread neatly, season it, and egg-and-crumb the slices. Fry until golden-brown, then drain and serve garnished with cut lemon and parsley.

Tripe and Onions

2 Spanish onions	½ pint milk
1½ lb. prepared tripe	Seasoning
1 oz. butter	A pinch of nutmeg
1 oz. flour	Toast
½ pint tripe liquor	

Peel the onions and cook them together with the tripe until both are tender. Then drain, reserving the liquor. Cut the tripe in pieces and chop the onions. Melt the butter in a fireproof casserole, mix in the flour, and then add the tripe liquor, a little at a time. Stir until boiling, add milk, seasoning, onions and tripe, and simmer all together for about 15 minutes, stirring occasionally. Serve in the casserole, garnished with toast cut in pieces.

POULTRY

The selection of poultry is of prime importance. When buying look for a plump bird with a smooth skin. For roasting the bird must have a flexible breast bone and smooth legs with short spurs. Most poultry is sold ready for the table; if, however, it has not been prepared it should be hung by the feet, somewhere cool, so that air can circulate round it. It should not be hung more than two to three days, according to weather conditions. The plucking is best carried out directly after killing, whilst the bird is still warm, then singe with a lighted taper. Remove the sinews from the legs, cut off the head, and draw after hanging and when required. The liver, gizzard, heart, and neck are used for making stock. Prepare the liver by removing the gall bladder, and the gizzard by cutting through to remove the "bag of grit". Fowls and turkeys are usually stuffed at the neck end, and geese and ducks at the tail end. After stuffing, truss the bird to keep it a good shape. The appropriate stuffings and accompaniments are as follows:

Turkey.—Sausage, celery, chestnut, or other forcemeat. Serve with gravy, bread sauce; sausages, bacon rolls, or cranberry sauce.

Chicken.—Forcemeat stuffing. Serve with gravy, bread sauce, sausages, fried crumbs, bacon rolls.

Duck—Sage-and-onion stuffing. Serve with gravy, apple sauce, and orange salad.

Goose.—Sage-and-onion stuffing. Serve with gravy, and apple sauce.

Guinea Fowl.—Serve with watercress, gravy, and orange salad. For roasting times see S6.

Chicken Casserole

1 chicken	Salt and pepper
1 oz. seasoned flour	A bouquet garni
1 onion	½ lb. mushrooms *or*
Dripping	½ lb. tomatoes
1 pint stock or water	

Joint the chicken, cut into convenient-sized pieces, and dip in seasoned flour. Cut up the onion finely and fry until golden in the hot dripping. Brown the chicken and put into a casserole with the onions. Stir the rest of the seasoned flour into the dripping and fry until brown, then add the stock or water and stir until boiling. Season well. Pour into the casserole over the chicken and add a bouquet garni and the roughly chopped mushrooms or tomatoes. Put on the lid and cook in a moderate oven (375° F.) for about 1½ hours, or until the legs of the chicken are tender when pierced with a fork or skewer. Remove the bouquet garni and serve.

Chicken Maryland

1 prepared chicken	White breadcrumbs
Seasoning	Dripping
Flour	Milk and stock mixed
1 egg	¼ lb. sliced mushrooms

Simmer the giblets and neck for stock. Season the jointed bird, dip in flour, then in beaten egg. Roll it in the crumbs and put in a greased tin. Roast in a moderately hot oven (375° F.), basting occasionally, until tender. Make a sauce by stirring a tablespoonful of flour into some of the fat left in the tin, and adding milk and stock. Simmer the mushrooms in the sauce. Serve the chicken with the sauce poured around.

Chicken Fricassée

1 chicken	1½ oz. flour
1 onion	A squeeze of lemon juice
1 stalk of celery	
A bouquet garni	A little "top of milk" if available
1½ pints stock or water	
Salt and pepper	Parsley
2 oz. margarine	Bacon rolls

Joint the bird, cut into convenient-sized pieces, and put into a pan with the sliced onion, chopped celery, bouquet garni, liquid, and seasoning. Cover the pan and simmer gently for about 1½ hours, or until the chicken is tender. Melt the margarine in another saucepan and stir in the flour. Gradually add about 1 pint of the chicken liquor and a squeeze of lemon juice. When boiling stir in a little "top of the milk," if available and season. The sauce should be of a coating consistency. Arrange the cooked chicken in a hot dish, pour the sauce over, and garnish with parsley and small rolls of bacon.

Chicken Galantine

Allow 12 oz. sausage-meat, some slices of ham (or tongue or bacon), and two hard-boiled eggs to each chicken. Spread some of the sausage-meat on the boned bird, and arrange slices of the ham and the sliced eggs on top. Season, and cover with the rest of the sausage-meat. Fold in both ends of the boned chicken and roll it up tightly. Tie in a clean cloth and simmer in stock for 2 hours. Place the galantine on a dish and press it down by putting a weighted dish on top. When it is cold brush the surface with glaze and decorate with piped butter and aspic jelly.

Devilled Turkey Legs

Chop off any unsightly length of bone and score the flesh of the legs deeply with a sharp knife, both round and across. Brush with melted butter.

Mix on a plate 1 teaspoonful each of French and English mustard, 2 of finely chopped chutney, a pinch of ground ginger, pepper, salt, Cayenne pepper, and browned breadcrumbs. Spread this mixture over and into the cuts, put the turkey legs aside for an hour, then cook under a very hot grill until crisp and brown. Serve quickly, garnished with water-cress. Pats of butter and some piquant sauce may be served separately.

Braised Duck

1 duck	A bouquet garni
Dripping	Salt and pepper
2 rashers of bacon	¾ pint stock
1 carrot	1 orange
1 onion	1 oz. flour
2 sticks celery	Watercress
A piece of turnip	

Joint the duck, cut into convenient-sized portions, and fry in a little dripping until brown. Dice the bacon, carrot, onion, celery, and turnip and put at the bottom of a stewpan or casserole. Add the *bouquet garni* and the fried pieces of duck. Season and add the stock, which should just cover the duck. Cover and cook on top of the stove or in a moderately hot oven (400° F.) until tender—this will take about 1½–2 hours. Put the pieces of duck on to a hot-plate. Strain the liquor and add the grated orange rind and juice of half the orange. Thicken the sauce with blended flour and pour over the duck. Garnish with watercress and pieces of orange.

Casserole of Pigeons

2 pigeons
1 tablespoonful flour
Pepper and salt
A piece of ham or bacon
1 oz. dripping
Piece of turnip, sliced
1 stalk of celery, sliced
1 onion, sliced
¾ pint stock or water
Bunch of herbs, tied in muslin

Prepare the pigeons, cut in halves, and toss in seasoned flour. Dice the ham or bacon and fry until lightly browned, then remove it from the pan. Add the dripping to the pan and fry the pigeons in this until lightly browned, and then remove from the pan. Add the vegetables and sauté for several minutes. Then add the flour, stir in the stock and bring to the boil, stirring. Return the pigeons and the bacon, and add the bunch of herbs (tied in muslin). Cover and simmer gently until the pigeons are tender (about 2 hours), or put into a casserole and cook in a slow oven. Remove the herbs and add more seasoning if necessary. Place a border of mashed potatoes round a hot dish, arrange the pigeons and vegetables in the centre, and pour the sauce over, or, if cooked in a casserole, it may be served without dishing.

GAME

All wild birds and animals protected by law during certain seasons of the year are known as game. The most common of these are pheasants, partridges, grouse, wild duck, hares and deer. Less commonly eaten in this country are snipe, plover, woodcock, quail, and ptarmigan. The game seasons are roughly from August, September, or October until December, February, or March, although it is now possible to buy frozen or imported game out of season.

Game birds should be hung for a week at least before being plucked and drawn. If cooked too soon game is tough and lacks flavour. The actual length of time for hanging can be judged only by individual taste, but as a guide the bird should be ready when the tail feathers come away easily. Small birds such as snipe and woodcock require less hanging time, and should be roasted undrawn on a piece of toast which is served with the bird.

Directions for roasting are given in the previous chapters, but game can be served with the following accompaniments.

Pheasant, *Partridge*, *Grouse*, *Ptarmigan*	Gravy, bread sauce, fried breadcrumbs, and game chips
Snipe, *Plover*, *Woodcock*, *Quail*	Gravy, fried breadcrumbs, game chips
Wild Duck	Gravy, orange salad, game chips

Pheasant Casserole

1 pheasant
Seasoned flour
Fat for frying
4–6 oz. mushrooms
Salt and pepper
2 rashers of chopped bacon
Stock
A little port (optional)
Chopped parsley

Joint the bird and dip the pieces in the seasoned flour. Heat the fat in a frying-pan and fry the pieces of pheasant until they are golden-brown, then put them in the casserole, with the sliced mushrooms, the chopped bacon, salt and pepper, and sufficient stock to half-cover the pheasant. A little port wine may be added with the stock, if desired; cook gently in a moderate oven (350° F.) for about 1½ hours. Just before serving, sprinkle the surface with chopped parsley. Serve with creamed or chipped potatoes and orange salad.

A Salmi of Partridge

Partridges
A little butter
Carrot
Onion
1–2 shallots
1 tablespoonful flour
Little white wine
Stock
1 tomato
A few mushrooms
Croûtons of fried bread

This can be made with either cooked or uncooked birds. If the latter, they should be roasted and left rather underdone, as they will finish cooking in the sauce. Cut each partridge into two or three pieces, according to its size. Remove the skin and the larger bones of the carcase, arrange the pieces in a casserole, and cover whilst making the sauce. Chop up the scraps, put them into a frying-pan with a little butter, a few small pieces of carrot and onion, and one or two shallots. Fry until brown, then sprinkle with about 1 tablespoonful of flour and brown that also. Moisten with a little white wine and stock, and add a tomato cut in pieces. Cover and cook slowly for 1 hour. Meanwhile cook a few fresh mushrooms, putting the trimmings in the sauce. When the sauce is ready, strain it over the pieces of partridge and let them heat thoroughly, but without boiling. In a salmi the sauce should be thick and velvety and the joints of game should seem to have been cooked with it, and must not appear to be swimming in gravy. Garnish with the mushrooms and some croûtons of fried bread.

Game Croquettes

¾ lb. cold cooked game
¾ lb. creamed potatoes
Seasoning
Beaten egg
Breadcrumbs
Fat for frying
¼ lb. mushrooms
Game chips
Parsley or watercress

Remove any bones or pieces of skin from the cold cooked game and mince the flesh finely. Place in a bowl with the creamed potatoes and seasoning, and mix well. Form the mixture into croquettes, coat them with beaten egg and roll them in breadcrumbs. Heat the fat in a pan until smoking hot, then fry the croquettes until they are golden-brown. Drain them carefully, and serve them at once in a hot dish, with grilled or fried mushrooms and game chips. Garnish with parsley or watercress.

Stewed Venison

(Use the shoulder, breast, and neck for stewing.)

1 lb. vension
1½ oz. flour
Salt, pepper, nutmeg
1 onion
1½ oz. dripping
Stock
Bunch of herbs, tied in muslin
1 dessertspoonful vinegar

Cut the venison in joints and toss in the seasoned flour. Slice the onion. Fry the meat and onion in the hot fat until lightly browned, then stir in any remaining flour, and brown, before adding the stock, bunch of herbs, and vinegar. Cover, and stew gently in the oven or on the top of the stove until tender (2–3 hours). Serve with stewed celery or a green vegetable.

Jugged Hare

1 hare
1–2 oz. dripping
1 rasher of bacon
1½ pints stock or water
1½ oz. flour, blended with a little stock
1 onion stuck with 2 cloves
Seasonings
Bunch of herbs tied in muslin
Small bay leaf tied in muslin
4 peppercorns tied in muslin
Small blade mace tied in muslin
1 teaspoonful red-currant or other sharp jelly
1 glass port or other red wine
Force meat balls

Skin and paunch the hare, reserving the blood and saving the liver, heart, and kidneys. Wipe the hare and cut into joints. Heat the dripping in a casserole and fry the joints in it with the bacon. When the meat is lightly browned add stock to cover and stir in the blended flour, the onion, seasonings, and herbs.

Cover and cook very gently in a moderate oven, or on top of the stove, until tender (about 3 hours).

A few minutes before serving remove the onion and herbs. Stir in the strained blood, the red-currant jelly, and the wine. Reheat without boiling, and serve garnished with forcemeat balls.

Roast Stuffed Rabbit

1 rabbit
Fat bacon
Dripping
½ oz. flour
½ pint stock or water
Bread sauce

For the Stuffing

4 oz. breadcrumbs
2 oz. chopped suet
½ teaspoonful thyme
A little grated lemon rind
Salt and pepper
A squeeze of lemon juice
A few drops of piquant sauce
Beaten egg or milk to mix

Prepare the rabbit. Wash the heart, liver, and kidneys, put in cold water and bring to the boil.

Strain, chop finely, and mix in a large basin with the other stuffing ingredients. Stuff the rabbit with forcemeat and sew up, leaving the ends of the string loose so that it can be removed after cooking. Cut the sinews in the hind legs at the thigh, bring legs forward and press closely against body; bend forelegs in the same way, and keep all in position with two fine metal skewers or with string. Tie a piece of fat bacon on the back and cover with greased paper.

Roast for about 1–1½ hours, basting every 15 minutes. A quarter of an hour before it is ready remove the paper and bacon, baste well, and remove skewers and string. Drain the surplus fat from the tin, add the flour, brown it, and add the stock or water to make a thick gravy; boil this for 5 minutes and strain it round the rabbit. Serve with bread sauce.

Rabbit Pie

1 small rabbit	2 tablespoonfuls chopped parsley
2–3 potatoes	¼ teaspoonful mixed herbs
1 onion	1 bay leaf
1 piece of fat bacon	Stock or water
Salt	8 oz. short-crust pastry
4 peppercorns (crushed)	

Wash the rabbit thoroughly and cut into neat joints, putting aside the head and the ribs for stock. Prepare and slice the potatoes and onion. Fill a pie-dish with alternate layers of rabbit, bacon, and vegetables, sprinkling each with seasonings and herbs. Put in the kidney and heart of the rabbit, the bay leaf, and sufficient liquid to come half-way up the dish. Cover with pastry, making a hole to let out the steam, and decorate with pastry leaves. Bake in a hot oven (450° F.) until the pastry is set and lightly browned, then reduce the heat and cook until meat and vegetables are tender—about 1½ hours in all. Fill up with stock and serve hot.

EGG AND CHEESE COOKERY

Both egg and cheese are rich in protein and can be cooked in many different ways to provide a satisfying main course. Cheese should be carefully cooked, otherwise it may become tough and indigestible, grate it finely and avoid boiling cheese sauces. The addition of dry mustard to a cheese dish helps to bring out the flavour.

Plain Omelet

½ oz. butter or margarine	3 eggs
	Pepper and salt

Melt the fat over a brisk heat and tilt the pan so as to allow the sides to become greased. Whisk up the eggs just sufficiently to mix the yolks and whites thoroughly together, and add seasoning. When the fat is beginning to brown, turn the eggs into the pan. Tilt the pan backwards and forwards and gather the mixture in from the sides as it cooks. When it is thick and creamy pour out the egg mixture evenly over the surface of the pan. Allow it to set for a second or two, then tilt the pan away from you and fold the omelet in three, forming a roll in the pan. Brown it slightly on the underside if preferred. Turn the omelet out on to a heated oval dish. Garnish and serve at once.

Ham Omelet

1 oz. butter	4 eggs
2 tablespoonfuls cooked ham	Pepper and salt

Melt the fat in the omelet pan, add the diced ham, and fry until lightly browned. Beat the eggs, season, pour them into the pan over the ham. Allow it to set for a second or two, then tilt the pan away from you and fold the omelet in three, forming a roll in the pan. Brown it slightly on the underside if preferred. Turn the omelet out on to a heated oval dish. Garnish and serve at once.

Soufflé Omelet

3 eggs	3 tablespoonfuls water or milk
Seasoning	½ oz. butter

Separate the egg yolks and whites. Beat the yolks with a wooden spoon until pale and creamy, add seasoning and liquid and beat again. Whisk the whites very stiffly. Now gently melt the butter in the omelet pan, without browning. Carefully fold the egg whites into the yolk mixture, avoiding over-mixing. Grease the sides of the pan with the melted fat and pour in the egg mixture. Cook over a moderate heat until golden-brown on the underside, then place the pan in a moderate oven (350° F.) or under the grill and lightly brown the top of the omelet. Run a spatula gently round the edge and underneath the omelet to loosen it, then mark it in halves and double it over. Turn it gently on to a hot plate, garnish, and serve at once.

Baked Eggs

Use individual oven-proof dishes of glass or china (ramekin cases) for this dish. Place them on a baking-sheet with a knob of butter in each dish and put in moderately hot oven (400° F.) for 1–2 minutes. When the butter is melted, break a fresh egg into each dish, season with salt and pepper, and return to the oven until just set—5–8 minutes. Serve at once.

Scrambled Eggs

2 tablespoonfuls milk	Salt and pepper
½ oz. butter	Buttered toast
2 eggs	

Heat the milk and the butter in a strong saucepan, but do not boil. Beat the eggs, add salt and pepper, and pour into the saucepan. Stir over a gentle heat until the mixture begins to thicken, then remove from the heat and stir until creamy. Pile on to hot buttered toast and serve immediately.

Stuffed Eggs

4 hard-boiled eggs	1 teaspoonful mayonnaise
½ oz. butter or margarine	A little chopped parsley
	Salt and pepper

Cut the eggs in half crossways and remove a small piece of white from the bottom of each, so that they stand firmly. Mix the yolks with the fat, mayonnaise, parsley, and seasoning, and pipe into the cases. Serve with salad and a good mayonnaise.

Scotch Eggs

½ lb. sausages or sausage-meat	Breadcrumbs
3–4 hard-boiled eggs	Fat for frying
2 teaspoonfuls seasoned flour	Parsley
A little piquant sauce	Tomato sauce
Beaten egg	Croûtons of fried bread (optional)

Remove the skins from the sausages and shell the eggs. Pass the eggs through the seasoned flour. Add a few drops of piquant sauce to the sausage-meat and divide equally into 3–4 pieces, according to the number of eggs. Cover each egg with the sausage-meat, doing this as evenly as possible to keep the egg a good shape. Brush over with beaten egg, toss in breadcrumbs, and fry in deep fat from which a very faint blue smoke is rising. As the sausage-meat is raw, it is essential that the frying should not be hurried unduly, and for this reason the fat must not be too hot. When the eggs are golden-brown in colour, remove from the fat and drain. Cut in half width-ways, garnish with a small piece of parsley, and serve with tomato sauce.

The eggs may be placed on croûtons of fried bread.

Welsh Rarebit

4 oz. cheese	A pinch of Cayenne pepper
½ teaspoonful dry mustard	A little milk
	Hot toast

Grate the cheese and add the mustard, pepper, and enough milk to moisten. Melt this in a double boiler or over gentle heat until it is creamy, and pour on to hot toast.

Macaroni Cheese

2 oz. macaroni	Salt and pepper
1 oz. fat	2–3 oz. grated cheese
1 oz. flour	Brown breadcrumbs
¾ pint milk	

Boil the macaroni in the usual way and drain. Melt the fat, add the flour, and cook for a minute.

Gradually add the milk and stir until it boils. Add the salt and pepper and the grated cheese, reserving a little. Add the cooked macaroni and pour into a greased au gratin dish. Sprinkle with brown crumbs and the rest of the cheese, and brown under a hot grill.

Cheese Pudding

6–8 slices bread and butter	2 teaspoonfuls piquant table sauce
2 eggs	4 oz. grated cheese
A little made mustard	1 pint milk
Salt and pepper	1 oz. breadcrumbs
1 chopped onion	

Cut the slices of bread into neat pieces and arrange in a pie-dish. Break the eggs in a basin and add the seasonings, finely chopped onion, and the sauce. Beat well and add the cheese, reserving about a quarter of it for the top. Stir in the milk, pour the mixture over the bread and butter in the pie-dish, and allow to soak for about 15 minutes before baking. Mix the remaining cheese and the breadcrumbs together, sprinkle over the top of the pudding and bake in a moderate oven (350° F.) until the mixture sets.

Cream-cheese Tartlets

3–4 oz. short-crust pastry	1 egg
1 oz. cream cheese	Pepper and salt
½ pint thick white sauce	1 oz. Parmesan cheese
½ teaspoonful piquant sauce	Paprika pepper

Line a number of small tartlet tins with the short-crust pastry. Using a fork, beat together the cream cheese, white sauce, piquant sauce, yolk of egg, and a little pepper and salt to make a creamy consistency. Beat the white of egg until stiff, and fold gently into the mixture. Three-parts fill the lined tartlet tins with the mixture and bake in a moderately hot oven (400° F.) for about 15–20 minutes. Before serving, sprinkle a little grated Parmesan cheese on top and dust with paprika pepper.

Hot Cheese Soufflé

3 eggs	½ pint milk
1 oz. butter	3 oz. grated cheese
1 oz. flour	Salt and pepper

Separate the eggs. Melt the butter and stir in the flour, gradually add milk and bring to boil, stirring. Cool slightly; add cheese, seasoning, and egg-yolks one by one, beating well. Fold in the very stiffly beaten egg-whites, and put mixture into a prepared case. Bake in moderately hot oven (400° F.) about 30 minutes, till well risen and brown. Serve at once.

VEGETABLES

Vegetables, especially greens, should be used as soon as possible in order to retain the maximum food value. When storage is inevitable keep them in a cool, airy place. Prepare the vegetables according to type, and cook by boiling, steaming, braising, baking, or frying (see previous chapter).

Potatoes

Boiled.—Allow these about 20 minutes to cook. For new potatoes a sprig of mint is usually added to the water. Serve glazed with a little margarine.

Steamed.—Allow about 30–40 minutes, according to size; then either serve the potatoes mashed or glaze with margarine and sprinkle with parsley.

Creamed.—Boil or steam some potatoes until tender, and sieve them or beat well with a fork, adding margarine, milk, and pepper. Serve hot, sprinkled with parsley.

Roast.—Cook these in dripping round the meat, or in a separate tin; baste occasionally, and allow about ¾–1 hour. The potatoes are sometimes par-boiled first.

Fried.—Cut the peeled potatoes into chips or rings and dry them in a tea-towel; then fry in smoking-hot fat to cover them completely a few at a time until golden brown. To make game chips slice the potatoes wafer-thin.

Duchesse Potatoes

1 lb. hot cooked potatoes	"Top" of milk
1 oz. margarine	Salt and pepper
1 egg	Beaten egg to glaze

Sieve the potatoes. Melt the fat in a pan, add the potatoes, and when warm add the beaten egg, about a tablespoonful of creamy milk, and seasoning to taste. Turn on to a floured board and divide into small squares. Place these on a greased baking-tin, brush over with beaten egg, and brown in a hot oven (450° F.). If preferred, force the mixture in the form of rosettes, using a large star pipe. Glaze with egg and bake as above.

Potato Salad

Lettuce	1 tablespoonful chopped celery
½ lb. diced cooked potatoes	1 tablespoonful chopped raisins
1 chopped onion	Mayonnaise
1 tablespoonful chopped parsley	

Arrange the lettuce-leaves in a dish. Mix all the other ingredients together and arrange on the lettuce.

Asparagus

Cut off the woody end of the stalks and scrape the white part lightly, removing any coarse spines Tie in bundles, and place upright in a saucepan of boiling salted water. Boil for 10 minutes, then lay flat and continue cooking until tender—a further 10–15 minutes. Drain very well and untie the bundles before dishing. Serve with melted butter (or margarine) or with Hollandaise sauce.

Asparagus may also be served cold, with a vinaigrette dressing or with mayonnaise.

Aubergine or Egg Plant

Egg plants should be of uniform purple colour, firm, smooth, and free from blemishes. To prepare them, cut off the stem and calyx, and wipe over. For some dishes the Egg Plants are required to be peeled; for others the skin is left on. They are usually stuffed and baked, sautéed, or fried.

Beans (Broad)

Shell, and cook in boiling, salted water until tender—20–30 minutes. If liked, serve with parsley sauce.

Towards the end of the season the skins of the beans may be very thick and tough—if this is the case it is well worth removing them before cooking.

When very young and tender, that is, when the pods are only a few inches long and the beans inside very small, the whole pods may be cooked and served, and these make a very delicious dish.

Beans (French and Runner)

Head, tail, and string the beans, and slice them diagonally. Cook in boiling salted water until tender—15–20 minutes, skimming if necessary. Drain well, then toss with salt and pepper and a knob of butter before dishing.

Young beans may be cooked whole if preferred.

Cold cooked French or runner beans are a useful ingredient in salads and hors d'œuvre.

Creamed Beetroot

1 large or 2 small beetroot	Salt and pepper
1 oz. butter	2 teaspoonfuls vinegar
1 oz. flour	Grated horseradish, if liked
½ pint milk	

Cook the beetroot very carefully, preserving its red colour. Skin, and cut into dice. Melt the butter in a pan, and mix in the flour. Add the milk by degrees, and bring to the boil, stirring continuously. Boil for 2–3 minutes, and then add the seasoning and vinegar. Add the cubes of beetroot to the sauce, and heat until the beet is hot through and the sauce coloured pink. Dish and serve at once, sprinkle, if liked, with a little grated horseradish.

Brussels Sprouts and Chestnuts

Brussels sprouts are frequently cooked with chestnuts. The sprouts should be prepared in the usual way and the shell removed from the chestnuts. Put both in boiling water and boil hard for 10 minutes, then strain both free from moisture, and remove the thin brown skin from the chestnuts. Melt 2 oz. butter to about 1 lb. chestnuts and Brussels sprouts, and stew them in the butter until both are thoroughly tender—about 15 minutes. Serve very hot.

Scalloped Cabbage

1 quart shredded cabbage	4 oz. diced or shredded cheese
½ pint well-seasoned white sauce	1 tablespoonful grated cheese

Shred fine white cabbage into ribbons, making 1 quart. Cook until tender in boiling salted water, drain well, and put in a greased baking-dish. To white sauce, made with ½ milk and ½ liquor from the cabbage, add the diced or shredded cheese. Cook gently until the cheese is melted and whip together until smooth. Pour the sauce over the cabbage, stir together lightly, sprinkle with the tablespoonful grated cheese, and brown in a very hot oven (425° F.) or under the grill.

Braised Carrots

1 lb. carrots	A pinch of sugar
1½ oz. butter	Salt and pepper
½–¾ pint brown stock	Chopped parsley

Prepare the carrots and cut lengthways into neat, even slices, or leave whole if young. Put into a pan of cold water, bring to the boil and strain. Heat the butter and fry the carrots golden-brown. Add half the stock, sugar, and seasoning, and cook gently for ½ hour, until tender, basting occasionally and adding the rest of the stock if required. Serve on a hot dish with a little of the liquor poured round and sprinkle with chopped parsley. Braised carrots are excellent with meat stews.

Cauliflower with Cheese Sauce

1 large or 2 small cauliflowers	Seasoning
2–3 oz. grated cheese	Slices of gherkin
¾ pint white sauce	A few capers
	A few mint leaves

Cook and drain the cauliflower and put it into an *au gratin* dish, reserving some of the best flower pieces for garnish. Add the cheese to the white sauce, keeping some cheese to sprinkle over the finished dish, if desired. Season the sauce, pour it over the vegetable, and garnish the dish with the reserved pieces; arrange the gherkin slices and capers to resemble flowers, adding the mint leaves.

To make cauliflower *au gratin*, mix pieces of cauliflower with sauce and pour into the dish. Sprinkle with cheese and brown crumbs, and brown in a hot oven (425° F.) or under the grill.

Braised Celery

Prepare the celery as usual and fry in a little dripping until lightly browned. Add salt and pepper and sufficient stock to half-cover. Cover closely with a lid, and cook gently until tender. Lift the celery on to a hot dish and boil the liquor until of a glazing consistency. Pour over the vegetables and sprinkle with chopped parsley.

Corn on the Cob

Pick the cobs when they are plump and well formed. Homegrown cobs may ripen to a pale golden yellow, but they are very good to eat when still green. Cook as soon after picking as possible.

Remove the outside leaves, leaving on the inner sheath. Put into boiling salted water and cook until tender; this will take about 12 minutes for fresh young cobs, or up to 30 minutes for older cobs. Drain, remove the sheath, and serve very hot, with butter (or margarine), pepper, and salt.

Stuffed Cucumber

1 large straight cucumber	¼ pint Espagnole sauce
¼ lb. chopped ham or sausage-meat	Croûtons of fried bread
Seasoning	Rounds of ham and truffle

Skin the cucumber, cut in 2-in. pieces, and take out the seeds with a round cutter or small vegetable knife. Season the meat, add one tablespoonful of the sauce, and pile into the prepared rounds. Braise slowly for about 20 minutes. Dish on croûtons of fried bread, put on rounds of ham and truffle as a lid, and pour Espagnole sauce (*see* S21) round.

Baked Stuffed Marrow

1 small marrow	1 tomato or a little tomato sauce
½ lb. onions	½ teaspoonful sage
¼ lb. scraps of meat (or liver, sausage, bacon, ham, etc.)	Salt and pepper
4 oz. dry bread (soaked and squeezed)	A little dripping
	Gravy or tomato sauce

Cut a wedge-shaped piece off the top of the marrow and scoop out all the seeds: there is no need to peel the marrow. Prepare and chop the onions, put into a basin with the minced meat (or bacon, ham, etc.), the soaked bread, sliced tomato or sauce, and the sage; season well with salt and pepper. Mix well together and fill into the marrow, then replace the lid. Grease a fireproof dish with dripping, put in the marrow, cover, and bake in a moderate oven (350° F.) until tender—approximately 1 hour. Serve with gravy or tomato sauce.

Stewed Mushrooms

1 lb. mushrooms	1 oz. flour
¾ pint milk	Salt and pepper
1 oz. margarine	Toast

Peel the mushrooms and cut into quarters. Add to the milk and bring to the boil. Melt the fat and add the flour. Gradually add the milk from the mushrooms, stirring until the mixture thickens. Season and pour over the mushrooms. Cover and simmer gently for 15–20 minutes. Serve with toast.

Stuffed Onions

Even-sized onions	Chopped parsley
Savoury cheese stuffing	Sauce or gravy
A little margarine	

After removing the papery outside skins, boil the onions for 30–40 minutes, according to size—do not allow them to become soft. Scoop out the centre portion with a small spoon or pointed knife. Fill the cavity with grated cheese mixed with some sieved dry mustard, breadcrumbs, and a little white sauce; minced bacon, breadcrumbs, and finely chopped sage or any other suitable filling may also be used. Place in a greased fireproof dish, dot the tops with shavings of margarine and bake in a hot oven (425° F.) for about ½ hour, until tender. Sprinkle the top of each stuffed onion with parsley and serve with a good white sauce, a tomato sauce, or gravy.

Seakale

Wash well, cut off the ends, and tie into neat bundles. Cook in boiling salted water to which a squeeze of lemon juice has been added (this is to preserve the white colour) until tender—20–30 minutes. Drain well, remove the string, and serve on toast, coated with a good white or Béchamel sauce. Seakale may also be braised or served *au gratin*. Cold, it may be served with vinaigrette dressing or added to a mixed salad.

Spinach

Wash well in several waters to remove all grit, and strip off any coarse stalks. Pack into a saucepan with only the water that clings to it. Heat gently, turning it occasionally, then bring to the boil and cook gently until tender—about 15 minutes. Drain thoroughly, and reheat with a knob of butter and a sprinkling of salt and pepper. If liked, the spinach may be sieved and one or two tablespoonfuls of white sauce, "top of the milk," or sour cream added to it. Reheat before serving.

Creamed Spinach and Mushrooms

2 lb. spinach	Nutmeg
Salt and pepper	Toast snippets
¼ lb. mushrooms	1 hard-boiled egg (if available)
1 oz. margarine	
½ pint white sauce	

Wash the spinach carefully, strip off any coarse stalks, and put the spinach in a pan with only the water that adheres to the leaves. Heat gently, turning occasionally, then bring to the boil. Boil for about 15 minutes, then drain thoroughly, mash finely, and season. Skin and chop the mushrooms and sauté them in the fat. When cooked add them to the white sauce, with a little grated nutmeg and salt and pepper. Make a border of the cooked spinach and pour the mushroom sauce in the middle. Garnish with toast snippets, and if possible with sieved hard-boiled egg.

Stuffed Tomatoes

4 even-sized tomatoes
1 oz. chopped ham
1 teaspoonful chopped onion
½ oz. butter
2 tablespoonfuls fresh breadcrumbs
½ teaspoonful chopped parsley
1 pinch pepper
½ cucumber
Croûtons of fried bread
Sprigs of parsley

Wash and dry the tomatoes. Cut a small round from each tomato at the end opposite the stalk, leaving it attached at one side. Scoop out the centre with a teaspoon handle. Sauté the ham and onion in the butter for about 3 minutes. Add the crumbs, parsley, seasonings, and pulp removed from the tomatoes. Fill the tomatoes with this mixture and pile neatly on top. Place the lids over and bake in a moderately hot oven (400° F.) for about 15 minutes. The cucumber garnish can be cooked in the same dish. Wipe the piece of cucumber and cut down in four strips. Wrap these in a buttered paper and bake for 15 minutes. Place the tomatoes on the croûtons of fried bread and garnish with parsley and the cucumber.

Green Salad

½ lb. raw peas
1 teaspoonful chopped chives
1 teaspoonful chopped parsley
1 teaspoonful chopped mint
Mayonnaise
1 lettuce
1 bunch watercress

Mix the peas, chives, mint, and parsley with the mayonnaise. Arrange in a dish with lettuce leaves round the edge and garnish with sprigs of watercress.

Summer Salad Bowl

2 lettuces
1 cupful green peas
1 cupful cooked potatoes
2–3 tomatoes
A few spring onions
1 teaspoonful chopped garden herbs (chervil, parsley, tarragon)
French dressing

Wash the lettuces carefully, reserving the best leaves for garnishing. Break up the remainder and combine with the peas, diced potatoes, sliced tomatoes, and thinly sliced spring onions. Add the chopped herbs to the French dressing and toss the salad ingredients lightly in it. Line the salad bowl with lettuce-leaves and pile the salad in the centre.

Russian Salad

Cooked mixed vegetables, such as carrots, peas, beans, potatoes, asparagus, turnips, etc.
A few capers, nasturtium seeds, or pickled cucumber
2–3 tablespoonfuls mayonnaise
Freshly chopped parsley
Watercress
Aspic jelly, if available

Cut the vegetables into small dice or rounds and chop the capers, nasturtium seeds, or cucumber. Mix all the ingredients with mayonnaise and serve in small individual dishes or in a large bowl, garnished with freshly chopped parsley and sprigs of watercress. If some aspic jelly is available, cut it into fancy shapes, or chop and use for garnishing.

Stuffed Tomato Salad

6 even-sized tomatoes
Cooked peas
Diced cooked carrot
Diced cooked potato
Spring onions
Salad cream
Chopped parsley
Lettuce

Cut the top off each tomato and scoop out the inside. Mix the cooked peas, carrot, potato, and finely chopped spring onion, and add sufficient salad cream to make the mixture bind together well. Fill the tomato cases with this vegetable salad, and sprinkle a little chopped parsley over the top of each. Place the tomatoes on a glass dish with some small pieces of lettuce. This salad makes a colourful accompaniment to cold meat or sliced meat loaf. If preferred, a potato-salad mixture instead of the mixed vegetables may be used to fill the tomatoes.

Orange and Watercress Salad

2–3 oranges
1 tablespoonful salad oil
1 dessertspoonful vinegar
1 teaspoonful lemon juice
Watercress
Small cress

Peel the oranges and remove all the white pith; cut them crossways into slices and remove any pips. Mix the salad oil, vinegar, and lemon juice, pour over the oranges, and allow them to stand for a short time before serving. Garnish with watercress and small cress. This salad makes a good accompaniment for hot or cold game dishes; grapefruit may be substituted for the orange, if preferred.

SAUCES AND STUFFING

Sauces are used to flavour, coat, or accompany various dishes, and are in some cases mixed in with the ingredients to bind them together. The foundation of most sauces in which flour is the thickening agent is the "roux" formed by cooking butter and flour together. The butter is melted and the flour added, and the two stirred together. The liquid is added slowly with constant stirring. The sauce must be stirred and boiled for at least five minutes to ensure thorough cooking of the starch grains. For a brown sauce dripping can be cooked until it is a golden brown. Milk, milk and water, or white stock are used for white sauces; vegetable or bone stock for brown sauces, and fish stock for fish sauces. Careful cooking and constant stirring are essential for a good sauce, and if an exceptionally glossy finish is required, the sauce should be strained through a tammy cloth, which is made from a special woollen material of fine texture. Flavouring or colouring should be added just before serving.

SAVOURY SAUCES

Basic White Sauce

1 oz. butter or margarine
1 oz. flour
½ pint milk, or milk and stock
Salt and pepper

Melt the butter, stir in the flour, then add the liquid gradually, stirring well during the process. Continue to stir until the liquid comes to the boil, then boil slowly for 3–5 minutes. Add seasonings.

Note: For a coating sauce, use only ½ pint milk or stock.

Sauces Made from the Basic Recipe

Parsley Sauce.—Add 2 tablespoonfuls freshly chopped parsley and a dash of vinegar just before serving.

Anchovy Sauce.—Add anchovy essence to taste (1–2 teaspoonfuls), omitting salt when seasoning. Add also a drop of pink colouring.

Cheese Sauce.—Add 2 oz. finely grated cheese, and season with mustard and a few drops of vinegar or piquant sauce.

Caper Sauce.—Add 1 dessertspoonful of chopped capers or pickled nasturtium seeds and 1 teaspoonful vinegar.

Mushroom Sauce.—Add 1 oz. of chopped mushrooms to the sauce and cook for 2–3 minutes before serving. If preferred, the sliced mushrooms can be sautéed in the fat when the sauce is being made.

Egg Sauce.—To ½ pint white sauce add 1–2 hard-boiled eggs, finely chopped.

Onion Sauce.—To ½ pint white sauce (made if possible partly from the vegetable liquor) add 1–2 chopped cooked onions.

Bechamel Sauce

1 pint milk
1 shallot
Piece of carrot
1 stalk of celery
1 clove of garlic
1 bay leaf
8 peppercorns
2 oz. flour
2 oz. butter
½ pint cream, if liked
Salt and pepper

Put the milk, vegetables, garlic, bay leaf, and peppercorns into a pan and bring slowly to the boil. Cover and stand near the fire for a few minutes to infuse. Strain and make a sauce, using the flour and butter in the usual way. When cooked allow to cool slightly, then add the cream and seasoning, reheat, but do not boil.

Brown Sauce

1 small onion
1 small carrot
1 oz. butter or dripping
½ pint brown stock or water
1 oz. flour
Seasoning
Gravy browning, meat cube, or glaze, if liked

Chop the onion and carrot into small pieces, melt the butter, and fry the vegetables until deep brown

in colour, but do not allow them to burn. Stir in the flour, blend with the vegetables, and continue to cook until the flour is also golden brown. Gradually add the stock, bring to the boil, stirring meanwhile, and simmer gently for 15–20 minutes, and then strain. Season to taste. If the sauce is not deep enough in colour a few drops of gravy browning may be added, or a meat cube or glaze may be used to improve the flavour.

Espagnole Sauce

2 oz. butter or dripping	1 pint brown stock
2 oz. bacon	1 dessertspoonful mushroom ketchup
1 shallot	A bouquet garni
1 large tomato	Pepper and salt
1 small carrot	
2 oz. flour	

Melt the butter and fry the chopped bacon in it, then fry the sliced vegetables until lightly browned. Add the flour and fry all to a rich golden brown. Add the rest of the ingredients and simmer for 40 minutes, then skim and strain. Reheat the sauce and season it.

Note: A tablespoonful or so of sherry may be added to the sauce just before serving.

Curry Sauce

½ oz. cooking-fat	½ pint stock
1 tablespoonful chopped onion	Salt
1 tablespoonful chopped apple	Lemon juice
1 teaspoonful curry powder	1 dessertspoonful chutney
½ oz. flour	1 teaspoonful table sauce
	1 tablespoonful sultanas

Melt the fat and fry the onion lightly, then the apple, and finally the curry powder and flour. Add the stock gradually and season with salt, boil and skim, then add the lemon juice, chutney, table sauce, and sultanas. Put on the lid and simmer for about 1 hour, stirring frequently. Strain if required.

Mustard Sauce

1 oz. margarine	½ pint water
½ oz. flour	2 tablespoonfuls vinegar
½ teaspoonful dry mustard	Pepper and salt

Melt the fat and fry the flour and mustard lightly. Add the water gradually, and then the vinegar and seasoning. Stir and boil gently for 3–5 minutes.

Hollandaise Sauce

2 tablespoonfuls water or stock	2 oz. margarine
1 dessertspoonful tarragon vinegar	Salt and pepper
2 egg yolks	1 dessertspoonful lemon juice

Put the water or stock, vinegar, and yolks of eggs into a basin and stand the basin in a saucepan of hot water. Whisk over heat until the sauce thickens, then draw the saucepan to one side and add the fat in small pieces, stirring well. Season to taste, and add the lemon juice. The sauce must not boil, or it will curdle.

Mock Tartare Sauce

Small pieces of carrot, turnip, onion, and celery	1 oz. margarine
A blade of mace	1 oz. flour
2 cloves	1 egg
1 bay leaf	½ a lemon
6 peppercorns	1 teaspoonful chopped parsley
½ pint milk or milk and water	½ tablespoonful chopped pickles
	Salt and pepper

Allow the vegetables and herbs to infuse slowly in the liquid for 20–30 minutes, then strain. Melt the margarine, stir in the flour, and fry for a minute or two without browning. Beat in the flavoured milk, adding it a little at a time to prevent lumps forming, then bring to the boil, stirring well. Allow to cool slightly, then beat in the egg and cook for a further few minutes. Add the lemon juice, the chopped parsley, chopped pickles, and seasoning to taste.

Robert Sauce

2 oz. butter	A few peppercorns
2 onions	Salt and pepper
1 tablespoonful flour	Mustard
½ pint brown stock	Vinegar
Bunch of herbs	Lemon juice
Bay leaf	

Melt the butter and fry the sliced onions in it over gentle heat until golden brown—about 10 minutes. Stir in the flour, to form a roux, then gradually add the stock and bring to the boil, stirring. Add the herbs, bay leaf, and peppercorns tied in muslin and season with salt. Cover and simmer for about ½ hour, then remove the bag of herbs and stir in the mustard, vinegar, and lemon juice to taste, with more salt and pepper if necessary. Serve with goose, pork, veal, or steaks.

Tomato Sauce

1 small onion	½ pint stock
A piece of carrot	1 oz. flour
½ lb. tomatoes	Seasoning
1 bay leaf	½ oz. dripping or margarine
A little milk	
A bunch of herbs	

Prepare the vegetables, and cut into small pieces. Place with the tomatoes and the fat in a strong pan and heat gently, stirring, until the fat is absorbed. Add the herbs and the stock and simmer for about ½ hour, then rub through a fine sieve. Add the flour blended to a smooth cream with a little milk, season and cook the sauce for a further 2–3 minutes, stirring.

Apple Sauce

2 lb. apples
1–2 oz. butter or margarine
Sugar, if required
Lemon juice, if required.

Choose good cooking apples, peel and slice with a stainless-steel knife, then cook gently to a pulp in a covered pan. Beat with a wooden spoon until smooth, and add the butter. Sugar may be added if liked, but a tart apple sauce is just the right accompaniment to a goose or duck. On the other hand, if the apples are sweet, a little lemon juice may be added.

Bread Sauce

½ pint milk or milk and vegetable stock mixed	A small blade of mace
1 teaspoonful chopped onion	2 oz. breadcrumbs (or stale bread soaked and squeezed)
1 clove	Salt and pepper
	A knob of margarine

Put the liquid into a pan with the onion, clove, and mace, and allow to infuse for about ½ hour. Strain and add the breadcrumbs, seasoning, and the knob of margarine. Leave in a very warm place at the side of the stove for 15 minutes, and make very hot before serving.

Horseradish Cream

1–2 tablespoonfuls grated horseradish	Cream or evaporated milk
1 tablespoon vinegar	Salt, pepper, and sugar

Soak the grated horseradish in the vinegar for 10–15 minutes. Stir in enough cream or evaporated milk to give the desired consistency, and season with salt, pepper, and sugar.

Maître D'Hôtel Butter

1 oz. butter	1 teaspoonful lemon juice
1 teaspoonful finely chopped parsley	Salt and pepper

Mix all the ingredients thoroughly into a creamy paste, using a fork or wooden spoon. Shape into pats and make very cold. Serve with grills, etc.

Mint Sauce

2 tablespoonfuls chopped mint	1 tablespoonful boiling water
1 teaspoonful sugar	1½ tablespoonfuls vinegar

Strip the mint from the stalks and chop it finely. Put the sugar and boiling water in a sauce-boat and stir until dissolved. Add the mint and stir in vinegar to taste.

Cranberry Sauce

Pick and wash 1 lb. cranberries and put them into a stewpan with 1 teacupful of water. Stew until reduced to a pulp, bruising them well with the back of a wooden spoon. Then add ½ lb. sugar, and a little port wine, if desired.

SWEET SAUCES

Basic White Sweet Sauce

½–1 oz. margarine	1 teaspoonful sugar
½–1 oz. flour	Vanilla essence or other flavouring
½ pint milk	

Melt the margarine, stir in the flour to form a roux, and cook for 1–2 minutes without browning. Add the milk a little at a time, stirring well to keep the mixture smooth. Bring to the boil, stirring all the time, and cook for 2–3 minutes, beating the sauce to make it smooth and glossy. Sweeten and flavour to taste and use as required.

Sweet Sauces Made from the Basic Recipe

Chocolate Sauce.—Add 1 tablespoonful of cocoa and a few drops of vanilla essence. Sweetened chocolate powder may be used in place of cocoa, in which case sugar will not be needed.

Lemon Sauce.—To the cooked sauce add lemon juice or substitute and a drop or so of lemon essence. A little extra sugar may be needed in this sauce.

Orange Sauce.—Use finely grated orange rind to flavour the sauce.

Butterscotch Sauce

3–4 oz. granulated sugar	½ oz. margarine
½ pint boiling water	2 teaspoonfuls flour
	½ pint milk

Put the sugar into a thick saucepan and heat gently until it caramelises; shake the pan during cooking to prevent uneven browning, but do not stir. When quite liquid and of a good brown colour, remove from the heat, cool slightly, and add the boiling water by degrees. Return to the heat and simmer until caramel is dissolved. Make a white sauce with the other ingredients and stir in the dissolved caramel. Boil for a further 2 minutes and serve hot or cold.

Custard Sauce

2 teaspoonfuls flour	1 teaspoonful sugar
½ pint milk	Vanilla essence
1 egg	

Blend the flour to a smooth cream with a little milk. Heat the remainder, and when hot add to the blended flour, stirring. Cool slightly, then add the egg and heat gently to cook the egg without curdling. Add sugar and vanilla essence to taste. If the sauce is to be served cold, cover while cooling to prevent skin from forming, and heat occasionally.

Chocolate Sauce

1½ oz. unsweetened chocolate	Pinch of salt
½ pint water	½ oz. butter
1 teaspoonful cornflour	2 oz. sugar
	Vanilla essence

Break up the chocolate, add half of the water, and dissolve over gentle heat. Mix the cornflour and salt to a smooth cream with a little of the remaining cold water, heat the rest and, when it is boiling, pour it on to the blended cornflour, stirring. Return it to the pan and bring to the boil, stirring. Add the dissolved chocolate, butter, and sugar, and cook for 4–5 minutes, stirring well. Lastly, add a few drops of vanilla essence.

Jam Sauce

½ teaspoonful cornflour or arrowroot	2 tablespoonfuls jam
½ pint water	A little lemon juice
	Colouring, if necessary

Blend the cornflour or arrowroot with a little water. Add the rest of the water, bring to the boil, and allow to cook for about 2 minutes. Stir in the jam, and add the lemon juice, and tint, if necessary, with a little colouring. Strain before serving.

Syrup Sauce

4 tablespoonfuls water	2 tablespoonfuls golden syrup
Juice of half lemon	

Mix all the ingredients together and boil rapidly for a few minutes.

Marshmallow Sauce

4 oz. granulated sugar	Few drops of vanilla essence
3 tablespoonfuls water	Colouring
8 marshmallows	
1 egg white	

Dissolve the sugar in the water, then boil together for about 15 minutes. Add the marshmallows, cut into small pieces with scissors. Beat the egg white very stiffly, then gradually fold in the marshmallow mixture. Add vanilla and enough carmine or cochineal to tint pale pink. Serve with ice-cream.

Note: Peppermint may be used instead of vanilla to flavour; in this case colour the sauce pale green.

Melba Sauce

4 tablespoonfuls redcurrant jelly	2 teaspoonfuls arrowroot or cornflour
3 oz. sugar	1 tablespoonful cold water
½ pint raspberry purée	

Mix together the jelly and sugar and the raspberry purée, and heat until boiling. Blend the arrowroot or cornflour with the cold water and add to the raspberry mixture. Continue cooking until the mixture becomes thick and clear, stirring all the time with a wooden spoon. Strain and cool.

Note: This is excellent to serve with peach melba and other sundæs.

Brandy Butter or Hard Sauce

2 oz. butter	1 dessertspoonful brandy
2 oz. castor sugar	

Beat the butter and sugar to a white cream, then gradually beat in the brandy. Leave in a cool place until required; serve piled up in a fancy dish.

STUFFINGS

Sage-and-onion Stuffing

2 large onions	4–5 sage leaves or 2 teaspoonfuls dried sage
Boiling water	½ teaspoonful salt
½–1 oz. butter	¼ teaspoonful pepper
4 oz. breadcrumbs	

Put the prepared onions into cold water, bring to the boil and cook for 5 minutes, then strain off the water, cover with fresh boiling water, and cook until tender. Drain well and chop finely, then add the butter, crumbs, chopped sage, and seasoning, and mix well together. Use for stuffing goose and duck, or to serve with pork.

Sausage Stuffing

1 large onion	½ teaspoonful mixed herbs
1 lb. pork sausage meat	4 tablespoonfuls fresh breadcrumbs
1 oz. dripping	Seasoning
1 teaspoonful chopped parsley	

Mix the chopped onion and the sausage meat, and sauté them in the dripping for a few minutes. Mix in the other ingredients and use as required.

Chestnut Stuffing

1 lb. chestnuts	A little grated lemon rind
½ pint stock or milk	Salt and pepper
2 oz. ham or bacon	1 teaspoonful chopped parsley
1 teaspoonful sugar	1 egg
1 oz. margarine	

Make a slit in both ends of the nuts and boil in water for 10 minutes, then skin them. Put them into a pan with stock or milk to cover, and simmer gently until tender and mash or sieve them. Pound with the finely chopped ham or bacon, add the crumbs, parlsey, melted fat, lemon rind, season with salt and pepper, add sugar, and bind with the beaten egg. Use to stuff turkey, chicken, etc.

Veal Forcemeat

2 oz. suet	¼ teaspoonful mixed herbs
1–2 oz. ham or bacon	Rind of ½ lemon
4 oz. breadcrumbs	Salt and pepper
2 teaspoonfuls parsley	Beaten egg

Chop the suet and the ham or bacon finely and mix with the crumbs; and chopped parsley, herbs, and grated lemon rind. Season, and add enough beaten egg to bind. Use for stuffing veal, chicken, rabbit, hearts, etc., or as forcemeat balls.

Oyster Stuffing

18 sauce oysters	A pinch of mace
6 oz. breadcrumbs	Salt and Cayenne
1 dessertspoonful parsley	2 oz. suet *or* 1½ oz. butter
Grated ½ lemon rind	1 egg

Beard and cut up the oysters, simmer the beards in the oyster liquor to extract the flavour, then strain. Mix dry ingredients and fat, add the oysters, the lightly beaten egg, and oyster liquor to moisten. Use for stuffing the breast of a boiled turkey. Small tinned oysters may be used for this stuffing.

Fish Forcemeat

3 oz. breadcrumbs	2 teaspoonfuls chopped parsley
1 oz. chopped suet or melted margarine	Salt and pepper
Grated rind of ½ lemon	Egg or milk
½ teaspoonful dried herbs	

Mix all the ingredients together, adding sufficient beaten egg or milk to bind.

PASTRIES

A few basic rules should be followed for successful pastry making. Working conditions must be cool, and a hot oven is essential. Handle the pastry as little as possible, and measure the ingredients accurately. Avoid stretching the pastry during the rolling. The richer puff and flaky pastries are improved if left in a cool place between rollings, and again before baking. The richer the pastry, the hotter the oven must be.

Suet Crust

8 oz. flour
1 teaspoonful baking-powder
½ teaspoonful salt
3–4 oz. chopped or prepared suet
Cold water to mix

Mix flour, baking-powder, salt, and suet together, add cold water to give a light elastic consistency, and handle as little as possible. Turn on to a floured board, knead very lightly, and use as required.

Dumplings

Roll the dough of suet-crust pastry into balls and add to boiling soups, stews, etc., allowing 20–25 minutes, according to size.

Syrup Layer Pudding

8 oz. suet crust	1 oz. breadcrumbs
1 lemon	4–6 oz. golden syrup

Make the pastry, adding the grated lemon rind to the flour. Mix the breadcrumbs and lemon juice with the syrup. Divide the pastry into six pieces, graduating in size. Put 1 tablespoonful of the syrup mixture into the bottom of a greased basin. Roll the smallest piece of pastry into a round and place on top of the syrup. Cover with a tablespoonful of syrup and then the next largest piece of pastry, rolled to a round, repeating till the pastry is used up and the basin two-thirds full. Cover with greased paper and steam 2½–3 hours. Turn out on to a hot dish and serve at once. Black treacle may be used in place of syrup, or a mixture of both.

Short-crust Pastry

8 oz. flour	4 oz. fat
A pinch of salt	Cold water

Sieve the flour and salt into a basin. Add the fat, cover it with flour, and then rub the two together with the tops of the fingers until the mixture resembles breadcrumbs. Lift up the flour and fat in the hands while doing this and let the cold air mix with them. Then make a hollow in the centre, and add cold water very gradually with the left hand while continuing to mix with the right. Add just sufficient water to make a stiff dough; if the pastry is made too moist, it will not be short. Turn the pastry on to a floured board and knead it lightly with the hand until it is free from cracks; then roll it out to the thickness required.

Cornish Pasties

6 oz. raw potato	Salt and pepper
¾ lb. lean raw steak or mutton	2–3 tablespoonfuls cold water
1 tablespoonful chopped onion	1 lb. short-crust pastry
	Yolk of egg or milk

Wash and peel the potatoes and cut into dice. Mix with the meat (cut up very small or minced), the finely chopped or minced onion, seasoning, and water. Roll out the pastry thinly and cut into rounds about the size of a saucer. Wet the edges of the pastry and put a tablespoonful of the meat mixture on each round. Fold over, press the edges of the pastry well together, and flute with the fingers. Stand the pasties upright on a baking-sheet, brush over with a little beaten egg or milk and bake in a hot oven (425° F.) till the pastry begins to brown, then reduce to a moderate heat (350° F.) and continue cooking until the meat is tender—about 1 hour in all.

Apple Pie

1½ lb. apples	½ lb. short-crust pastry
2 oz. sugar	Milk or egg white to glaze
Cold water	

Peel, core, and slice the apples. Half-fill a dish with fruit, then add sugar, the rest of the fruit, and water to cover the bottom of the dish. Roll out the pastry 3 in. wider and longer than the pie-dish. Cut off strips 1 in. wide, moisten the edge of the dish with water, and lay the pastry strips on the edge of the dish; press in place. Moisten the pastry strip with water. Lift the piece of pastry on the rolling-pin and lay it over the pie-dish, taking care not to stretch it. Press the edges in place and trim them with a sharp knife. Decorate the edges of the pie and brush over with milk or white of egg. Bake near the top of a hot oven (425–450° F.) for 20 minutes, then remove to a lower part of the oven and continue cooking until the fruit is cooked.

Bakewell Tart

4 oz. short-crust pastry	1 egg
Raspberry jam	2 oz. ground almonds
2 oz. butter or margarine	1–2 drops almond essence
2 oz. sugar	Icing sugar

Line a flan ring or sandwich tin with the pastry and spread with a layer of raspberry jam. Beat the fat and sugar together until soft and creamy. Add the beaten egg by degrees, beating very thoroughly. Stir in the ground almonds and a drop or two of almond essence and spread over the jam in the pastry case. Bake in a moderately hot oven (400° F.) for 30–40 minutes, until the tart is well risen and brown and the filling is set. Dredge with icing sugar.

Custard Tart

4 oz. short-crust pastry	½ pint milk (short measure)
1 egg	Nutmeg
½ oz. sugar	

Line a fireproof baking-plate with the pastry. Beat the egg and sugar together and pour on the hot milk, stirring meanwhile. Strain into the prepared pastry case and grate a little nutmeg over the mixture. Bake in a hot oven (425° F.) for about 10 minutes, until the pastry is set, and then reduce the heat and continue to bake in a moderate oven (375° F.) until the custard is set.

Lemon Meringue Pie

4 oz. short-crust pastry	1½ oz. sugar
1 level tablespoonful cornflour	1 lemon or 2 tablespoonfuls lemon squash
4 tablespoonfuls cold water	1 egg

Line a flan-ring or pie-plate with the pastry and decorate. Prick the bottom and bake "blind."

Meanwhile, blend the cornflour with the water, add the sugar, lemon juice or squash, and grated lemon rind. Bring to the boil in a small saucepan, stirring well, and boil for 2 minutes. Allow to cool slightly, then stir in the egg-yolk and pour into the pastry case. Whip the white of egg very stiffly, fold in a little sugar, and pile on top. Bake in a moderate oven (375° F.) for a few minutes, until a light golden-brown.

Syrup Tart

6 oz. short-crust pastry	2 oz. breadcrumbs
3–4 tablespoonfuls golden syrup	Juice of ½ a lemon

Line a sandwich tin or a fireproof plate with the pastry, prick the bottom and place breadcrusts on it to prevent the pastry rising. Bake in a hot oven (450° F.) for about 15 minutes. Remove from the oven, pour in half the syrup, sprinkle on the breadcrumbs, add the lemon juice and the rest of the syrup. Decorate with strips of pastry and bake in a moderately hot oven (400° F.) for 20 minutes.

Flaky Pastry

8 oz. flour	A good squeeze of lemon juice
¼ teaspoonful salt	Cold water to mix
3 oz. lard	
3 oz. butter or margarine	

Sieve the flour and salt into a basin. Divide the fat into four portions, using half-lard and half-butter in each portion. Rub one portion of fat into the flour until it is as fine as breadcrumbs and mix to a soft dough, using lemon juice and water. Knead lightly and roll out into a long strip. Put one-third of the remaining fat in small flakes over two-thirds of the pastry, taking care not to put it too close to the edges. Fold the pastry in three, the plain part being folded over the fat. Seal the edges of the pastry with a rolling-pin and half-turn it to bring the folded edges to the sides. Press firmly and again roll out into a long strip. Repeat this process twice, using up the remaining two-thirds of fat. Roll out and fold once more, and allow the pastry to stand in a cool place until required.

Sausage Rolls

Roll some flaky (or rough puff) pastry rather thinly and cut this into strips about 3½ by 5 in. Divide a raw sausage into four or six pieces and roll the pieces to the required shape. Place a piece of sausage across one end of each strip of pastry, damp the edges, fold the rest of the pastry over, seal the edges neatly, and glaze if required. Bake in a hot oven (450° F.) for 20–30 minutes.

If larger rolls are needed, the sausages may be semi-cooked (prick and bake), left till cold, and then placed whole on the pastry. Brush the tops with beaten egg and bake as above.

Prawn Patties

8 oz. flaky pastry	¼–½ pint white sauce
Egg to glaze	Parsley
½ pint picked prawns	Watercress

Roll out the pastry to ¼ in. in thickness and cut it out with a fluted pastry cutter. Using a smaller cutter, mark the centre of each round, cutting about half-way through the pastry. Glaze the top with a little beaten egg and bake in a hot oven (450–475° F.) for 15–20 minutes, until well risen and golden-brown. Carefully take out the round "lids." Mix the prawns with enough well-flavoured white sauce to bind them together, and fill the patties with this mixture. Replace the "lids" if desired. Garnish the patties with parsley and watercress, and serve them either hot or cold, with a few large prawns arranged to decorate the dish.

Eccles Cakes

8 oz. flaky (or rough puff) pastry	1 oz. chopped candied peel
4 oz. cleaned currants	1 oz. sugar
Nutmeg and spice to taste	1 oz. butter
	White of egg to glaze
	Sugar to dredge

Roll the paste to ⅛ in. thick and cut into rounds about 4″ in diameter. Mix the other ingredients and place a spoonful in the centre of each round. Damp the edges and draw them together, forming a ball-like shape. Turn the smooth side uppermost, flatten into a round, and cut lightly, marking the top into squares, so that the currants show. Brush with white of egg, sprinkle with sugar, and bake in a hot oven (450° F.) for about 20 minutes.

Mince Pies

12 oz. flaky pastry	Beaten egg
Mincemeat	Icing sugar

Divide the pastry in half and roll it out thinly. Cut rounds of pastry large enough to fit some patty tins and put about 2 teaspoonfuls of mincemeat in each. Roll out the rest of the pastry and cut out slightly smaller rounds for the lids. Damp the edges of the pastry lining the patty tins and press on the tops. Flake up the edges with a knife, and snip the top of each, using scissors. Brush the top of each mince pie with beaten egg, and bake in a hot oven (450–475° F.) for 25–30 minutes. Dredge the tops with icing sugar, and serve the pies hot or cold, as preferred. Short-crust, rough puff, or puff pastry may also be used, and fruits, such as sliced apples or raspberries, make a variation in filling.

Rough Puff Pastry

8 oz. flour	2–3 oz. lard
¼ teaspoonful salt	¼ teaspoonful lemon juice
2–3 oz. butter or margarine	Cold water

Sieve the dry ingredients into a basin, and add the fats, cut into pieces the size of a small nut. Add the lemon juice, mix into a dough with cold water, and turn on to a floured board. Roll out into a long, narrow strip, always rolling with a forward movement and not too heavily. Fold in three, turn the pastry half-round, bring the join to the right-hand side, seal the edges, and roll again. Repeat this until the pastry has had four turns. (A roll and a fold is called "a turn.") Cool the pastry thoroughly before using; if wrapped in a floured cloth or greased paper it can be kept overnight.

This pastry is useful for meat pies and savoury pastries of all kinds.

Puff Pastry

8 oz. butter	A squeeze of lemon juice
8 oz. flour	Cold water
Salt	

This pastry, when well made, consists of innumerable thin layers which melt in the mouth, and in both appearance and taste it is superior to any other type. Its characteristic lightness depends on the amount of cold air enclosed by the special method of making, and the expansion of that air during the baking.

Butter gives the best results, but a mixture of two-thirds margarine and one-third lard may be used. If butter is used, it should first be washed to remove all salt and butter-milk. Put it into a basin under a tap of cold running water, heat the hands in hot water and chill them in cold, then squeeze the butter in the water until of a waxy consistency and easy to handle. Then dry it in a lightly floured cloth and pat it until every drop of water has been expelled.

Sieve the flour into a basin, add a pinch of salt, then take a piece of the butter about the size of a walnut and rub it into the flour with the finger-tips. Make a well in the centre, put in a squeeze of lemon juice, which helps to lighten the pastry, and add sufficient cold water to form a dough. The aim should be to get both the dough and the butter of the same consistency.

Form the dough into one lump and turn it out on a lightly floured board. Knead vigorously for about 10 minutes, until it is smooth and velvety and no longer sticks to the fingers. When it is smooth and elastic, take the rolling-pin and roll it out into a thin square or round. Shape the remainder of the butter into a flat cake and place it in the centre. Fold over the sides of the dough so as to enclose the butter completely, at the same time leaving room for the spread of the butter when rolling. Pat down with the rolling-pin and roll out into a long narrow strip. Now fold the pastry in three, folding the first flap from you and the second towards you. Then turn the

pastry half-way round, bringing the folds to the right-hand side.

Press the edges firmly with the rolling-pin, to enclose all the air possible; this finishes what is called one "turn" in pastry-making. Puff pastry requires seven "turns" or rollings in all, but as too much rolling at one time would make it too soft, it has now to be put aside in a cool place for at least ¼ hour, covered with greaseproof paper or with muslin wrung out in cold water. Bring it out again on to the board and give it two turns in exactly the same way as the first one. Again lay it aside, and repeat this twice more, until the pastry has had its seven turns in all.

The baking of puff pastry requires as much care and judgment as the making. The secret of success lies in having the pastry cold and the oven hot. The temperature should be from 450° to 500° F. to begin with, and when the pastry has risen its full height, the heat may be reduced slightly to allow it to finish cooking.

Puff pastry is used for any dish requiring a very light pastry, such as *vol-au-vent* patties, small French pastries, mince pies, etc.

Chicken Vol-au-vent

8 oz. puff pastry	½ pint white coating sauce
Beaten egg	2 oz. mushrooms
6 oz. diced cooked chicken	Cress and parsley

Roll out the pastry to about 1 in. in thickness and cut into a round, using a large cutter or a saucer. Using a smaller cutter or a knife, mark another circle inside, to form a lid. Make some decorative cuts around the top edge of the pastry and brush it with a little egg. Bake in a hot oven (475° F.) for 30–35 minutes, covering the top of the pastry if it tends to become too brown. When it is cooked, remove the lid and take out any soft dough inside. Heat the diced chicken in the white sauce and fill the vol-au-vent case. Serve garnished with grilled mushrooms, and with cress and parsley.

Jam Puffs

Puff pastry	Egg white
Jam	Castor sugar

Roll the pastry thinly and cut it into squares. Put a little jam on one side, fold the pastry over to form a triangle and seal the edges firmly. Brush over with egg white and sprinkle with sugar. Bake in a hot oven (475° F.) for 10–15 minutes.

Vanilla Slices

6 oz. puff (or flaky) pastry	Vanilla essence
Mock cream, cream, or thick custard	Raspberry or strawberry jam
	White glacé icing

Roll the pastry ¼ in. thick and form into a strip 4 in. wide. Cut into oblong pieces about 1½ in. wide and bake in a hot oven (475° F.) for 10 minutes. Allow the slices to become quite cold, then sandwich two or three of them together with jam and the mock cream, cream, or thick custard, which has been flavoured with vanilla essence. Top the slices with a little white glacé icing, made according to directions. Serve these pastries as a cold dessert, or for tea.

Choux Pastry

¼ pint water	2½ oz. flour
1 oz. butter or margarine	A pinch of salt
	2 eggs

Place the water and fat in a saucepan and bring to the boil. Add the flour and salt to the mixture and beat well over a low heat until it forms a ball. Cool slightly and add the eggs a little at a time, beating well. Using a forcing-bag, force into éclair shapes on to a greased tin. Bake in a moderately hot oven (400° F.) for about 30–40 minutes. Allow to cool slightly, slit down one side, and remove any soft part from the inside. Fill with sweet or savoury filling.

Chocolate Eclairs

Synthetic or fresh cream or thick custard	Choux pastry
	Chocolate glacé icing

Make the choux paste, and put into a large forcing bag fitted with a plain ½- or ¾-in. nozzle. Pipe fingers of paste about 3½–4 in. long on to a greased baking sheet, keeping the éclairs very even in size. Bake in a moderately hot oven (400° F.) for about 30–40 minutes, according to size, until the éclairs are well risen, golden-brown, and very light in texture. Remove them from the tin, slit each down the side to allow the steam to escape, and put on a rack to cool. Fill them with whipped cream, mock cream, or a thick sweet custard, and coat the top of each with a little chocolate glacé icing.

Cream Buns

Sweetened or mock cream, or thick custard	Choux pastry
	Icing sugar or chocolate sauce

Make the choux paste and put it into a forcing-bag fitted with a plain ½- or ¾-in. nozzle. Pipe the mixture in rounds on to a greased baking-tin, which should be covered with an inverted meat tin, or into a tin which has a tightly fitting lid. Cover, and bake in a moderately hot oven (400° F.) for 45–50 minutes without opening the tin, as this would cause the steam to escape and the buns to collapse. When they are cooked, remove them carefully, slit to allow the steam to escape and leave them on a rack to cool. Fill them with cream or custard and dredge with icing sugar, or serve with a chocolate sauce.

Profiteroles

To make these miniature cream buns, force small balls of choux pastry through a ½-in. plain pipe on to a baking-sheet, and bake in a moderately hot oven (400° F.) till well risen, crisp, and golden-brown (20–25 minutes). Split and cool on a rack. Fill with cream, and ice with glacé icing.

Flan Pastry

Flan or biscuit crust is a richer, sweetened type of short-crust pastry, suitable for flans and cold lunch or dinner sweets and for tea-time pastries.

Basic Recipe

4 oz. flour	1 teaspoonful sugar
A pinch of salt	1 egg yolk
2 oz. fat	Cold water to mix

Sieve the flour and salt into a bowl and rub in the fat (margarine or a mixture of margarine and white fat) using the finger-tips. Add the sugar and mix with the egg-yolk and sufficient cold water to make a stiff dough. Knead slightly till it is quite smooth, then use as required. To line a flan ring: Place a flan ring on greaseproof paper on a baking-tin. Line the flan ring with pastry, without stretching it. Lightly roll across top of flan to trim edge cleanly. Put greaseproof paper in the flan and fill it with baking-beans. (A sandwich tin may be used instead of a flan ring.)

Flans are frequently baked "blind," but the filling is sometimes added first and cooked with the pastry. Flan pastry should be cooked in a hot oven (425° F.); after about 10–15 minutes remove the beans and lower the temperature to finish cooking the pastry a further 5–10 minutes.

Mixed Fruit Flans

Bake some pastry flan cases and fill with fresh, tinned, or lightly stewed fruit, drained free of juice. Make a jelly glaze by dissolving 1 teaspoonful of gelatine (or more, according to type) in ½ pint of the sweetened fruit juice. When just beginning to set, pour it over the fruit.

Balmoral Tartlets

6 oz. flan pastry	½ oz. cake-crumbs
1 oz. margarine	1 oz. glacé cherries and candied peel, mixed
1 oz. castor sugar	¾ oz. cornflour
1 egg	

Line ten to twelve patty tins with the pastry. Cream fat and sugar until light and white, and beat in egg-yolk. Add the crumbs, shredded cherries, and peel and cornflour. Fold in the stiffly beaten egg-white. Put thin strips of pastry over the top, and bake in a moderate oven (375° F.) for 20 minutes.

Hot-water Crust Pastry

8 oz. flour	¾ gill hot water or milk and water
½ teaspoonful salt	
2 oz. lard	

Sieve the flour and salt into a warm basin. Melt the lard in a small saucepan, add the liquid,

and bring just to boiling point. Pour this mixture into the centre of the flour and mix quickly into a paste. Turn out on to a floured board and knead with the hands until smooth and free from cracks. Form into the shape required as quickly as possible, as this pastry hardens on cooling.

Raised Veal-and-ham Pie

For the Filling

12 oz. veal	Pepper and salt
¼ lb. ham	Cold water
Parsley	2 eggs
1 lemon	Some jelly stock

For the Pastry

1 lb. flour	1½ gills water or milk and water
1 teaspoonful salt	Yolk of egg to glaze
4 oz. lard	

To Prepare the Filling.—Remove any skin and bones from the meat, wipe with a damp cloth, and cut it in small pieces. Add to it the ham, cut in small pieces, and season with chopped parsley, a little grated lemon rind and juice, pepper, and salt. Mix well together and moisten with a little cold water. Hard-boil the eggs and cut them into six to eight pieces.

To Make the Pie-crust.—Make the pastry as directed above. Cut off about a quarter of the quantity and keep it warm for making the lid and decoration later on. Mould the larger piece with the hands into an oval or round pie-case, making it the desired height and with walls and bottom of an equal thickness. At first the pastry may be inclined to collapse, but as it hardens it will stand up and retain its form. Sometimes a jar or tin is put in the centre to help with the moulding.

To Finish the Pie.—Fill the case with the meat mixture and eggs, and shape it up again if necessary. Roll out the remaining piece of pastry, wet the inside edge of the pie-crust and lay on the cover. Press the two edges together, and trim round neatly with a pair of scissors, leaving a ridge about ½ in. in height standing straight up round the pie. Snip this ridge with the scissors at a distance of ½ in. apart. Then, with the fingers bend the fringe-like pieces outwards and inwards alternately, to make a pretty edge. Make a good hole in the centre of the pie and brush all over with yolk of egg beaten with a little water. Roll out any remaining scraps of pastry and cut out leaves and narrow strips for decoration. Fix these on to the sides and top of the pie and give them also a coating of egg. Pin or clip a double piece of stiff kitchen paper (greased on the inside) round the outside of the pie, to keep it in position. Lift the pie with a fish-slice or broad knife and place it on a greased baking-tin.

Bake in a hot oven (425° F.) for 15–20 minutes, and then in a cooler one for 1½ hours or longer, until the meat feels quite tender when tested with a skewer and the pastry is golden-brown. Have ready some well-seasoned stock that will jelly when cold: this may be made from the bones and trimmings of the veal, with a little gelatine added if necessary. Fill up the pie with this by means of a filler, and set it aside until cold. Serve with salad.

Pork Pie

1 lb. lean pork pieces	Pepper and salt
1 apple	1 lb. hot-water crust
A pinch of powdered cloves	Egg yolk
	Stock

Wipe the meat and cut into small pieces. Peel, core, and slice the apple and mix it with the meat, together with the cloves and seasoning. Sprinkle with 1 tablespoonful of water. Wash any bones, place them in a pan, cover with cold water, and allow to simmer gently to make stock for the pie.

Make the pastry; cut off one-quarter of the paste and leave it in a warm place. With the remainder line the raised pie mould, or shape it by hand into an oval or round case, then fill up with the prepared meat mixture. Roll the reserved piece of pastry to form a lid. Make a hole to allow the steam to escape, trim the edges, and decorate as desired. Brush the top with egg yolk, and if a mould is not being used, pin a band of greased paper round the pie. Bake in a moderately hot oven (400° F.) for about 1 hour, then reduce to a moderate heat (350° F.) and cook until the meat feels tender when tested with a skewer. When the pie is cooked fill it up with well-seasoned stock and serve hot or cold.

An economical raised pie can have sausage meat as its main filling. Add some hard-boiled egg, herbs, and a par-boiled onion, all finely chopped. Season well, and fill the pastry case. Bake in a hot oven (425° F.) for about ½ hour to cook the pastry, then reduce temperature and cook for a further hour.

Game Pie

½ lb. veal and	1 blackcock, or other game bird
½ lb. pork *or*	1 lb. hot-water crust
1 lb. sausage-meat	Beaten egg to glaze
Seasonings	Stock
1 rasher bacon	

Cut up the meat and mince it finely, mixing it with the seasonings. Cut the bacon into small pieces and the game into small joints, removing the bones. Line a tin or pie mould with pastry and put a layer of minced meat (or sausage-meat) at the bottom and round the sides. Put the game and bacon in the pie and then a layer of meat or sausage-meat. Cover with pastry and decorate. Glaze the top and bake for about 2 hours in a moderately hot oven (400° F.). Add stock.

PUDDINGS HOT AND COLD

Baked Custard (Basic Recipe)

1 pint milk	1 oz. sugar
2 eggs	Nutmeg

Heat the milk, but do not boil it. Beat the eggs and the sugar, then add the hot milk, stirring. Strain into a greased pie-dish and grate a lit[tle] nutmeg on the top. Bake in a slow oven (350° F.) for about 40 minutes, until the custard is set.

On no account allow the mixture to boil, or the eggs will curdle.

Bread-and-butter Pudding.

2–3 slices thin bread and butter	½ oz. sugar
1–2 oz. currants or sultanas	½ pint milk
	1 egg
	Nutmeg

Cut the bread and butter into neat strips, and lay in a buttered pie-dish, buttered side up, sprinkling each layer with fruit and sugar (but omitting fruit in the top layer). Heat the milk and pour on to the beaten egg. Strain into the pie-dish, grate nutmeg on top, and stand aside for ½ hour to let the bread swell. Bake in a moderate oven (375° F.) for about ½ hour, until set and lightly browned.

Queen of Puddings

½ pint milk	½ oz. sugar
¼ pint breadcrumbs	2 egg yolks
Grated rind of 1 lemon	2 tablespoonfuls raspberry or other jam
½ oz. butter	

For the Meringue

2 egg-whites	2 oz. sugar

Heat the milk and pour it on to the bread-crumbs; add the lemon rind, butter, and sugar and leave aside for about ½ hour for the bread to swell. Beat in the egg-yolk and pour the mixture into a greased pie-dish. Bake in a moderately hot oven (375° F.) for about ½ hour, until set.

Spread a thick layer of jam on the top, heating the jam if necessary, so that it will spread easily. Whisk the egg-whites very stiffly, then fold in 1½ oz. (1½ tablespoonfuls) of the sugar. Pi[le] on top of the pudding and dredge with the remaining sugar. Return to a moderate oven (350° F.) and leave for 20–30 minutes, until the meringue is lightly coloured and crisp to the touch.

Canary Pudding

4 oz. margarine	½ teaspoonful baking powder
4 oz. sugar	A pinch of salt
2 eggs	Milk, if necessary
4 oz. flour	

Cream the fat and sugar until light and fluffy. Add the eggs one at a time, beating well after each addition. Sieve the flour, baking-powder, and salt, and fold all into the creamed mixture. Ad[d]

milk, if required, to give a dropping consistency. Put the mixture into a greased basin, cover with greaseproof paper, and steam for 1½ hours. Serve with sauce.

Variations on Canary Pudding

Syrup Pudding.—Put 2 tablespoonfuls golden syrup into the greased basin before adding the pudding mixture.

Lemon or Orange.—Add the finely grated rind of 1 lemon or orange after beating in the eggs.

Chocolate.—Sieve 1 oz. cocoa into the dry ingredients, and add a little extra liquid to mix.

Ginger.—Add 2 oz. chopped preserved ginger to the dry ingredients.

Spotted Dick

8 oz. flour	4 oz. finely chopped suet
¼ teaspoonful salt	3 oz. sugar
1 teaspoonful baking-powder	4 oz. currants
	Milk to mix

Sieve the flour, salt, and baking-powder. Add the suet, sugar, and cleaned currants. Mix with sufficient milk to make a soft dough. Grease and flour a pudding-cloth, place the dough on the cloth, and tie both ends with a piece of string, leaving enough room for the pudding to swell. Cook in fast-boiling water for 2 hours.

Christmas Pudding

6 oz. flour	2–3 fresh eggs
½ teaspoonful mixed spice	A few drops of almond essence
¼ teaspoonful grated nutmeg	A few drops of vanilla essence
2 oz. breadcrumbs	1 teaspoonful lemon juice or substitute
4 oz. chopped suet	1 small teaspoonful gravy browning or caramel
1–1½ lbs. mixed dried fruit	Milk or milk and water to mix, with a little brandy if available.
Grated rind of 1 orange	
1 grated carrot *or*	
1 finely chopped apple	
3 oz. sugar	

Sieve the flour and spices into a bowl, and add the breadcrumbs, suet, cleaned and prepared dried fruit, grated orange rind, carrot or apple, and the sugar. Mix with the beaten eggs, essences, lemon juice and gravy browning, adding a little liquid to give a stiff dropping consistency.

If suet is not available, substitute 2 oz. margarine and 2 oz. cooking-fat. This should be rubbed into the flour before the rest of the ingredients are added.

Three-quarters fill one large well-greased basin (or two small ones), cover closely with greased paper or a floured cloth, and steam for 5–6 hours.

When the pudding is cooked, allow the basin and covering to dry thoroughly, then place a clean cloth or greaseproof paper over the original coverings (which will have been sterilised by being boiled with the pudding). If protected in this way the pudding will be ready for further cooking on Christmas Day. Store in a cool, dry place.

Basic Batter Recipe

4 oz. flour	1 egg
¼ teaspoonful salt	½ pint milk

Sieve the flour and salt into a basin and make a well in the centre. Drop in the egg and half of the milk, and mix in a little of the flour at a time, using a wooden spoon and keeping the mixture smooth, until a thick creamy mixture is obtained. Beat for 5–10 minutes until the mixture is full of bubbles. Stir in the rest of the milk and cover and stand, or use at once.

Coating Batter

4 oz. flour	1 egg
¼ teaspoonful salt	¼ pint milk

Sieve the flour and salt into a basin and make a well in the centre. Drop in the egg and half of the milk, and mix in a little of the flour at a time, using a wooden spoon and keeping the mixture smooth, until a thick, creamy mixture is obtained. Beat for 5–10 minutes until the mixture is full of bubbles. Stir in the rest of the milk and cover and stand, or use at once.

Pancakes

Make the batter according to the basic recipe opposite. Warm a small frying-pan, rub with a little salt and kitchen paper and wipe clean. This "tempering" ensures that the pancakes will not stick, and it need be done only at the beginning of the frying.

Melt the cooking-fat in a small pan, pour a little into the prepared frying-pan, and when smoking hot pour it back into the saucepan; a film of fat will be left, which will be sufficient for frying the pancakes.

Pour in slowly just enough batter to cover the bottom of the pan. When set and lightly browned on one side, turn or toss and cook the other side. Turn out on to a sugared paper, dust with castor sugar, sprinkle with lemon juice, and roll up.

Apple Fritters

Coating batter	Fat for frying
Cooking-apples	Sugar

Make some coating batter according to the directions. Peel and slice the apples in rings. Dip the apple rings into the coating batter, using a skewer to lift them out. Put them into smoking hot fat. Fry until golden-brown on one side, then turn them over to cook the other side. Drain thoroughly before serving. Quartered bananas and sections of orange, or halved peaches, also make good fruit fritters.

Serve fritters as soon as possible after making, as they soon lose their crispness. They may be rolled in sugar, or accompanied by a sweet sauce.

Apple Charlotte

1 lb. apples	1 lemon
3 oz. breadcrumbs	4 oz. sugar
2 oz. grated suet	2 oz. butter

Peel and slice the apples. Mix together the breadcrumbs, suet, grated lemon rind, and sugar. Put a layer of apples in a pie-dish, then a layer of the breadcrumb mixture, add a squeeze of lemon juice and a few pieces of butter Repeat until the dish is full, finishing with a layer of breadcrumbs and a little butter. Bake in a moderate oven (350° F.) about 1¼ hours or until the apples are tender. Serve with custard or cream.

An alternative method is to line the dish with the breadcrumb mixture (reserving a little for the top), fill with the sliced apples and cover with the remaining breadcrumbs, etc. Bake as above.

Fruit Jelly

¼ pint fruit-squash juice	¾–1 oz. gelatine
¾ pint hot water	Sugar to taste

Mix the fruit squash with the water. Dissolve the gelatine in ¼ pint of the mixture over a gentle heat, add to the remaining liquid and sweeten to taste. Pour into a wetted 1-pint mould and put in a cool place to set. Turn out and decorate with slices of oranges and other fresh fruit, sprinkled with sugar.

Milk Jelly

1 pint milk	2 oz. castor sugar
Thinly peeled lemon rind	¾–1 oz. gelatine
	A little water

Put the milk, lemon rind, and sugar into a pan, and allow them to infuse over gentle heat for about 10 minutes. Dissolve the gelatine in the water and add the cooled milk. Strain the mixture into a wetted mould and leave to set. Turn out the jelly, dip mould into fairly hot water (allow longer for a china one), free edge of jelly, invert on to the dish, and shake well.

Apple Snow

2 sponge cakes	Juice of ½ lemon
½ pint cup custard	1 white of egg
3 oz. sieved stewed apple	Colouring, if liked
3 oz. castor sugar	Cherries, angelica, to decorate

Cut the sponge cakes into thin slices, lay in a glass dish and pour the custard over; allow to soak. Put the apple pulp in a basin and add the sugar and lemon juice. Whisk the white of egg until stiff, add to the apple mixture, add colouring if liked and continue whisking until stiff and very fluffy. Pile on to the custard in the dish and serve at once, decorated with cherries, angelica, etc.

Honeycomb Mould

2 large eggs	½–¾ oz. powdered gelatine
1 pint milk	2 tablespoonfuls water
1½ oz. sugar	
Vanilla essence	

Separate the yolks and whites of the eggs. Make a custard with the yolks, milk, and sugar, and flavour with vanilla. Dissolve the gelatine in the water, and add it to the custard. Whisk the egg-whites very stiffly and fold lightly into the cool custard mixture. Pour into a glass dish or mould and turn out when set.

Charlotte Russe

½ pint lemon jelly	2 tablespoonfuls milk
Cherries and pistachio nuts, or angelica	½ pint cream
8–10 Savoy fingers	1 tablespoonful brandy or ½–1 teaspoonful vanilla essence
½ oz. gelatine	1½ oz. castor sugar
2 tablespoonfuls water	

Pour a thin layer of jelly into the bottom of a plain 1-pint soufflé tin and allow to set. Decorate with cherries and pistachio nuts, pour over a thin layer of jelly and allow to set. Line the sides of the mould with Savoy finger biscuits, trimming them at the sides and ends and dipping the ends in the jelly, before putting them into position. Allow to set. Pour in a thin layer of jelly. Dissolve the gelatine in the water over gentle heat and add the milk. Whip the cream until fairly stiff, stir in the gelatine, flavouring, and sugar. Put into the prepared mould and allow to set. When quite set turn out carefully on to a glass or silver dish.

Summer Pudding

2 tablespoonfuls water	4 oz. bread
4 oz. sugar	Whipped cream or custard sauce
1 lb. raspberries and red-currants	

Put the water and sugar together and bring to the boil, add the fruit and stew carefully, until tender. Line a pudding-basin with thin slices of bread, pour in the stewed fruit, and cover with thin slices of bread; the basin should be full. Place a saucer with a weight on it on top of the pudding. Leave for several hours. Turn out and serve with whipped cream or cold custard sauce.

Chocolate Soufflé

1 oz. almonds	2 tablespoonfuls water
2 oz. chocolate	Vanilla essence
½ pint milk	¼ pint cream or evaporated milk
3 eggs	Pistachio nuts
2 oz. castor sugar	Whipped cream
½ oz. gelatine	

Prepare a soufflé case. Blanch the almonds, shred them, and brown lightly in the oven. Dissolve the chocolate in the milk, whisk the egg-yolks, sugar and dissolved chocolate over a pan of very hot water until thick and creamy, then remove from the heat. Dissolve the gelatine in water then stir into the whisked mixture, together with the chopped almonds and vanilla essence. Fold in the whipped cream lightly. Whip up the whites of egg very stiffly and fold them into the mixture. Pour into the prepared soufflé case and leave to set. Before serving, decorate with pistachio nuts and whipped, sweetened, and flavoured cream.

Note: To prepare soufflé case cut a strip of firm paper long enough to go round the soufflé case, overlapping slightly and deep enough to come about 2 in. above the rim of the case. Tie firmly round the case with string.

Lemon Mousse

2 tablespoonfuls sugar	½ oz. gelatine
1 large lemon	2 tablespoonfuls water
3 eggs	Cream

Prepare a soufflé case. Add the sugar and the grated rind of ½ lemon to the egg-yolks and beat until light and creamy. Add the strained lemon juice. Dissolve the gelatine in the water over gentle heat and add it to the egg mixture. Beat until the mixture is well incorporated. Fold in the stiffly beaten whites of egg. Pour the mixture into the prepared case and leave to set. Decorate with whipped, sweetened, and flavoured cream.

Vanilla Ice
(Using gelatine)

1 teaspoonful custard powder or cornflour	A few drops of vanilla essence
½ pint milk	1 teaspoonful gelatine dissolved in 2 tablespoonfuls of water
1 egg	
1 tablespoonful sugar (approx.)	

Blend the custard powder or cornflour with a little of the milk. Bring the rest of the milk to the boil and pour on to the blended mixture, stirring well. Return to the saucepan, bring to the boil, and boil for a minute or two, stirring. Remove from the heat, add the beaten egg, and cook gently for a further minute or so, still stirring. Remove from the heat and add the sugar and vanilla essence to taste.

Dissolve the gelatine in the water over gentle heat, and when it is quite dissolved stir it into the custard mixture. Allow to cool, beating or whisking at intervals to prevent a skin forming and to aerate the mixture. Freeze in the usual way.

BREAD AND ROLLS

The processes in bread-making should be followed carefully, bearing in mind that yeast requires a warm temperature in which to live. Only sufficient yeast should be bought for immediate use, as it will only keep a day or two. Dried yeast can, however, be kept in a tin for about six months. The following processes are the basis of all yeast cookery:

Warming.—Warm the bowl of flour and liquid (water, or milk and water). The temperature of the liquid should be lukewarm or blood heat (98° F.).

Creaming the Yeast.—Add ½ teaspoonful of sugar to the yeast for creaming.

Adding the Fat.—Incorporate the fat into the flour, either by rubbing it in or by adding it in melted form.

Setting the Sponge.—Pour the mixture of yeast and water into a well in the flour, and leave to set the sponge for 10–15 minutes.

Mixing the Dough.—Mix the dough to obtain a soft elastic and almost sticky mixture, allowing about ½ pint liquid to 1 lb. flour.

Kneading.—Unless kneading is thorough, the bread will be full of holes. Turn the dough on to a floured board and knead by lifting the edge of the dough, and bringing it to the centre.

Rising.—Leave the dough in a bowl covered with a damp cloth in a warm place to rise. It should be left until it has doubled its size.

Shaping.—Knead the dough for another 3 minutes and cut into required shapes, allowing the tins to be three-parts filled.

Proving.—Put the prepared loaves or rolls in the tins and leave in a warm place for 10–20 minutes to prove.

Baking.—Put the loaves in a hot oven for about 15 minutes, to kill the yeast, and then lower the heat to finish cooking. Allow ¾–1 hour for a 2-lb. loaf. To test tap the underside of the loaf, and if a hollow sound results the bread is cooked. Leave to cool on a wire tray.

Basic Bread Recipe

3½ lb. flour	1 teaspoonful sugar
½ oz. salt	1¾ pints tepid water (approx.)
1 oz. yeast	

Follow the method shown above.

Brown Bread

10 oz. white flour	½ oz. yeast
1½ teaspoonfuls salt	¾ pint tepid water
10 oz. wholemeal	

Sieve the flour and salt into a warm bowl and add the wholemeal. Cream the yeast and add the tepid water. Strain into the flour, mix, and knead thoroughly till smooth. Set to rise for 1 hour, then knead slightly. Form into two loaves, put into warm floured tins, and set to prove for 15 minutes. Bake in a hot oven (450° F.) for about 45 minutes, until the bread feels light and is crisp outside.

Milk Rolls

1 lb. flour	About ½ pint milk and water
Salt	A little beaten egg to glaze
2 oz. lard	
½ oz. yeast	

Warm the flour, add about ½ teaspoonful of salt, and rub in the lard. Cream the yeast and add most of the liquid, then add this to the flour and mix to an elastic dough. Knead well. Put to rise for 1 hour, or until double the size. Turn on to a floured board and knead well. Shape into rolls, dinner buns, or twists. Put on to a warmed, greased tin and prove for 10–20 minutes, until they have risen well, but avoid overproving. Bake in a hot oven (450° F.) for 15–30 minutes, according to size. Glaze with beaten egg.

Chelsea Buns

8 oz. flour	¾ gill warm milk and water
A pinch of salt	1 oz. margarine or lard
3–4 oz. currants and sultanas	1 egg
2 oz. sugar	A little melted fat
½ oz. yeast	2 teaspoonfuls sugar to glaze

Sieve together the flour and salt and put to warm. Clean the currants and sultanas and mix with 2 teaspoonfuls of the sugar. Cream the yeast with ½ teaspoonful of sugar and add it to the liquid. Add this to one-third of the flour and set it to sponge. Rub the fat into the remaining flour, add the rest of the sugar, and gradually beat in the egg. Next mix in the sponged mixture. Beat all thoroughly with the hand and put in a warm place to rise. When it has doubled its size knead lightly on a floured board and then roll into an oblong strip. Brush over with melted fat and sprinkle evenly over it the mixed fruit and sugar. Roll up and cut into twelve even-sized slices. Pack lightly, cut side down, into a greased tin, which should have straight sides, (*e.g.*, A Yorkshire pudding-tin). Allow to prove for 15 minutes, then bake in a hot oven (450° F.) for 15–20 minutes. Glaze with sugar and water.

Doughnuts

8 oz. flour	Castor sugar
A pinch of salt	1 egg
2 oz. margarine	Jam
½ oz. yeast	Fat for frying
3–4 tablespoonfuls warm milk	Ground cinnamon (optional)

Warm the sieved flour and salt in a basin and rub in the margarine. Cream the yeast with 1 teaspoonful castor sugar and add to it the tepid milk and beaten egg. Pour into the centre of the flour and mix to a soft dough. Beat well with a wooden spoon or the hand, and leave to rise until the dough becomes twice the original size; then knead lightly. Divide into ten to twelve pieces. Shape each into a ball, flatten a little, and place about ¼ teaspoonful of jam in the centre of each piece. Gather the edges together over the jam, forming balls. Place on a greased and floured tin and leave in a warm place for a few minutes to prove. Heat some deep fat until smoking faintly but not too hot, and fry the doughnuts in it until golden-brown and cooked through (about 5 minutes). Drain, then turn out on to a paper and dredge with castor sugar. If preferred, sprinkle with a little ground cinnamon mixed with sugar. Serve very fresh.

Crumpets

½ oz. yeast	A pinch of bicarbonate of soda
1 pint milk and water	1 teaspoonful salt
1 lb. flour	

Cream the yeast with a little of the tepid liquid, add the rest and pour it into the flour. Beat very thoroughly with the hand for 5 minutes. Cover the bowl and stand it in a warm place for 1 hour. Dissolve the bicarbonate of soda and salt in a little warm water and add it to the sponge mixture. Beat it up, and put it to rise again for ¾ hour. Have ready a greased girdle, moderately hot; grease some crumpet rings and let them heat on the girdle. Pour in enough batter to cover the bottom completely and allow it to cook gently until the top is set. Remove the rings, turn the crumpets over, and allow them to dry for a few minutes on the underside.

Sally Lunn Tea-cakes

12 oz. flour	1 egg
¼ teaspoonful salt	1 oz. lard or margarine
½ oz. yeast	Egg or milk and sugar to glaze
1 teaspoonful sugar	
⅓ pint milk and water	

Sieve the flour and salt into a basin. Cream the yeast with the sugar, stir in the tepid liquid, and pour the mixture into the centre of the flour. Add the beaten egg and melted fat, mix to a light, soft dough, and knead well. Divide into two or three pieces, shape into rounds, and put into small greased and floured cake-tins, half-filling them. Set in a warm place until the dough rises to the top of the tins, then bake in a hot oven (450° F.) for 15–20 minutes. A few minutes before they are ready to be taken out of the oven, brush the tea-cakes over with a little beaten egg, or with milk and sugar.

Rum Baba

8 oz. flour	4 oz. margarine
¼ teaspoonful salt	4 oz. currants, candied peel and chopped nuts
½ oz. yeast	Hot rum syrup
½ teaspoonful sugar	Mock cream and glacé fruits (optional)
¼ pint warm milk	
4 eggs	

Sieve the flour and salt into a bowl. Cream the yeast and sugar and add the warm milk. Pour the mixture into the centre of the dry ingredients and sprinkle flour on top. Put in a warm place to work for about ½ hour. Beat the eggs and add them with the melted fat to the mixture, beating well with the hand. Brush a large border mould or some small ones with melted fat, and put in the currants and chopped peel and nuts. Half-fill the moulds with the yeast mixture, cover, and put in a warm place until the mixture rises to the top of the tins. Bake in a moderate oven (375° F.) for about ¾ hour, then turn out and prick the surface. Pour over some rum syrup (made by heating 4 oz. sugar with ¼ pint water, a squeeze of lemon juice, and rum to taste) and serve hot; or decorate with mock cream and glacé fruits and serve cold.

Croissants

1¼ lb. flour	½ pint milk and water
¼ oz. salt	1 oz. yeast
6 oz. margarine	½ oz. sugar

Warm the flour and add the salt. Melt 1½ oz. of the fat, add it to the liquid, and warm. Cream the yeast and sugar. Make a well in the centre of the flour and mix to a light dough with the yeast and liquid. Knead lightly and set to rise for about ½ hour. Knead lightly on a floured board and roll out to an oblong. Place one-third of the remaining fat in small heaps on the top two-thirds of the dough, then fold in three, turning the bottom third up and bringing the top third over it. Seal the ends with the rolling-pin and give one half-turn. Roll again into an oblong, and repeat with the two remaining portions of margarine. Roll out dough very thinly and cut into squares and then triangles, finishing with the point, and curling the ends round to form a crescent. Prove for about 10 minutes on a greased tin. Then brush over gently with beaten egg and milk, and bake in a hot oven (450° F.) for 10–15 minutes.

Scones.—A plain scone mixture can have different additions which add to the variety of this simply made dish. Scones may be cooked in the oven or on a girdle.

Oven Scones

8 oz. flour	½ teaspoonful bicarbonate of soda
¼ teaspoonful salt	1–2 oz. fat
1 teaspoonful cream of tartar (½ teaspoonful, if sour milk is used)	¼ pint (approx.) fresh or sour milk

Sieve the flour, salt, cream of tartar, and bicarbonate of soda into a basin and rub in the fat. Make a well in the centre and stir in enough milk to give a light, spongy dough just firm enough to handle. Turn it on to a floured board, knead very lightly if necessary, to remove any cracks; then roll out lightly to 1 in. thick, or pat it out with the hand. Cut rounds with a sharp cutter,

dipped in flour, or cut it into triangles with a sharp knife. Place on a floured baking-sheet, glaze if desired with beaten egg or milk, and bake near the top of a hot oven (450° F.) for 7–10 minutes till brown and well risen. Cool on a rack.

Fruit Scones.—Add 2 oz. currants, sultanas, raisins, or chopped dates to dry ingredients.

Oatmeal Scones.—Follow the same recipe, substituting 2 oz. oatmeal for 2 oz. of the flour.

Rich Afternoon Tea Scones.—Follow the same recipe, adding 1–2 tablespoonfuls castor sugar to the dry ingredients, and using 1 beaten egg with 1–2 tablespoonfuls water or milk to mix. If desired, 2 oz. dried fruit may be included, rather less sugar being used.

Plain Girdle Scones

8 oz. flour
½ teaspoonful bicarbonate of soda
1 teaspoonful cream of tartar
A pinch of salt
1½ oz. butter or margarine
½–1 oz. sugar
¼ pint milk or milk and water

Sieve the dry ingredients, rub in the fat, and add the sugar. Mix to a fairly soft dough with the liquid, then turn it on to a floured board and knead it very lightly, if necessary, to remove any cracks. Roll out ½ in. thick, cut in triangles or rounds, and place on a hot, floured girdle. Cook steadily until well risen and pale brown underneath, turn over gently and cook until the other side is browned and the centre is dry. (If desired, 2 oz. sultanas may be included: add them with the sugar.)

Drop Scones

8 oz. flour
½ teaspoonful bicarbonate of soda
½ teaspoonful cream of tartar
1–3 oz. sugar
2 eggs
¼ pint sour milk or buttermilk

Sieve the flour and raising agents, add sugar, mix with eggs and milk to a fairly thick batter. Place spoonfuls of mixture on the hot, greased girdle; keep at a steady heat, and turn scones when the bubbles burst. Cook the scones till golden on both sides, and keep them in a cloth to prevent their becoming dry and crisp. Serve them with butter and jam.

Potato Cakes

1 lb. potatoes
1 teaspoonful salt
1 oz. margarine
3–4 oz. flour

Boil, drain, and sieve the potatoes. Add salt and margarine, and work in flour. Knead the dough lightly on a floured board, roll to about ¼ in. thick, and cut into triangles. Cook on a hot, greased girdle till brown on both sides. Serve hot with butter.

BISCUITS

Biscuits are made from a pastry-like dough, and during the mixing it is therefore essential to add the liquid slowly to avoid a sticky dough which may be difficult to manage. Roll the biscuit dough out on a floured board and prick the surface of the dough to prevent rising. Bake on the top shelf of a moderately hot oven (350–400° F.). Biscuits require watching during baking, as they cook quickly. Remove from the tray as soon as they are done, and cool on a wire tray. Biscuits should be stored in an airtight tin.

Digestive Biscuits

6 oz. flour
1 teaspoonful salt
1½ oz. coarse oatmeal
½–1 oz. sugar
1 teaspoonful baking-powder
3 oz. lard or cooking-fat
Milk to mix

Mix the dry ingredients together and rub in the fat very thoroughly with the finger-tips. Mix in enough milk to give a firm dough. Turn it on to a floured board, knead it lightly, and roll out rather thinly, then cut it in rounds. Place the biscuits on a greased baking-sheet, prick them well, and bake in a moderately hot oven (400° F.) until they are lightly coloured—about 15 minutes.

Easter Biscuits

12 oz. flour
Pinch of salt
6 oz. butter or margarine
5 oz. castor sugar
1 egg
3 oz. currants
1 oz. peel
Pinch of saffron steeped overnight in a tablespoonful of milk or brandy
White of egg
Little castor sugar

Sieve the flour and salt. Cream the butter and sugar. Add the beaten egg to the creamed mixture with a little of the sieved flour. Stir in remaining flour, currants, and finely chopped peel, and mix in the saffron-flavoured milk or brandy. The dough should be softer than pastry but stiff enough to roll out.

Roll out ¼ in. thick and cut into large rounds. Place on a greased baking-sheet and bake in a moderately hot oven (400° F.) for about 20 minutes, until lightly coloured.

After 10 minutes' baking brush with beaten white of egg and dredge with castor sugar.

Shrewsbury Biscuits

3 oz. margarine
3 oz. sugar
½ an egg
Vanilla essence
8 oz. self-raising flour
1 tablespoonful water (approx.)

Put the fat and sugar in a bowl and cream together until soft and white, then gradually add the egg and a few drops of vanilla essence (or a little grated lemon rind), and work in the flour, together with enough water to form a soft, pliable dough. Roll out to about ¼ in. in thickness and cut into fancy shapes with biscuit cutters. Bake in a moderate oven (375° F.) for 15–20 minutes. Cool on a wire tray.

Shortbread

6 oz. flour
A pinch of salt
4 oz. butter (or margarine)
2 oz. castor sugar

Sieve the flour and salt, and rub in the fat. Add sugar, and then knead the mixture until it will bind together. Roll it out on a lightly floured board and form it into a round cake. Crimp edges, prick, and mark into wedges. Put on a tin lined with greased paper, and bake in a moderate oven (325° F.) for 1 hour, or until lightly brown. Cool and dust with sugar.

Ginger Biscuits

2 oz. margarine
2 oz. castor sugar
1 egg-yolk
1 teaspoonful ground ginger
2½ oz. self-raising flour
Wheat flakes

Cream together the fat and sugar and beat in the egg-yolk. Stir in the sieved ginger and flour a little at a time, and knead lightly to form a dough. Form into balls, toss these in wheat flakes, and put on a greased baking-tin. Bake in a moderate oven (375° F.) for about 20 minutes.

Chocolate Biscuits

6 oz. self-raising flour
2 tablespoonfuls cocoa
4 oz. butter or margarine
4 oz. castor sugar
A little water
Vanilla essence

Sieve together the flour and cocoa and rub in the fat very thoroughly until the mixture resembles fine breadcrumbs. Add the castor sugar and mix well. Mix to a very firm dough with a tablespoonful or so of cold water to which 1 or 2 drops of vanilla essence have been added. Turn on to a floured board, roll out ¼ in. thick, and stamp into rounds or fancy shapes. Put on a greased baking-sheet and cook in a moderately hot oven (400° F.) for about 10–15 minutes.

To finish, dust with castor sugar.

As an alternative, make the biscuits thinner, then sandwich together with chocolate butter icing, and ice with chocolate (or white) glacé icing.

Brandy Snaps

3 oz. syrup
2 oz. sugar
3 oz. butter
2 oz. flour
½ teaspoonful ground ginger or grated lemon rind
1 teaspoonful brandy (optional)

Melt the syrup, sugar, and butter and allow to cool slightly, then add the flour and ground

ginger or grated lemon rind, mixing well. Stir in the brandy and put in small teaspoonfuls, 3–4 in. apart on a well-greased tin. Bake in a moderate oven (350° F.) until well spread and just golden-brown. Allow to cool for a moment, then lift off with a palette knife and quickly roll over the greased handle of a wooden spoon. Slip off carefully. If the biscuits cool too much, and are too brittle to roll, return them to the oven for a moment to soften.

Macaroons

2 whites of eggs	1 oz. ground rice (good measure)
4 oz. ground almonds	1 teaspoonful orange flower water
8 oz. castor sugar	

To Decorate

Split almonds	Little white of egg

Whisk the whites of eggs fairly stiffly. Stir in the almonds, sugar, ground rice, and flavouring, and mix thoroughly. Cover a greased baking-sheet with rice paper and place the mixture in small heaps on the rice paper; or pipe, using a calico forcing-bag and large plain pipe, leaving room for spreading. Place a split almond on each biscuit, brush with white of egg and bake in a moderate oven (350 °F.) for about 20–25 minutes until pale golden-brown. It is important to cook macaroons rather slowly, to allow them to colour evenly and to get a good texture.

Coconut Pyramids or Cones

2 egg-whites	5 oz. desiccated coconut
5 oz. sugar	

Whisk egg-whites stiffly and fold in sugar and coconut. Pile on a greased tin (covered with rice paper if available), press into shape, and bake in a cool oven (275–325° F.) until pale fawn—about ¾–1 hour. If desired, tint mixture pink or green before shaping.

CAKES

Basically there are four different types of cake. Those made by the "rubbing-in" method, by which the fat is rubbed into the dry ingredients and the liquid is added afterwards. These are usually of the plainer variety. Richer cakes are made by creaming the fat and sugar together, adding the eggs to this mixture, and finally the flour. The third method is used for fatless sponges, where the eggs and sugar are whisked together over hot water and the flour is folded into the whisked mixture. For gingerbreads the melted fat and sugar are added to the dry ingredients.

The following rules of cake-making should be observed :

Prepare the tin by greasing with lard or clarified fat. For richer cakes and some whisked sponges line the tin with greased greaseproof paper. Collect and weigh the ingredients carefully, cream the fat and sugar very thoroughly until the mixture has a white fluffy appearance.

Avoid opening the oven door during the cooking.

To test the cake to see if it is cooked, press the centre top lightly, it should be spongy and give only lightly to the pressure.

Allow the cake to cool slightly before turning it out of the tin.

Store in a tightly covered tin.

PLAIN CAKES

Rock Cakes

12 oz. self-raising flour	6 oz. margarine
A pinch of salt	6 oz. sugar
¼ teaspoonful grated nutmeg	3 oz. currants
¼ teaspoonful mixed spice	1½ oz. chopped peel
	1 egg
	Milk to mix

Sieve the flour, salt, and spices. Rub in the fat, and add the sugar, fruit, and peel. Mix with beaten egg and just enough milk to bind. Using a teaspoon and a fork, place mixture in rocky heaps on a greased baking-sheet and bake in a hot oven (450° F.) for 15–20 minutes.

Plain Fruit Cake

8 oz. self-raising flour	2 oz. sultanas
A pinch of salt	1 oz. desiccated coconut (optional)
3 oz. margarine	2 eggs
3 oz. sugar	Milk to mix
2 oz. currants	

Sieve the flour and salt into a bowl, rub in the fat, and add the sugar. Add cleaned fruit and coconut (if used). Beat the eggs lightly and add them, with a little cold milk. The mixture should now be of a dropping consistency. Put it into a greased tin and bake in a moderate oven (350° F.) for about 1 hour. Leave for a minute or two, then turn out carefully. Place on a wire cake rack to cool.

Soda Cake

8 oz. flour	Grated nutmeg
A pinch of salt	5 oz. margarine
½ teaspoonful bicarbonate of soda	5 oz. sugar
½ teaspoonful cream of tartar	6 oz. currants
	1 egg
	Sour milk to mix

Sieve the dry ingredients, rub in fat, and add sugar and fruit. Mix with beaten egg and sour milk to a dropping consistency. Put into a 6-in. cake-tin and bake in a moderate oven (375° F.) for about 1 hour.

Note : If no sour milk is available, add 1 teaspoonful lemon juice or a few drops of vinegar to ¼ pint fresh milk.

Dripping Cake

8 oz. self-raising flour	3 oz. dripping
½ teaspoonful mixed spice	5 oz. brown sugar
A little grated nutmeg	8 oz. mixed dried fruits
A pinch of salt	1 egg
	Milk to mix

Sieve the dry ingredients and rub in fat. Add sugar and fruit, mix with egg and milk to give soft dropping consistency. Put in prepared 6-in. tin and bake in moderate oven (375° F.) for 1–1½ hours.

Plain Chocolate Cake

5 oz. self-raising flour	3 oz. sugar
A pinch of salt	Milk to mix
1 oz. cocoa	Vanilla essence
3 oz. margarine	

Sieve the flour, salt, and cocoa together, and rub in the margarine. Add the sugar and mix with milk and a few drops of vanilla essence to a soft consistency. Put into a prepared 5- or 6-in. cake-tin and bake in a moderate oven (375° F.) for about 40 minutes.

RICH CAKES

Queen Cakes

4 oz. butter or margarine	½ teaspoonful baking powder
4 oz. sugar	A little milk if necessary
2 eggs	2 oz. sultanas
4 oz. flour	

Thoroughly cream the fat and sugar and add the eggs a little at a time, beating well. Fold the sieved flour and baking-powder into the mixture, together with a little milk if necessary, to give a soft dropping consistency. Add the prepared fruit, and place in spoonfuls in greased patty tins. Bake them in a moderately hot oven (400° F.) for 15–20 minutes, until firm to the touch and golden-brown in colour.

Walnut Layer Cake

6 oz. butter or margarine	2 teaspoonfuls coffee essence
6 oz. sugar	A little milk
3 eggs	Coffee walnut butter cream
6 oz. flour	American frosting
½ teaspoonful baking-powder	Walnuts to decorate

Cream fat and sugar and beat in eggs one at a time. Fold in sieved flour and baking-powder and add essence, with a little milk if necessary to give a soft consistency. Put into three prepared sandwich-tins, and bake in a moderate oven (375° F.) for 35–40 minutes, then cool. Sandwich the cakes together with coffee walnut butter cream, coat with white American frosting, and decorate with halved walnuts before the frosting sets firmly.

Rich Chocolate Cake

4 oz. butter or margarine	1½ oz. cocoa
6 oz. castor sugar	1½ teaspoonfuls baking-powder
2 eggs	A pinch of salt
Vanilla essence	About ½ pint milk
8 oz. flour	

Cream together the fat and sugar, and beat in the eggs and a few drops of vanilla essence. Sieve the flour, cocoa, baking-powder, and salt, and add to the mixture, together with enough milk to give a soft dropping consistency. Put into a prepared 7-in. tin and bake for 1–1½ hours in a moderate oven (375° F.). When the cake is cool, it may either be dredged with icing-sugar or coated with white glacé icing and decorated with chocolate butter cream, piped in an attractive design.

Madeira Cake

8 oz. flour	5 oz. butter or margarine
A pinch of salt	3 eggs
1 teaspoonful baking-powder	Milk to mix
A little finely grated lemon rind	A few drops of lemon essence
5 oz. sugar	Citron peel

Sieve dry ingredients, add rind, cream sugar and fat together until light and fluffy, then beat in the eggs a little at a time. Add the sieved dry ingredients to the creamed mixture, alternately with a little milk and the essence. Put in prepared tin and lightly add slices of peel (or put on top as soon as cake sets). Bake 1–1½ hours in moderate oven (350° F.).

Cherry Cake

8 oz. flour	6 oz. butter or margarine
¼ teaspoonful salt	6 oz. sugar
½ teaspoonful baking-powder	2 eggs
3 oz. glacé cherries	Vanilla essence
	Milk to mix

Sieve the flour, salt, and baking-powder, and add the glacé cherries, cut into quarters. Cream together the fat and sugar, and beat in the eggs one at a time; add a few drops of vanilla essence. Add the dry ingredients, and mix lightly with a little milk. Put into a prepared tin and bake in a moderate oven (350° F.) for about 1 hour.

If desired, before baking the cake put a few halved cherries on top of it, and sprinkle with castor sugar, to give a crisp, sugary surface.

Dundee Cake

6 oz. sultanas	½ teaspoonful baking-powder
3 oz. currants	6 oz. butter or margarine
3 oz. candied peel	6 oz. sugar
3 oz. blanched almonds	3 eggs
9 oz. flour	Milk to mix
¼ teaspoonful salt	

Prepare the fruit and slice the peel finely. Chop the almonds, reserving about ½ oz. for the top of the cake.

Sieve together the flour, salt, and baking-powder. Cream together the fat and sugar, and beat in the eggs one at a time. Add the dry ingredients, and mix with a little milk, if required, to give a stiff dropping consistency. Put the mixture into a prepared 8-in. tin and place the halved, blanched almonds on top. Bake in a moderate oven (350° F.) for 1½–2 hours, until firm to the touch.

Rich Fruit Cake

1 lb. currants	6–8 eggs
8 oz. raisins	12 oz. flour
1 lb. sultanas	A pinch of salt
6 oz. mixed peel	2 teaspoonfuls mixed spice
4 oz. glacé cherries	Grated rind of 1 lemon
4 oz. shelled almonds	Lemon juice
10 oz. margarine	A little mik
10 oz. castor sugar	

Clean fruit and chop peel and cherries. Blanch and chop almonds. Have all other ingredients ready. Warm margarine slightly, if hard, but do not over-heat. Cream with sugar until soft and light. Break the eggs separately into a basin, beat lightly, and add one by one to creamed mixture. Beat each egg in very thoroughly before adding next. The mixture should be light and fluffy. Sieve dry ingredients into a bowl, add fruit and rind. Fold gradually into creamed mixture. Continue to mix in dry ingredients lightly, adding a squeeze of lemon juice and a little milk. Put the mixture, which should be of a stiff dropping consistency, into a lined 9-in. tin. Bake the cake for 4½–5 hours in all, first at 350° F. for about 2 hours, and then at 300° F. Decorate if required.

SPONGE CAKES

Sponge Cake

4 eggs	4 oz. flour
6 oz. castor sugar	

Put the eggs and sugar in a large basin, stand this over a pan of hot water, and whisk the contents very briskly, until light and fluffy—the mixture should be stiff enough to retain the impression of the whisk for a few seconds. Remove from the heat. Sieve one-third of the flour over the mixture and fold in very lightly, using a metal spoon. Add remaining flour in the same way. Pour mixture into a 7-in. cake-tin, greased and dusted with sugar and flour. Bake in a moderate oven (350° F.) for about 1 hour.

Jam Swiss Roll

3 eggs	1 tablespoonful hot water
4 oz. sugar	Castor sugar
4 oz. flour	Warmed jam

Put eggs and sugar in a large basin and stand this over hot water. Whisk the mixture as in recipe above. Sieve one-third of flour over surface of mixture and fold in very lightly, using a metal spoon. Add rest of flour in same way, and stir in hot water. Pour mixture into prepared Swiss roll tin, tipping to allow it to spread over surface; bake in a hot oven (425° F.) for 7–9 minutes, until golden-brown and well risen. When the sponge cake is cooked, turn it out on to paper which has been liberally sprinkled with castor sugar. Remove the paper from the cake. Using a sharp knife, quickly trim off the crisp outer edges of the cake. Spread with warmed jam, make a cut almost through the sponge 1 in. from near edge, and begin to roll. Now roll the sponge as tightly as possible, using the paper to help manipulate it. Put the roll on a wire cake-rack and leave it until cold.

Genoese Sponge

3 oz. butter or margarine	½ oz. cornflour
2½ oz. flour	3 large eggs
	4 oz. sugar

Clarify the butter and sieve the flour and cornflour. Put the eggs and sugar into a large basin, stand it over a saucepan of hot water and whisk briskly until the mixture is light and thick, and stiff enough to retain the impression of the whisk for a few seconds. Remove the basin from the heat. Sift about half of the flour over the surface of the mixture, and fold in very lightly. Add the remaining flour in the same way, alternately with the cooled clarified butter. Pour into a shallow greased and lined tin. Bake in a moderate oven (375° F.) until golden-brown and firm to the touch, the time depending on the depth of the cake—about ¾ hour.

Note: Genoese sponge must be very lightly mixed, or the fat will sink and cause a heavy cake.

This mixture may be used as a foundation for layer cakes and iced cakes and also for a variety of iced and decorated petits fours, etc.

GINGERBREADS

Gingerbread

1 lb. flour	½ teaspoonful salt
1½ teaspoonfuls ground ginger	8 oz. brown sugar
2 teaspoonfuls baking-powder	6 oz. butter
½ teaspoonful bicarbonate of soda	¾ lb. treacle or syrup
	½ pint milk
	1 egg

Sieve dry ingredients. Warm sugar, butter, and treacle, without over-heating. Warm milk and beat egg. Combine all ingredients, mixing very thoroughly. Pour into a greased and lined tin and bake in a moderate oven (350° F.) for about 1½ hours, or until the centre is firm to the touch.

Parkin

8 oz. flour
8 oz. medium oatmeal
2 teaspoonfuls ground ginger
½ teaspoonful mixed spice
A pinch of salt
½ teaspoonful bicarbonate of soda
4 oz. dripping
8 oz. treacle
4 oz. brown sugar

Sieve the dry ingredients into a bowl and mix well. Melt the dripping, treacle, and sugar in a saucepan and stir into the dry ingredients. Pour into a well-greased and lined square tin, and bake in a moderate oven (325° F.) for about 1 hour.

CAKE ICINGS

Royal Icing

1 lb. icing sugar
About 2 egg-whites
A few drops acetic acid

Sieve the icing sugar several times if at all lumpy. Make a well in the centre and stir in the lightly beaten whites of eggs. Add the small quantity of acetic acid and continue to beat vigorously until the icing is opaque and smooth.

Glacé Icing

½ lb. sieved icing sugar
A few drops of flavouring essence
3 tablespoonfuls warm water
Colouring, if required

Put the sieved icing sugar and flavouring in an enamelled saucepan and add the water very gradually over a gentle heat. Stir till warm. Do not let the icing get too hot, or it will become crystallised. It should be thick enough to coat the back of a spoon. If too thin, more sugar should be added, or more water if too thick. Add colouring and use at once.

Butter Icing

3 oz. butter or margarine
6 oz. sieved icing sugar
Vanilla essence
Colouring, if required

Cream the fat, add the sugar by degrees, beat until smooth and creamy, then add the flavouring and, if required, the colouring.

Coffee essence may be used in place of vanilla.

Almond Icing

1 lb. ground almonds
1 lb. icing sugar
2 eggs
1 teaspoonful vanilla essence
Juice of 1 lemon

Mix ground almonds and sugar together. Beat the eggs lightly and add them, with the flavouring essence and lemon juice, to the dry ingredients. Mix to a paste and knead well.

PRESERVES

Jam must be made from fresh sound fruit, and when possible 1 lb. of sugar should be allowed to each pound of fruit. For fruit that is not rich in pectin it is necessary to add either a proportion of fruit rich in this essential or a little acid—usually citric or tartaric acid or lemon juice.

The fruit is first simmered to extract the pectin, and the sugar is then added. The jam is boiled and stirred until setting point is reached. The jam can be tested for setting by any of the following methods:

Pour a little jam on to a cold saucer. If a skin forms and wrinkles to the touch the jam is set.

When the jam falls in flakes and not drops from a wooden spoon it is set.

A thermometer can be used to find out the setting point, the average temperature being 220° F. Stir the jam evenly before the temperature is taken.

When the jam is ready to set pour it into clean, hot jars and cover at once with a waxed disc.

Black-currant Jam

4 lb. black-currants
2 pints water
4 lb. sugar

Remove the stalks, wash the fruit, and put it into a preserving-pan with the water. Simmer gently until it is tender and the contents of the pan are somewhat reduced. The skins of black-currants are usually very tough, so it is important to cook the fruit thoroughly, until tender. Then add the sugar and stir until dissolved. Bring to the boil and boil briskly until the jam sets when tested on a cold plate. Pot and cover immediately.

Strawberry Jam

(Using red-currant juice to increase bulk and aid setting)

1½ lb. red-currants
2 lb. strawberries
2 lb. sugar

Wash the currants, put them in a pan with a little water, simmer gently until tender, then pass them through a hair sieve to obtain the juice. Pick over the strawberries and put them in a pan with the currant juice and boil gently until tender. Add the sugar, stir until dissolved, and bring to the boil. Boil for about 10–15 minutes and test for jelling. Cool for 15 minutes before potting, to prevent the fruit from rising in the jars. Cover as usual.

Apricot Jam

1 lb. dried apricots
3 pints water
2½–3 lb. sugar
The juice of 1 lemon (or ½ teaspoonful citric or tartaric acid)

Wash the apricots thoroughly, put them into a basin with the water, cover, and leave to soak for at least 24 hours. Then put them into a preserving-pan with the water in which they were soaked and the lemon juice or acid. Bring to the boil, and boil gently for ½ hour, stirring occasionally. Add the sugar, stir until dissolved, and boil until the jam sets when tested on a cold plate: stir almost constantly after the sugar is added. Pot and cover immediately.

Cherry Jam

(Using citric or tartaric acid)

4 lb. Mayduke or Morello cherries
¼ oz. citric or tartaric acid
3 lb. sugar

Stone at least two dozen cherries and remove the kernels. Put the kernels in a saucepan with the cherries and acid, and cook over a low heat to begin with; then bring to simmering point and simmer for ½ hour, or until the cherries are tender. Add the sugar, stirring while the contents of the pan come to the boil; boil fairly briskly for 10 minutes, then remove the stones. Test on a cold plate for jelling. As soon as it sets, pot in hot sterilised jars and cover immediately.

Note: As cherries are lacking in pectin the jam is only of light set.

Gooseberry Jam

6 lb. slightly under-ripe gooseberries
2 pints water
6 lb. sugar

Put the fruit and water into a pan. Heat slowly at first, and as the fruit gets soft break it with a spoon. Continue cooking until the contents of the pan have reduced by approximately one-third. Add the sugar, previously warmed in the oven, and stir until it dissolves, skimming if necessary. Boil gently for 15 minutes, then test on a cold plate for jelling. As soon as the jam sets pot and cover immediately.

Plum Jam

3 lb. plums
½ pint water
3 lb. sugar

Wash the fruit and cut in halves, removing the stones. Crack the latter to obtain the kernels. Put the water, kernels, and plums in a pan and bring very slowly to boiling point: simmer gently until the fruit is cooked. Add the sugar, stir until dissolved, and bring to the boil. Boil hard for about 10–15 minutes and test for jelling. Pot and cover as usual.

Note: If the plums are ripe, less water is required.

Raspberry Jam

3 lb. raspberries
3 lb. sugar

Place the fruit in a pan, heat gently at first (adding a very little water, if necessary), then simmer until the fruit is tender. Add the sugar, stir until dissolved, and bring to the boil. Continue to boil for about 15 minutes, or until the preserve jells on testing. Pot and cover as usual.

The principles of jam-making apply also to jelly-making, in particular, pectin, acid, and sugar must be present in the correct proportions. The fruit is boiled until it is soft and pulpy before being strained through a jelly bag, and allowed to drip overnight. The sugar is added to the juice, which is then boiled until a set is obtained.

Apple Jelly

4 lb. sharp apples
Juice of 1 lemon
Water
Sugar

Windfalls can be used successfully, but sweet dessert apples do not contain sufficient pectin to produce a good set. Wash and remove any bruised or damaged portions, and cut into thick slices without peeling or coring. Put them in a pan with the lemon juice, and sufficient cold water to cover—2 quarts is approximately the amount required. Put over a low heat, bring to the boil, and simmer slowly until the apples are reduced to a pulp; then strain through a jelly cloth, leaving for several hours to drip. Measure the juice and put into a preserving-pan, with ¾–1 lb. of sugar to each pint. Bring to the boil, stirring meanwhile until the sugar has dissolved, and continue to boil briskly for 10 minutes. Test on a cold plate for jelling. Skim, pot, and cover immediately.

Blackberry or Bramble Jelly

4 lb. blackberries
¼ oz. tartaric acid
½ pint water
Sugar

Wash the berries, which should not be over-ripe, and pick them over. Put them with the acid and water into a preserving-pan and bring to the boil. Cook slowly for 1 hour, or until the fruit is quite tender, mashing it occasionally. Strain through a jelly cloth. Measure the extract into a preserving-pan, add 1 lb. sugar to each 1 pint, stir until dissolved, and bring to the boil. Allow to boil briskly without stirring about 10 minutes, then test for jelling. Pot and cover at once.

Quince Jelly

3 lb. quinces
2½ pints water
½ teaspoonful tartaric acid
Sugar

Wash the fruit, remove and discard the core and pips, and cut into small pieces or mince. Put into a strong pan, with the water and tartaric acid, and stew slowly (this is most important) with the lid on the pan, mashing from time to time, until the fruit becomes tender. If necessary, more water must be added. When the pulp is tender and fairly thick, strain through a scalded jelly bag. Weigh the extract, put into a preserving-pan, and bring to the boil. Add an equal weight of sugar, and stir while it is coming to the boil again. Boil briskly for 10 minutes, then test on a cold plate for jelling. As soon as it sets remove from the heat, skim, pot, and cover immediately.

Red-currant Jelly

3 lb. red-currants
¾ pint water
Sugar

Wash the fruit, but do not remove the stalks, and put into a preserving-pan with the water. Place over a very low heat and simmer gently until the fruit is thoroughly cooked and all the berries pulped. Strain through a jelly bag and allow to drip for several hours. Measure the extract, put it into a pan and bring to the boil. Add 1 lb. sugar to each pint of extract. Then cease stirring, allow it to boil briskly for about 7–10 minutes, and test for jelling. When the preserve jells pot and cover as usual.

Marmalades are made from citrus fruits, and as the skins are tough, prolonged boiling is required to soften the shredded skins, for this reason more water is added.

Seville Orange Marmalade

5 large or 6 small Seville oranges (about 2 lb.)
4 pints water
1 lemon or ½ teaspoonful citric or tartaric acid
4 lb. sugar

Wash the fruit and cut it into shreds. Leave in a basin with the water overnight. Put the contents of the bowl into a deep saucepan or preserving-pan, bring slowly to boiling point, add the acid, if used, and simmer gently until the peel is soft and the contents of the pan reduced almost by half; this will take about 1½ hours. Add the sugar, stir until dissolved, and then boil rapidly until a good set is obtained when a little marmalade is tested on a cold saucer. Allow to cool a little, and pour into hot, sterilised jars. Cover at once with waxed circles and then tie down.

Sweet Orange Marmalade

2 lb. sweet oranges
½ teaspoonful citric or tartaric acid
4 pints water
4 lb. sugar

Shred the oranges and put with the acid and water into a pan. Simmer gently until the rind is tender and the contents of the pan considerably reduced. Add the sugar, stirring until dissolved, and boil rapidly until a jell is obtained when a little of the marmalade is tested on a cold plate. Pot and cover as usual.

Grapefruit Marmalade (Thick)

3 grapefruits (each weighing 10–12 oz.)
4 medium-sized lemons
½ oz. tartaric acid
9 pints water
5 lb. sugar

Wash the fruit thoroughly, cut it in half and squeeze out the juice. Shred the pith and rind thinly, but discard the cores and pips. Put the prepared rind and pith, the juice, tartaric acid, and water into a large pan or bowl. The next day boil in a preserving-pan slowly until the contents are reduced by half; this will take about 3 hours. Add the sugar and stir while bringing to the boil. Boil for 10 minutes, or until it jells when tested. Pot and cover as usual.

PICKLES AND CHUTNEYS

Spiced Vinegar for Pickles

To 1 quart of vinegar allow:

¼ oz. blade of mace
¼ oz. allspice
¼ oz. cloves
¼ oz. stick cinnamon
6 peppercorns
¼ oz. root ginger (if a hot pickle is liked)

Tie the spices in muslin, place in a covered pan with the vinegar, and heat slowly to boiling point. Remove from the heat, leave to stand for 2 hours, and remove the spices before using.

Pickled Cabbage

Use red cabbage. Remove the outer leaves and shred finely. Place in a deep bowl, sprinkling the layers with dry salt, and leave for 24 hours. Drain, cover with cold spiced vinegar, and leave for a further 24 hours, mixing occasionally. Pack and cover as usual.

Pickled Onions

Use small pickling onions. Remove the skins carefully, without cutting the onions, wash, cover with brine, and leave for 24 hours. Drain, wash and dry, put into jars, and cover with cold spiced vinegar. Seal as usual.

Piccalilli

3 lb. green tomatoes
1 cauliflower
2 cucumbers
1 lb. onions
Salt
8 oz. sugar
½ oz. turmeric
1 oz. mustard
1 teaspoonful mustard seed
1 quart vinegar
1 teaspoonful peppercorns

Cut up the vegetables into small pieces and place in layers in a basin alternately with layers of salt. Let stand overnight and then drain. Boil together the vinegar, sugar, turmeric, and mustard, together with the mustard seed and peppercorns

tied in a muslin bag. Add the vegetables and heat through without boiling. Remove the muslin bag, pack the pickle into sterilised jars, and seal. Store for about a month before using.

Green Tomato Chutney

3 lb. green tomatoes	½ oz. mustard seed
½ oz. salt	½ teaspoonful pepper
4 oz. prunes or sultanas	½ teaspoonful mixed pickling spice
6 oz. chopped onion	4 pints vinegar
6 oz. chopped apple	
6 oz. sugar	

Wipe or wash the tomatoes and remove the stalks and stalk ends. Chop them small or pass them through a mincing-machine, then put them into a basin in layers with the salt, cover, and leave to stand overnight. Soak the prunes also, if used. The next day drain off the liquid and turn the tomatoes into a preserving-pan. Stone and chop the prunes and add to the tomatoes, with all the other ingredients. Cook slowly, stirring occasionally, until reduced to a soft pulp; the time required will be about 2 hours. Then pot and cover.

Marrow Chutney

3 lb. marrow	2 tablespoonfuls salt
¾ lb. shallots	12 peppercorns
¾ lb. green apples	½ oz. bruised root ginger
¾ lb. sultanas, if available	4 oz. sugar
	1½ pints vinegar

Cut up the marrow, place in a basin, sprinkle with the salt, and leave for 12 hours; drain and rinse thoroughly. Peel and chop the shallots and apples finely and add the sultanas. Tie the spices in muslin. Put all the ingredients in a saucepan, bring slowly to the boil, and simmer gently until the chutney is cooked and of the correct consistency. Pot and cover.

Note: Cinnamon and allspice may be added to this chutney, if liked.

FRUIT BOTTLING

Fruit for bottling must be in perfect condition. It should be washed and packed tightly into clean preserving-jars. The patent lids and rubber rings must be examined carefully before sterilising takes place. Water or syrup made from water and sugar is used for bottling. The average proportion for syrup is 6–8 oz. sugar to 1 pint of water. To prepare this, boil the sugar and water in a covered pan for 1 or 2 minutes and then strain through muslin.

Sterilisation by one of the following methods is carried out to destroy any moulds or bacteria.

Sterilising under Water

After the fruit has been packed in the bottling-jar, cover it with cold water or syrup. Put the tops and rubber bands in position and adjust metal clips or screw bands. Screw bands should be given one half-turn back after they have been screwed on to allow for expansion of glass during the sterilisation. Place the bottles in a deep vessel, standing them on wooden slats or a similar "false bottom," taking care that they do not touch each other. Fill the pan with cold water to come at least to the neck of the bottles. Heat gently to required temperature, taking approximately 1½ hours to reach this point. Maintain temperature as shown in the following table. Remove the bottles from the water and tighten screw bands. The next day remove bands or clips and test for a seal.

Time and Temperature Chart for Sterilising Fruit

(For use when bottling fruit by sterilising under water.)

Fruit.	Temperature to which water should be raised in 1½ hours (in degrees Fahrenheit).	No. of minutes this temperature should be maintained.
Apples	165°	10
Apricots	165°	10
Blackberries	165°	10
Cherries	190°	10
Currants (black, red or white)	180°	15
Damsons	165°	10
Gooseberries	165°	10
Greengages	165°	10
Loganberries	165°	10
Mulberries	165°	10
Peaches	165°	10
Pears	190°	20
Plums (ripe, whole)	165°	10
Plums (under-ripe or halved)	165°	20
Quinces	190°	20
Raspberries	165°	10
Rhubarb	165°	10
Strawberries	165°	10
Tomatoes	190°	30

Sterilising by the Oven Method

Pack the fruit in the jars, cover each with patty tin, and stand on a baking-tin in a cool oven (240° F.). Leave for about ¾ hour, or until the fruit has shrunk, changed colour, and appears cooked. If the shrinkage is considerable fill one jar up from another and replace in the oven for 5–10 minutes. Remove the jars one by one from the oven and fill to the brim with boiling syrup or water. Put on rubber bands, tops, and clips or screw bands. Leave before testing as before.

Vegetable Bottling

Vegetables may be preserved by bottling, provided a pressure cooker is used to sterilise them. They should be prepared according to type, and blanched before being packed into jars. Blanching is done by tying the vegetables in muslin and plunging them into boiling water for a few minutes, and then plunging into cold water. For sterilising follow the directions given in a reliable pressure-cooker instruction book. The following table shows the times required for blanching and sterilisation:

Table for Blanching and Sterilising Vegetables

Vegetable.	Blanching time.	Sterilising time (1 pt. bottles, 10 lb. pressure).
Asparagus	2–3 minutes in boiling water	30 minutes at 240° F.
Broad beans	2–3 minutes in boiling water	35 minutes at 240° F.
Beetroot	10–30 minutes in boiling water	35 minutes at 240° F.
Carrots	10–15 minutes in boiling water	35 minutes at 240° F.
Celery	5 minutes in boiling water containing ½ level teaspoonful citric acid per quart	30 minutes at 240° F.
French beans or runner beans	3 minutes in water at 180° F.	35 minutes at 240° F.
Mushrooms	Stew in a casserole	30 minutes at 240° F.
New potatoes	5 minutes in boiling water (remove skin first)	40 minutes at 240° F.
Peas (fresh)	1–2 minutes in boiling water	40 minutes at 240° F.
Vegetable macedoine	According to the individual types	40 minutes at 240° F.

IV. REFERENCE TABLES

Basic Proportions

Pastry

Suet Crust. 1 lb. flour, 2 teaspoonfuls baking-powder, 6–8 oz. suet, cold water to mix.

Short Crust. 1 lb. flour, 8 oz. fat, cold water to mix, pinch of salt.

Flan. 1 lb. flour, 10 oz. fat, 1 teaspoonful sugar, 1 yolk of egg, cold water to mix.

Flaky. 1 lb. flour, 10–12 oz. fat, pinch salt, lemon juice, approx. ½ pint cold water.

Rough Puff. 1 lb. flour, 8–12 oz. fat, pinch salt, lemon juice, approx. ½ pint cold water.

Puff. 1 lb. flour, 1 lb. butter, lemon juice, salt, cold water to mix.

Hot-water Crust. 1 lb. flour, ¼ lb. fat, salt, ½ pint milk or milk and water.

Steamed Puddings

Suet. 4 oz. flour, 4 oz. fresh breadcrumbs, 1 teaspoonful salt, 4 oz. suet, 2 oz. sugar, approx. ¼ pint milk to mix.

Plain Sponge. 8 oz. flour, 2 teaspoonfuls baking-powder, 2–3 oz. fat, 1 oz. sugar, milk or milk and water to mix.

Sponge. 3 oz. fat, 3 oz. sugar, 1 egg, 5 oz. flour, 1 teaspoonful baking-powder.

Batter Puddings

Yorkshire Pudding and Pancakes. 4 oz. flour, 1 egg, salt, ½ pint milk.

Coating Batter. 4 oz. flour, 1 egg, salt, ¼ pint milk.

Milk Puddings

Powdered Grain. 1 pint milk, 1½ oz. grain.
Ground Grain. 1 pint milk, 1½ oz. grain.
Whole Grain. 1 pint milk, 1½ oz. grain.

Custard

Baked. 1 egg, ½ pint milk.
Steamed. 1 egg, ¼ pint milk.
Cup. 1 egg, ¼ pint milk.

Cakes

Plain. 1 lb. flour, 4–8 oz. fat, 4–8 oz. sugar, 4–8 oz. fruit, 2–4 eggs, 2–3 teaspoonfuls baking-powder, ¼ teaspoonful salt, milk to mix.

Rich. 1 lb. flour, ½–1 lb. fat, ½–1 lb. sugar, 4–8 eggs, 1 teaspoonful baking-powder, ½–3 lb. fruit, milk to mix.

Sponge. 1 egg, 1–1½ oz. sugar, 1 oz. flour.

Gingerbreads. 1 lb. flour, ½ teaspoonful salt, 1½ teaspoonfuls ground ginger, 2 teaspoonfuls baking-powder, ½ teaspoonful bicarbonate of soda, 8 oz. brown sugar, 6 oz. margarine, ¾ lb. treacle, ½ pint milk, 1 egg.

Sauces

Pouring. ½ oz. fat, ½ oz. flour, ½ pint liquid.
Coating. 1 oz. fat, 1 oz. flour, ½ pint liquid.
Panada. 2 oz. fat, 2 oz. flour, ½ pint liquid.

Homely Measures

Flour, Cornflour, Cocoa, Custard Powder	2 level teaspoonfuls.	¼ oz.
	1 level tablespoonful	½ oz.
	2 level tablespoonfuls	1 oz.
	1 teacupful	3½ oz.
	1 breakfast cupful	5 oz.
Sugar, Rice, Lentils, etc.	1 tablespoonful	1 oz.
	1 teacupful	6 oz.
	1 breakfast cupful	8 oz.
Breadcrumbs, etc.	2 level tablespoonfuls	¼ oz.
Liquids	1 teacupful	¼ pint
	1 tumblerful or breakfast cupful	½ pint

British Standard Measures

Cup Measures

A British Standard Cup contains 10 fluid ounces, *i.e.*, one half-pint, a Standard Tablespoon ⅝ of a fluid ounce. Standard Measures should be filled level.

Flour	1 cup . . .	5 oz.
Semolina	1 cup . . .	6½ oz.
Sugar (granulated)	1 cup . . .	8 oz.
Fat	1 cup . . .	8 oz.
Breadcrumbs (fresh)	1 cup . . .	2½ oz.
Liquid	1 cup . . .	½ pint
Golden Syrup	1 cup . . .	1 lb.
Sultanas	1 cup . . .	6 oz.

American Standard Measures

These are based on the American pint of 16 fluid ounces. For a recipe given entirely in cup measurements use either British or American Standard Cups, provided the same measuring system is used throughout.

Avoirdupois and Liquid Measures

Avoirdupois

16 drs.	1 oz.
16 oz.	1 lb.
28 lb.	1 qr.
4 qrs.	1 cwt.
20 cwt.	1 ton
14 lb.	1 stone
8 stone	1 cwt.
112 lb.	1 cwt.

Liquid Measures

4 gills	1 pint
2 pints	1 quart
4 quarts	1 gallon

Note: 1 pint of water weighs 1¼ lb.

Liquids

Boiling	212° F.
Simmering	200–210 F.
Slow simmering	180–190° F.
Blood Temp. (also called tepid and lukewarm)	98·4° F.

Cooking Temperatures

Ovens

Slow oven	275–325° F.
Moderate oven	325–375° F.
Moderately hot oven . .	375–425° F.
Hot oven	425–475° F.
Very hot oven	475–500° F.

Electric Cookers

With thermostatically controlled electric ovens it is usually found that the thermostat scale is marked either in degrees Fahrenheit or in Numbers 1, 2, 3, etc., corresponding with 100° F., 200° F. 300° F., etc.

Gas Ovens

THERMOSTATIC SETTINGS FOR WELL-KNOWN MAKES OF GAS COOKERS

Name of stove.	250° F.	300° F.	350° F.	400° F.	450° F.	500° F.
Radiation New World "Regulo"	¼–½	1–2	3–4	5–6	7–8	9–10
Main Cooker "Mainstat" . .	¼–½ or AB	1–2 or C	4 or D	6 or F	8 or G	10–11 or J
Parkinson Stove "Ajusto" .	I	3	4–5	6	7–8	8–9
Flavel Kabineat "Thermo tat"	B	C–D	E–F	G	H–I	J
New Herald "Thermostat" .	½	1–2	4	6	8	10–11
Newhome "Autokook" . . .	½–1	1–2	4	6	8–9	10
Cannon Champion "Autimo" .	¼–½	1–2	3–4	6	8–9	11

Note: Most new gas cookers will have thermostats showing standard markings as follows:

Setting	¼	½	1	2	3	4	5
° F.	241	266	291	313	336	358	379
Setting	6	7	8	9	10	11	12
° F.	403	424	446	469	491	513	536

V. HOUSEHOLD HINTS

6. STAIN REMOVAL

The following general rules and the ready reference chart below may help to solve this difficult problem :—

1. Stains should be tackled soon after they occur, for if left they are apt to set and become more difficult.

2. Check up on the nature of the staining matter and the type and colour of the material. It is wisest to try the simplest method of removal first.

3. When dealing with delicate or coloured material, first try out the treatment on a hidden corner.

4. Short, repeated treatments are less likely to cause damage to the fabric, so be patient and very persistent.

5. Be sure to remove thoroughly the chemical used for treating the stain, or the fabric may be damaged. (Grease solvents, of course, evaporate without further treatment.)

6. Handle the chemicals carefully, especially those, such as oxalic acid and salts of lemon, which are poisonous.

COMMON STAINS AND THEIR TREATMENT

Stain.	Treatment.
Acid	Sponge with warm water to which a little ammonia has been added.
Blacklead	Sponge with turpentine, and then wash in the usual way.
Blood	Soak in cold salt water (1 teaspoonful to 1 pint) for about an hour. Wash in cool, soapy water. Any resistant or old stains will require to be treated with oxalic acid or salts of lemon solution (see Iron mould).
Candle grease	Scrape off "crust" and then sponge with cleaning benzine.
Cocoa	Treat as for tea stain.
Cod-liver oil	Treat as for grease marks, and wash if possible. Any remaining stain will need to be bleached with hydrogen peroxide (20 vol. diluted 1 part in 5 of water). Soak 10–15 minutes and wash in the usual way.
Coffee	Treat as for tea stain. If non-washing material rub in a little glycerine, removing any excess with methylated spirits. (Test rayons before treating.)
Creosote	Sponge with benzole or eucalyptus oil.
Fruit	Treat as for tea stain.
Grass	Sponge with methylated spirits.
Gravy	Sponge with a grease solvent and wash in warm, soapy water. Rinse well.
Grease	Lay the stained area over a pad of absorbent material, and dab sparingly with grease solvent, such as carbon tetrachloride. Start well outside the mark and work towards the centre, in order to prevent "ringing." Shake to hasten evaporation. Avoid inhaling the fumes of carbon tetrachloride, and keep the bottle tightly corked.
Ink :	
Writing ink	*Washable Fabrics* should be rinsed immediately in cold water. Any remaining trace of stain will require a bleach as follows : *White Linens and Cottons :* Apply a solution of chlorine bleach immediately over the mark. After a few minutes rinse thoroughly and boil. *White Silk and Wool :* Use a warm solution of oxalic acid or salts of lemon (½ teaspoonful to ½ pint) in place of chlorine bleach. Remember that these chemicals are poisonous. *Coloured and Delicate Fabrics :* Treat first with a solution of potassium permanganate (½ teaspoonful to ½ pint water) applied immediately over the mark. After a few minutes rinse away with cold water. The remaining brown stain should be removed by treating with a solution of hydrogen peroxide (20 vol. diluted 1 part to 5 parts water), acidified with ½ teaspoonful of vinegar. Rinse well.
Red ink	*Washable Materials* should be soaked in warm water to which a liberal amount of borax has been added. Wash and rinse, then bleach any remaining stain with a solution of hydrogen peroxide. *Unwashable Materials* should be sponged with methylated spirits. (Test rayons.)
Green ink	*Washable Materials* should be washed in warm, soapy water and treated with a strong solution of household ammonia. Rinse well. This treatment is not suitable for woollen or delicate fabrics.
Marking ink	Most types contain aniline dye and are very resistant : repeated treatment with permanganate solution followed by oxalic acid solution (½ teaspoonful to ½ pint water) is generally effective (see Writing ink).
Indian ink	Very resistant stain ; a solution of citric acid is sometimes effective.
Copying ink	Rub oleic acid into stain and leave for 15 minutes, then dip in ammonia solution, rub well and rinse.
Ball-point-pen ink	Sponge with methylated spirit. (Test rayons before treatment.)
Iodine	Treat with solution of washing soda or a solution of photographic hypo. (1 tablespoonful to ½ pint water.)

Stain.	Treatment.
Iron mould	Treat with a warm solution of oxalic acid or salts of lemon (¼ teaspoonful to ½ pint). After a few minutes rinse thoroughly. Handle acids carefully.
Mildew	Treat alternately with potassium permanganate solution and oxalic acid (see Writing ink). These marks are very resistant, and short, repeated treatments are necessary.
Nail polish	Sponge with acetone. (Test rayons before applying, and on no account use on acetate rayons.)
Nicotine	Sponge with methylated spirits. (Test rayons.)
Paint :	
Enamel	Treat with turpentine or white spirit.
Cellulose	Treat with acetone or amyl acetate. (Test rayons first.)
Oil paint	Treat with turpentine or benzine.
Paraffin	Treat with cleaning benzine.
Rust	Treat as for iron mould.
Scorch	Wash with soapy water containing borax, then gently rub in a little glycerine and wash again. A mild oxidising agent, such as hydrogen peroxide, is helpful, but there is no remedy for bad scorch marks.
Sealing wax	Sponge with methylated spirits.
Shoe polish	Sponge with methylated spirits or wash in warm water to which a little ammonia has been added.
Soot	Treat with carbon tetrachloride.
Tar	Scrape off tar and treat immediately with benzol or eucalyptus oil.
Tea	*White Materials:* Stretch the stained area over a basin, damp and sprinkle with borax. Pour through hot water from a kettle. Push the stained area into the solution and leave to cool. Rinse, wash, and finish in usual way. *Coloured Materials:* Sponge with a warm solution of borax (½ oz. to ½ pint). Rinse well.
Transfers	Sponge with methylated spirits. (Test rayons first.)
Varnish	Sponge with methylated spirits. If this fails try turpentine or white spirit.
Whitewash	Sponge with vinegar and water.
Wine	Treat as for fruit stains.

HOW TO PREVENT ACCIDENTS IN THE HOME

An average of twenty-four people die in their homes every day from accidents; and in addition tens of thousands enter hospital and at least 2 million cases are dealt with by out-patients departments. Doctors are agreed that most home accidents could be avoided; and the Royal Society for the Prevention of Accidents offer the following twenty pointers to home safety. Accidents fall into four main groups: falls; burns and scalds; poisoning; and suffocation.

1. Check the fabric of the house periodically for defects, repairing worn steps, broken sash cords, loose tiles or floorboards, etc.

2. Provide adequate, if not generous, lighting throughout the house.

3. Guard against fires by regular cleaning of chimneys and flues, by checking grates, stoves, gas and electric and paraffin heaters for defects.

4. Use well-designed, firmly fixed fireguards on all fires.

5. Do not use paraffin or petrol on sulky fires; or draw up fires with newspapers; or use inflammable solvents for cleaning anywhere near a source of flame. Keep matches away from children.

6. Call in experts to deal with gas or electrical defects of all kinds.

7. Provide extra handrails on staircases, outside steps, in toilets, and bathrooms when there are elderly or infirm people in the house.

8. Use non-slip floor polish. Keep floor coverings in good repair, well tacked down, and stair rods firmly fixed.

9. Avoid inflammable fabrics when possible Always use fireguards and keep mantelpieces clear of clocks, mirrors, or anything which might tempt people to go too near the fire.

10. Arrange a sensible domestic routine with a "clear up as you go" plan, thus avoiding undue haste and fatigue.

11. Train the family to be tidy.

12. Guard hot liquids. Choose well-balanced saucepans with heat-resisting handles, safety kettles, and teapots with safety devices to keep lids in position.

13. Where there are toddlers in the house turn saucepan handles and kettle spouts away from the front of the stove, and turn tablecloths under.

14. Check gas taps for looseness, use safety taps where possible, never sleep with gas fires on.

15. See that all medicines are clearly labelled and kept in a locked medicine chest. Dispose of unused medicines or pills by burning or pouring down W.C.

16. Keep all linaments, rubs, lotions, etc., for external use on a separate shelf in the medicine chest, or in a special place for safety.

17. Keep household poisons under lock and key, or on a high shelf.

18. Use safety straps in high chairs, prams, and cots; use only small, firm pillows for babies, and always hold in the natural position (*i.e.*, breast-feeding position) for a feed; never leave a baby to feed itself from a bottle.

19. Use electrical apparatus with discretion never take portable appliances into the bathroom use earthed plugs and sound flex. Switch off power at point as well as apparatus when not in use.

20. Remember that good housekeeping and common sense will protect against Home Accidents.

(A booklet called *Fire! Fire!* written to help to avoid the dangers of fire, is issued by H.M.S.O. at 4*d*.)

Wines

Wine is the naturally fermented juice of the grape. Wines differ vastly with regard to the time required for ageing; most reach ripeness for bottling 6–12 months after fermentation. The flavour of a wine depends not only on the species of grape used, but also amongst other things on the methods of fermentation and the different salts contained in the soil where the grape is grown. Therefore the quality and flavour of wines vary greatly from vineyard to vineyard as well as from country to country. Theoretically, sweet wines are produced by halting the process of fermentation before all the sugar in the grapes has been converted into alcohol; similarly, if most of the sugar is converted, a dry wine will result. In fact, much of the sweet wine sold is artificially sweetened. Fortified wines are made by the addition of brandy in the case of sherry, port and Madeira, and of a liqueur in the case of vermouth; this addition is made primarily not to strengthen the wine but to ensure stability. Sparkling wines are produced by bottling before fermentation has finished, a special type of cork being necessary to retain the CO_2 gases formed in the bottle.

The principal wine-producing countries, in order, are: France (including Algeria), Italy, Spain, Rumania, Portugal, Argentina, U.S.S.R., Greece, Jugoslavia, Hungary, U.S.A., Germany, Chile, Bulgaria, Tunisia, South Africa, Turkey, Austria, Brazil, Australia, Switzerland, Morocco, Uruguay, and Czechoslovakia. Not all of these countries produce wine for export, and France, for instance, exports less than she imports for home consumption, chiefly from Algeria.

Nobody would wish to deny that the best French wines are beyond compare, but it would be foolish to ignore the fact that there are now many other wines available here which can be compared favourably with French wines at a similar price. These are likely to prove extremely popular with what we can term the "new class" of wine-drinker, and some notes of interest may be found in the alphabetical list below of countries which are now exporting to us wines in the cheaper categories.

There is no doubt that in Britain we have been drinking more wine since the War; this is perhaps due in part to habits acquired by our troops whilst in France, Germany, and the Mediterranean countries, and partly to the increase in visits by tourists to these countries. In the wine-producing countries one drinks the local wine, red or white (seldom both), at all times and with all meals as a matter of course, and only rarely wine from another region. In Britain, one is offered today an almost limitless choice governed only, alas, by one's purse, and this choice is not rendered any easier by the fact that wine-drinking seems to have become inextricably associated with ceremony and snobbery. The ordinary beverage wine for which one acquired such a taste in the *bistro* or *trattoria* was usually placed on the table in a carafe with as little ceremony as the jug of water here But in this country much of the pleasure is destroyed by the ritual of wine-waiter in attendance, sometimes long after the meal has appeared, pouring the wine and waiting for the embarrassed diner to taste it and pronounce his approval. And if the price is not enough to discourage him, there are a hundred and one little rules of wine etiquette for him to observe if he is not to be damned for all time in the eyes of the person who "knows about wine." Small wonder then if the diner-out decides to forget the whole thing. In public-houses the picture is even more desolate for the wine-lover. The brewers, it might be argued, have a case for not wanting to promote the sales of wine as opposed to beer, but one wonders, if spirits, liqueurs, and soft drinks, why not wine?

The home is, after all, the best place for wine. As already stated, there is available today a wonderful choice of wines from a great variety of countries which are suitable for drinking at home and which do not cost a great deal more than bottled beer or "vintage" cider. These require the minimum of preparation, and will not need decanting, unless it is not intended to consume the whole bottle at one sitting, in which case it is better to open a half-bottle, as the wine will not be so nice the following day, and will probably be undrinkable after a period of more than a few days (these remarks do not, of course, apply to fortified wines). Red wines usually require to be served at room temperature, about 60° F., and can be brought to the required temperature by standing the bottle in the room with the cork drawn for a period up to an hour; do not attempt to warm by placing near the fire, as this will increase the acids, and both flavour and digestion will suffer. Most white wines are best at around 50° F. and can be kept in a cool place or, in hot weather, stood on ice or under running water. The pale, dry sherries also benefit greatly from being served slightly chilled.

A word of warning as to price: the duty on table wine bottled in this country is 2*s.* 2*d.* per bottle, 4*d.* less for an Empire wine and nearly twice as much if it was bottled in the country of origin (6*s.* 4*d.* for fortified wines, 1*s.* 8*d.* less if they were produced in the Empire). In addition, it must be reckoned that the costs of bottles, corks, handling, packing, transport, etc., add up to nearly 2*s.* per bottle, so that with a bottle of wine costing 6*s.*, 2*s.* will represent the cost of the wine and the merchant's profit. If we deduct 4*s.* therefore from the price of a bottle of wine we arrive at approximately the cost of the wine to the merchant, and it requires no very lively imagination to grasp the fact that he will be able to sell for 8*s.* a wine for which he has paid twice as much as that which he can sell for 6*s.*, and therefore that the value which the buyer can get for his money is quite disproportionate if he is prepared to pay a few shillings more than the very cheapest obtainable. Here, then, is a short guide to the various wines now available to the discerning purchaser:

FRANCE

The two main varieties of French wine are Bordeaux and Burgundy, both of which can be either red or white. The system of classification of Bordeaux wines seems particularly complicated for the amateur, but a little application will bring its own reward. The wine-producing regions are divided into various areas, and Bordeaux wines are grouped first according to the district from whence they come. The best wines are those which are named with the prefix *château* (vineyard), signifying that they are unblended with the wine of any other vineyard, and these will go on improving for many years in the bottle, whether *château*-bottled or bottled in England. Here already, one must not allow one's common sense to be affected by the snobbery prevalent in the trade; there are more than three thousand *châteaux* (*clos* and *domaines*) in Bordeaux, and therefore it follows that a good deal many more than the dozen or so well-advertised ones will be excellent; also that whereas *château*-bottled claret is not necessarily better than the same wine bottled by a good merchant in Britain, it is unfortunately a fact that it is more expensive, since it comes under a different rate of duty.

Many of the vineyards of France, in common with the rest of Europe, were replanted with native vines grafted on immune stocks from California in 1879 after being ravaged by *Phylloxera*, a plant-louse which came from

America. Curiously enough the remedy also came from America, the vine stocks there being immune to this insect. The better known white wines from Bordeaux include Graves, Entre deux Mers, and Sauternes (including Barsac). All of these names cover numerous varieties, but Graves is usually medium to dry, and Sauternes medium to sweet. In contrast to some of the Burgundies, no sugar is added to the sweet wines of the Sauternes; possibly the most famous is Château d'Yquem.

Red Bordeaux wines are called claret in this country and are light, dry, and, at their best, delicate in flavour and bouquet. Claret needs more time to mature than Burgundy, and will continue to age longer. As wine stocks evaporated during the war years and the vintages of the 1930s were generally disappointing, one must go back to the 1920s to find an exceptional claret suitably matured. St. Julien, Médoc, Fronsac, red Graves, and St. Estèphe are all clarets obtainable in the cheaper categories. St. Emilion is probably the heaviest of the Bordeaux wines, this and Pomerol being more akin to Burgundy in character. Château Cheval Blanc and Château Petrus are top-priced wines in these respective categories. *Vin rosé* is probably the Bordeaux wine which was first called claret (*clairet* = clear) in this country. *Rosé* wines are made from black grapes by fermenting the wine with the skins until the required colour is obtained. The juice is then drawn off from the skins to finish fermentation. The cheaper *rosé* wines may have been made by blending white and red wines.

The most famous white Burgundies are probably those from the Montrachet area, comprising three vineyards, Chevalier Montrachet, Le Montrachet, and Bâtard Montrachet. A hyphenated name, such as Puligny-Montrachet, denotes not a vineyard but a parish and will be a blend of wines from that parish. Famous, too, is Chablis, divided into four qualities: *grand crû* (unblended and from the best vineyards), *premier crû* (a blend of wines from the best vineyards), Chablis and Petit Chablis, lesser blends in order of merit. Mention must be made, too, of Meursault (produced a "mouse jump" away from the red wine district), and Pouilly-Fuissé, which comes from the Mâcon area and should be drunk young.

Red Burgundies are full-bodied and of slightly higher alcoholic content than clarets, though possibly of less subtle flavour. One of the best wines produced in the Beaujolais area is Moulin à vent, as it is the only one made with the superior Pinot Grape instead of the Gamay; like most Beaujolais, this wine should be drunk young. It is usually false economy to purchase the very cheapest kinds of Burgundy. Apart from the names mentioned, likely wines in the medium-price range should be available from Mâcon, Santenay, Chambolle-Musigny, Chambertin, Nuits St. Georges, and Corton (Côte de Beaune), amongst many others. The system of petty proprietorship makes possible wide variations in quality in all these vineyards, and, generally speaking, the better wine will be the more expensive one. Some excellent wines from the Loire are to be had, but more famous are those from the Rhône. 1952 was a particularly good year, and 1953, also good, is now ready for drinking and can be bought in the medium-price range, the names to remember being Châteauneuf du Pape (red), Tavel rosé, and Hermitage (red or white); Chante Alouette is a white Hermitage of most distinctive flavour.

It remains to mention the French sparkling wines. Champagne, one of the world's most famous wines, comes only from the area round Reims and is a white wine made from black grapes, the skins being excluded from the fermentation process. France also produces sparkling wines, red and white, from Bordeaux and Burgundy.

GERMANY

The very best white wines from Germany are perhaps second to none. In the middle and higher price ranges some incomparable wines are to be found among the Hocks and Moselles. The great post-war years were, of course, 1949 and 1953. Again we have a system of naming after the vineyard as well as the district. In addition, some indication as to quality is given on the label by the words *Feinste Auslese*, *Feine Auslese*, and *Auslese*, meaning that the bunches of grapes were specially selected, *Beerenauslese*, the berries of each bunch, *Goldbeerenauslese*, the ripest berries of each bunch, and the ultimate *Trockenbeerenauslese*, made from over-ripe, half-dried grapes (such a wine, if encountered, will be something of a collector's item). *Spätlese* means late vintaged, but it does not necessarily follow that the late gathering has succeeded in producing very good quality. *Original-Abfüllung* means that the wine has been bottled by the growers, who are guarantors of its quality. An *Abfüllung* relates to a firm, it may be British, which has bought wine from the growers and bottled it in its own cellars. *Naturwein* means that no sugar has been used to make it and that it is a pure grape product, but this guarantee, important for diabetics, is covered by *Original-Abfüllung* or the grower's name.

Hock (from Hochheim) is the white wine from the Rhineland-Palatinate and elsewhere in the tall, slender brown bottle while Moselle comes in a green bottle (bottlers in the United Kingdom are not above causing confusion by occasionally reversing the procedure). The Stein wines from Lower Franconia are sold in square flagons (*Bocksbeutel*). The cheaper Hocks are apt to be somewhat acid in character, while the more expensive ones are usually expected to have a faint trace of sweetness. The great Rhine wines come from the smallest district, the Rheingau; these include Schloss Johannisberg and Schloss Vollrads. "Liebfraumilch," a name originally applied to wines made around the church of that name in the town of Worms, may now be applied to any wine "of good quality and pleasant character" according to the definition of the Worms Chamber of Commerce in 1910. Dienheim, Nierstein, Rüdesheim, and Oppenheim are well-known place-names which may appear on the labels, and the wines from the Nahe Valley and Rhine-Hesse are often surprisingly good. The good Moselles are dry without being the least bit sour (the German adjective is *herb*) and most distinctive in character; they are light wines with plenty of bouquet, and are drunk young in contrast to the great Rhine wines, which will improve with age. Berncastel, Wehlen, and Zeltingen are among the famous names here, but the wines from the tributaries, the Saar and the Ruwer are not to be ignored; these are sharper in flavour, but may be of even higher quality than those from the Moselle itself. The study of some of the names applied to German wines is rewarding in itself; the more imaginative include the "Ungeheuer" (monster) of Forst, the "Gerümpel" (rubbish) of Wachenheim, and the "Lump" (ragamuffin) of Escherndorf; in addition there is the allegedly salacious appeal of "Liebfraumilch," already mentioned, and the "Kröver Nacktarsch."

With the possible exception of the "Affentaler Spätburgunder," with the monkey in relief on the bottle, there are no German red wines to acquire international reputation, though a certain amount is produced, largely in the Ahr valley, for home consumption; it is usually drunk new. We must, however, mention Sekt, the German equivalent to Champagne (both white and pink varieties are produced) and the well-known sparkling Moselles.

ALSACE

Though geographically part of France, Alsace produces wines akin to the hocks and Moselles of Germany; the best are outstandingly good, and many of great charm and individuality are available in the medium-price categories. They are named according to the species of grape used, *e.g.* Pinot, Muscat, Sylvaner, Riesling, and Traminer ("Gewürztraminer," sometimes seen on a label, is identical with Traminer, a "spicy" flavour being characteristic of this type of wine), sometimes coupled with the name of the vineyard, village, or shipper. *Grande Réserve* and *Réserve*

are terms used by the Alsatian wine-growers to correspond to *Feinste Auslese* and *Auslese* of a German wine. Although many Alsatian growers prefer to bottle their wines in their own cellars, and admittedly this provides an additional guarantee of quality, it is possible to find excellent wine which has been imported here in cask and is correspondingly cheaper.

ALGERIA

The reputation of Algerian wine in this country has never recovered from the influx of inferior-quality wine, inexpertly stored, shortly after the War. Nevertheless, more Algerian wine (under various labels, as Algeria is in any case technically a province of France) is consumed here today than is generally realised. In fact, much good wine is produced in Algeria and as labour costs are much lower than in France proper, it may offer, price for price, the better value of the two in the more modestly priced categories. Some of the wine being offered at a few shillings more than the very cheapest obtainable is particularly enjoyable.

AUSTRALIA

Australian viticulture has had the benefit of a great deal of publicity lately, so one must be ready to concede that good Australian wines may at any rate be enjoyed on their home ground. Although we have been familiar with the ferruginous Burgundies in their impossible-to-store flagons for a number of years, it seems that only these and the very cheap, sweeter table and dessert wines are generally available here in the U.K., though the Hocks and drier Sherries are worth going to some trouble to track down.

AUSTRIA

Few of the famous vineyards are left in what remained of the Austrian Empire after the First World War, but quite a variety of the drier white wines (*e.g.*, Riesling, Traminer) are available here in the medium-price categories. One of the great features of life in Vienna, of course, was, and still is, the "Heurigen," the tasting of the potent new wine in the inns on the slopes of the Vienna Woods, and there can be few who have experienced this whose judgment of these wines will not be affected by a special sort of sentimentality!

CHILE

Ancient European vines existing in uniquely disease-free conditions in volcanic soil, with opportunities for sun-ripening and cheap labour possibly greater than those existing in any European country, are among the reasons why wines can be obtained at almost rock-bottom prices from this distant country. None should be below average for the price, and some are of high quality. Several types are available here under French and German names; the "Chambertin" and "Stein wine" are recommended, and the former can be "laid down" for a few years with good effect.

CYPRUS

Some excellent bargains, notably the indigenous Commandaria, can be obtained from Cyprus by those with a taste for the sweeter dessert wines. Large quantities of sherry, both dry and sweet, are also imported and are, we imagine, the very cheapest obtainable.

GREECE

Dry and sweet table wines, as well as the sweet "muscatel"-type dessert wines from Samos, can be found; Marco and Tegea, the pink wine from Arcadia, may be sampled, but Retsina, the resinous Greek national wine, is a (hardly ever) acquired taste, and presumably is imported for the benefit of the Greek population of these islands.

HUNGARY

The most internationally renowned of Hungarian wines is Tokay, made from Io Furmint grapes left on the vines until partially dried. The best qualities take years to develop and are said to go on improving for centuries. Tokay varies from dry to sweet, but the flavour is always quite distinctive. Prices will depend on the vintage, but need not be excessive even for some which may be older than the consumer. It is usually estate-bottled, and comes in a smaller bottle than one would expect, but it compares in price quite favourably with, say, sherry or Madeira and, although not a fortified wine, can on occasion make a welcome change from these. Also available and warmly recommended are the Balatoni Riesling and Furmint and the light, dry red "Bulls' Blood" (Egri Bikaver), all costing only a few shillings more than the cheapest wine obtainable.

ITALY

Italy produces 200 types of wine, some of which have achieved great popularity in this country since the War, though some people will be familiar only with Chianti in the attractive straw-covered *fiaschi*. Tuscany produces the lighter-bodied Orvieto as well as Chianti, and both wines come in red and white varieties. When one has presented all one's friends with lamp-stands made from these flasks it is well worth-while looking around for these wines bottled in England in ordinary bottles, thus avoiding the expensive freight charges and additional duty. Various brands of Chianti, as well as the more modestly named "Tuscan table wine," can be bought this way at the very cheapest prices, and will be much appreciated by those with a taste for a slightly rough, dry wine to accompany meals. Also from Northern Italy are Nebbiolo, Piedmontese Riesling, Barolo, and Barbaresco. Valpolicella is a dry red wine from the hills near Verona with a characteristic bite; prices will vary according to the year, with the years 1949 and 1953 commanding a few more shillings at present, though none of the Italian wines mentioned is in the expensive category. Verdicchio, Soave, and Frascati are whites which will repay sampling, some exceptionally dry wines to be found under the last-named label. The island of Ischia produces large quantities of wine held in great esteem locally and on the mainland. From the Naples area also comes Lacrima Cristi, of subtle flavour and bouquet; the name is applied to a great many varieties, red and white, but generally speaking the price will have most bearing on the quality. Sicily produces Marsala, a sweet dessert wine which became well known in England after the Napoleonic wars, later to be superseded in general favour by sherry, port, and Madeira. Sardinia, besides several table wines of local repute and the dessert wine called Malvasia (supposed to be the original form of Malmsey), produces the unique and extremely potent *apéritif* Vernaccia, which we have not yet succeeded in encountering beyond its native shores. Italy also produces several delightful rosés, and the sparkling wine is Spumanti.

JUGOSLAVIA

The important vineyards north of Lubliana and round Zagreb, formerly famous in the Hapsburg Empire, now come into this category and also those around Pola and the Capo d'Istria. Wine is also produced farther south, in Bosnia and Herzegovina. The several varieties of Riesling, Sylvaner, and Traminer now available represent excellent bargains, and it is worth-while trying for those which cost a few shillings more than the cheapest obtainable.

PORTUGAL

Portugal is chiefly known in this country for the dessert wines Port and Madeira, both with traditional ties with England. "Port" is one of the few names in the wine trade protected by law, and can be applied only to wine which comes

from the Douro valley, has been fortified with Portuguese brandy, and shipped from Oporto. Tawny and ruby ports are matured in cask, and if kept too long in bottle will throw a sediment and require decanting. Crusted ports are bottled after two to three years and mature in bottle, ageing more quickly than the vintage ports, which are blends of wines from various vineyards but all of the same year, and made only in particularly good years; they are put into bottle after about two years, where they continue to mature from ten to fifty years. A matured vintage port will throw a heavy crust in the bottle so it must be decanted with care. Madeira is somewhat akin to sherry in character, but is made from grape juice which, after fermentation and before fortification, is heated to 100–160° F. in hot chambers. Madeiras are named from the grapes from which they are produced, *e.g.*, Bual, Malmsey (sweet and full-bodied), and Sercial (drier). In addition to these, Portugal has sent us recently some good, cheap table wines, including Bucellas (white) and Collares (red), though the particularly heavy and potent *vinho tinto* will not be to everybody's taste.

SPAIN

Spain's main connections with wine-drinkers in this country have always been through Sherry, the wine which first became popular in England in the sixteenth century, when it was known as "Sack" (*sec*). The only wine entitled to this name came from grapes grown at Jerez in the south-west corner of Spain and became known as "Jerez Sack," abbreviated into "Sherry." Sherry is divided into two main types, according to whether the grapes produce the white film called *Flor* during fermentation; those that do are called *Fino*, such as the dry Amontillado, and those that do not are called *Oloroso* and are sweeter. The sherries on the market today are bewildering in their variety, and selection can be only a question of personal taste. Sherry ranges from the light, exceedingly dry Manzanilla, excellent for the table as well as an apéritif, to the rich, sometimes treacly, dessert wines of "nut-brown" hue. A cheaper sweet dessert wine is the red wine from Tarragona, and Spain has recently been sending us large quantities of excellent and competitively priced table wines. Look out specially for the light claret-type Rioja wines from the upper Ebro valley and the white Alella from Catalonia, available in almost the cheapest categories. Much wine is also produced in Valencia and Alicante, though "Alicante" as the name on a label denotes a wine from Israel and "Alicant" will be Portuguese.

SWITZERLAND

Switzerland produces lighter-bodied wines of distinctive flavour, red and white. Sion Pétillant is a sparkling wine remembered gratefully, and those who have visited Liechtenstein will recall the exceptionally light red Vaduzer. Several fairly cheap Swiss white wines have become available here just recently, and these should be worth investigating.

UNION OF SOUTH AFRICA

South African Hocks and Burgundies, in particular, amongst table wines, as well as sherry in a variety of grading, offer some splendid bargains. As well as being commendable in themselves, they enjoy the advantage of the slightly preferential duty treatment.

Wine with Food

Wine at table promotes appetite, digestion, and well-being. Readers will have observed that we consider one's own personal tastes more important than what the etiquette books decree; nevertheless, the following may be useful as a rough guide:

For an apéritif—dry sherry or Champagne or a young white wine such as Moselle or Pouilly-Fuissé.
With soup—dry sherry or Madeira.
With sea-foods and white fowl—medium to dry white wine.
With steaks, roasts, chops, game and most highly-seasoned foods excepting curries—red wine.
With dessert—sweet dessert, sweet table, or sweet sparkling wine.
With cheese—port or Burgundy.
With nuts—port.
Fruit—the palate will benefit if fruit is not eaten until the wine is finished.
Coffee—coffee also should not be drunk till after the wine is finished, as it will kill the flavour of any wine.

Note that food accompanied with wine should not be dressed with vinegar.

Storage and Buying of Wines

Bottles of wine should be stored lying on their sides and tilted slightly upwards in order to keep the corks damp. Suitable racks can be bought quite reasonably, and for preference they should be kept in a cool, dark cellar, or at any rate in a cupboard away from the light.

Glasses

Text-books can be found giving elaborate illustrations of the types of glass suitable for the various wines, but in these days of limited dwelling-space and functional furniture few of us will want to bother with more than two sets of wine-glasses. One should be of the long-stemmed variety with a fairly large cup-shaped bowl; these should do service for all white and sparkling wines and should be handled by the stem to avoid raising the temperature of the wine too much. Also recommended is a set of the modern, stemless variety with a fairly large tulip shaped bowl, produced so pleasingly in Scandinavia and elsewhere. These are ideal for red wines, as the bowl can be held in the hand and the contents maintained at body temperature, and they can also be used for port and sherry as well as for spirits and liqueurs. Thin, colourless glass should be chosen so that the colour of the wine is seen to advantage, and the bouquet will be enjoyed better if the glass is not filled too full.

VINTAGE CHART

This chart, prepared by The Wine and Food Society, is for the benefit of those interested in good wine.

Year	Port	Claret	Burgundy	Rhone	Rhine and Moselle	Sauternes	White Burgundy	Champagne
1935	7	2	4	3	5	2	5	3
1936	3	3	2	5	1	3	4	2
1937	4	5	5	6	6	7	7	5
1938	5	4	3	5	4	3	4	4
1939	3	2	2	3	3	2	2	2
1940	5	3	2	2	3	3	1	3
1941	4	1	1	3	2	0	1	4
1942	6	3	3	5	5	4	4	5
1943	5	5	5	6	5	6	6	5
1944	4	4	2	3	3	4	2	3
1945	6	6	7	6	6	7	6	6
1946	5	3	4	4	4	3	5	3
1947	7	7	7	7	6	7	7	7
1948	7	6	5	4	5	4	5	4
1949	4	7	7	6	7	5	6	6
1950	5	6	4	6	5	4	6	3
1951	3	3	3	4	2	3	3	2
1952	4	6	7	7	6	6	6	7
1953	5	7	6	6	7	7	7	6
1954	6	4	4	5	3	3	4	3
1955	7	6	6	7	5	6	6	7
1956	–	2	3	5	2	4	3	4
1957	–	4	5	4	2	3	4	2

0 = no good   7 = the best

A Guide to Gardening

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CULTIVATION OF FLOWERS.

Throughout this section the notes must be taken to refer to cultural conditions in the British Isles, although in many cases the information can be adopted to suit the necessity of readers living abroad. Undoubtedly, in many temperate parts of the world interest in gardening has increased enormously during the past decade or so, despite the fact that numbers of large gardens have ceased to exist and that few people can afford to pay for full-time help in their gardens. To counteract this, the all important labour-saving garden has come into its own; shrubby plants have replaced annual bedding schemes and large lawns put down instead of herbaceous borders or beds of particular plants.

In addition, the owner-gardener is anxious to avail himself of the excellent selection of modern tools; thus the conventional hoe is being replaced by the "Swoe" or the Wolf pattern of Dutch weeder, both of which are very easy to use, and digging can be done quickly—and with much less effort—by using the new German tool the "Terrex" spade. For grass mowing, the work is easily done with motor mowers like the "Rotosythe," or an electrically-driven pattern.

For greenhouse work, smaller houses are being used and one, say, 12 ft. by 8 ft., can be run economically with a minimum winter temperature of 40° Fahrenheit by the introduction of trouble-free, thermostatic heaters or the turbo-heaters. At the moment, besides automatic heating, the prototypes for automatic ventilation and watering are making an appearance.

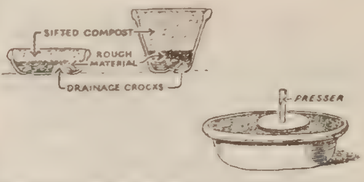
While advocating the use of such appliances, it must be pointed out that there are also to be found tools, sundries, and fertilisers of little value, and many of which have never been properly tested prior to being put on the market. It is, therefore, a good plan to discuss the comparative merits of any appliance or horticultural sundry with a competent horticulturist or to contact a public authority. In particular, many local horticultural societies have special trading facilities, and the merits of most garden things are generally known and discussed among members.

Throughout this Guide the vexed question of change in scientific name has been dealt with as liberally as possible and, whenever necessary, synonyms and cross references are given. In dealing with cultivar names, that is, varietal names like rose 'Peace,' reference is made as recommended in *The International Code of Nomenclature for Cultivated Plants* (1958). By so doing, the references are right up to date and further information on any particular plant or subject is easy to find. For the purpose, a few standard works of reference are given after each section. Normally, all the plants mentioned in the text are available through the usual trade channels.

After each plant listed there is a note on its propagation. Generally, this is the easiest or most efficient way of doing so, but it is not necessarily the only means. Details of the various methods employed are as follows:

Seed. Generally speaking, the early spring is the most suitable time for sowing seeds of trees and shrubs besides those of herbaceous plants and alpines. Where only a few plants are needed, the seed can be sown in pots and a suitable compost made up with 2 parts of soil, 1 part of peat, and 1 part of coarse sand. Before sowing, the pot should be stood up to its rim in water so that the soil is soaked. Then the seed can be sown thinly and covered with a light sprinkling of sifted compost.

For very fine seed, like begonias or azaleas, the seed must have only the merest "sugaring" of sand just sufficient to anchor it. When sown, the pots should be covered with a pane of glass (to prevent evaporation) and kept, if possible, in a warm greenhouse or frame. With this method of propagation it is important to remember that failure will result if the seed is sown too deeply, if the temperature is too low, or if the soil is too dry.



Correct Preparation of Seed Pots and Pans—Note provision for ample drainage and compost to rim of its container. After sowing, the containers are covered with a sheet of glass.

Cuttings. There are two main types of cutting: soft-wood cuttings made from fresh, green shoots in the spring and summer and hard-wood cuttings made of mature or semi-mature woody shoots in the autumn. A soft cutting is taken about 3 in. long, the lower leaves removed and a clean cut made through a node in the stem. These are then inserted in pots containing a light, sandy soil or a rooting medium such as horticultural vermiculite, well watered, and covered with a bell jar or plastic bag. Delphiniums, hydrangeas, and lupins are all propagated in this way.

Hard-wood cuttings are taken in the autumn and made from shoots about 8–12 in. long. These are inserted in a sandy soil out of doors or in a cold frame, and left to develop for a year. Blackcurrants, forsythia, and roses can be propagated by this means.

Layering. This is one of the easiest ways of propagating the majority of woody plants, and is used to increase stocks of plants like clematis, lilacs, and rhododendrons. Normally, layering is done in the autumn or spring when suitable branches are pegged down. On each of these the young shoots are, in turn, pegged down and tips turned upwards and tied in position. To encourage rooting, gritty sand and peat should be worked around each layer, and usually the young plant can be severed from the parent after about eighteen months.

Division. By this method it is easy to propagate the majority of herbaceous plants, some rock-garden plants, and a few shrubs. A few herbaceous plants, like delphinium and paeony, are slow to get established after moving, and here the method should not be employed. In any case, old plants should not be split up in a wholesale manner; instead, it is far better to select a few young healthy plants, divide these, and replant the best of the young shoots, in the autumn.

ALPHABETICAL LIST OF ORNAMENTAL PLANTS.

Abutilon.—The greenhouse species is often used in public parks for bedding schemes. *A. vitifolium*, with white, mauve, or blue flowers makes a fine wall shrub for warm gardens. If given full sun it will quickly reach 10–15 ft., but is sometimes short-lived. *Prop.*—Easily raised from seed sown in March in a warm greenhouse or frame.

Acer (**Maple**).—Hardy, ornamental trees; the Norway maple is often planted for its magnificent autumn colour and as a lawn tree. *A. palmatum* and vars. constitute the Japanese maples; all colour brilliantly in the autumn but do not grow freely unless given some shade and a light soil rich in humus. *Prop.*—Seed, layering, or budding.

Achillea (**Yarrow**).—Grey-leaved perennials for open border or, dwarf species, for rock garden. Valued as a cut flower, particularly *A. ptarmica* 'Perry's White,' with double, white flowers and *A. eupatorium* 'Gold Plate,' with large, flat, yellow flower heads. *A. millefolium* is a pernicious weed of turf (T33). *Prop.*—Division in autumn.

Acidanthera.—Scented, bulbous plant introduced from Abyssinia. It is not difficult to grow if the corms are planted in the spring and lifted in the autumn for storing in a frost-proof shed. It requires a sunny position and plenty of water in the summer. *Prop.*—Offsets removed when the old crop of bulbs is lifted.

Aconitum (**Monkshood**).—Blue-flowered perennial plants particularly useful for lightly shaded positions or full sun; flowers from May to July, height 3–5 ft.; roots poisonous. *Prop.*—Seed or division.

Adiantum.—*See* **Ferns.**

A Well-Grown Agapanthus—In winter the pot should be kept in a cold greenhouse or some protected place; in summer afforded full sun.

Agapanthus.—A bulbous plant, native of South Africa, usually found in seaside gardens and sometimes grown in tubs; flowers blue, violet, or white. It needs winter protection in the form of a covering of bracken or straw and a light soil heavily enriched with manure. Worthy of wider cultivation. *Prop.*—Seed or division in March.

Ageratum.—Blue-flowered carpeting plant. *See* **Annuals.**

Allium (**Flowering Onion**).—A genus of nearly 300 species of bulbous plants widely distributed over the Northern Hemisphere. The foliage has the distinctive smell of garlic, but some species are grown for garden ornamentation; in particular *A. roseum*, valuable late-flowering rock plant for dry positions. *Prop.*—Offsets, taken from parent bulbs in the spring.

Alstroemeria aurantiaca (**Peruvian Lily**).—This tuberous-rooted, herbaceous plant is often grown for cutting. Flowers orange-red and height 2–3 ft.; of easy culture if afforded a sunny position and left undisturbed. For best results apply liquid manure or soot water when growth starts. *Prop.*—Seed or division.

Althaea (**Hollyhock**).—A truly delightful, old-world plant, but not often seen, as modern hybrids have given way to rust disease. Best grown in a rich, heavy loam. Mulch with manure of any sort and stake as necessary. *Prop.*—Seed in June, thin out, and transfer to flowering position in September. Although a perennial, in some localities the best results are obtained by treating it as a biennial and raising a small supply annually.

Alyssum.—Low-growing annuals and perennials for rock garden and sunny border. The perennial, *A. saxatile*, is deservedly popular by reason of its bright, spring flowers and value as a wall plant. The variety 'Citrinum' is bright yellow and 'Dudley Neville' biscuit-yellow. *Prop.*—Perennial sorts by cuttings in June.

Amaryllis belladonna.—Often this plant is confused with the greenhouse, bulbous plant, *Hippeastrum*. The true amaryllis is a half-hardy bulb for planting at the foot of a warm wall; it has white to pinkish-red flowers. When planting, cover neck of bulb with an inch of soil and leave undisturbed, as the plant resents moving and is slow to get established. Lack of flowering is generally due to planting too deep. Established clumps may be fed with hoof and horn meal at 2 oz. per sq. yd. in July. *Prop.*—Divide and replant clumps in early July.

Amelanchier canadensis.—A large shrub or small tree; valuable for its spring flowers and autumn colour. As it will grow almost anywhere in sun or shade, it makes a good plant for informal screening. *Prop.*—Seed or layers.

Amepelopsis.—*See* **Parthenocissus.**

Anchusa italica.—A blue-flowered perennial with fleshy roots, growing to a height of about 3 ft. Responds to feeding and needs a position in full sun. *Prop.*—Root cuttings in the spring; division in the autumn.

Anemone.—The tuberous-rooted section includes the 'Caen' and 'St. Brigid' strains. These are best grown in an open position in light, rich soil; plant in October, lift and store when foliage dies. The hardy, fibrous-rooted perennials are varieties of *A. hybrida* (syn. *japonica*) and constitute one of the most accommodating of perennials, being particularly useful for damp, shady positions. Worthy of wider attention from gardeners. *Prop.*—Perennial sorts by division in autumn.

Annuals.—These are plants which develop from seed, flower, fruit, and die within a year. Additionally, some perennials, like antirrhinums, may be treated as annuals for the convenience of their cultivation. Sunny borders may be planted solely with annuals, they may be interplanted with perennials, used for window boxes, or, occasionally, in the rock garden. All sorts do best in well-worked, light loam enriched each year with a dressing of fish meal at 3 oz. per sq. yd., ten days before sowing or planting.

In the division of the group Hardy Annuals may be sown in the open ground as soon as conditions permit during March or April where the plants are to flower. Wet or cold soils will give many failures, and fine seed should be covered only with the lightest sugaring of soil. Often surprising—but delightful—results may be obtained by sowing broadcast mixed seed of annuals specially offered by some trade houses.

To raise Half Hardy Annuals, seed may be sown in early March in a warm greenhouse and the seedlings pricked out into boxes. Subsequently, the plants are grown on in a cold frame, gradually hardened off, and then transferred to their flowering positions towards the end of May.

Anthemis tinctoria.—Hardy perennial with feathery, grey foliage and flowers in varying shades of yellow. Height 2–3 ft., needs full sun and good for cutting. *Prop.*—Division in the autumn. *Anthemis nobilis* is the chamomile sometimes unwisely used to make lawns.

Antirrhinum (**Snapdragon**).—The popular bedding plant requiring a good soil and position in full sun now largely in disfavour owing to rust

disease; planting should be restricted to rust-resistant varieties. *See* Annuals

Aphelandra squarrosa.—An evergreen, perennial plant introduced from Brazil. Often sold as a house plant, albeit a warm temperature and a high humidity are necessary for its cultivation. When grown indoors it is best discarded when the flowers fade and the foliage starts to wither, as it cannot be successfully grown on from year to year under normal conditions indoors.

Aquilegia.—The modern race of hybrids are the result of much interbreeding with wild forms to give a wide range of colours. Best when planted in light shade where soil is naturally moist. *Prop.*—Seed in late spring; transplant to flowering position for following year.

Arabis caucasica.—Once known as *A. albida*, this common rock plant is often used on dry walls. The double-flowered form is particularly good. *Prop.*—Cuttings in July; a fresh stock should be raised regularly as the special forms tend to die out.

Araucaria (Monkey Puzzle).—This tree was introduced from Chile, where it forms large natural forests, and widely planted in Victorian days. Browning of foliage suggests lack of water in the summer or, occasionally, effects of very cold weather. It should be planted in a position protected from the prevailing wind. *Prop.*—Seed in a warm greenhouse.

Armeria maritima.—A hardy perennial with pink or red flowers in the spring; must be grown in full sun where the soil is dry. *Prop.*—Division after flowering.

Artemisia.—A genus of shrubs and perennials suitable for sunny borders or rockeries. *A. lactiflora* is among the best of the herbaceous species, having grey foliage and creamy-white flowers. *A. abrotanum* (lad's love) in the shrubby section has grey, fragrant foliage. *Prop.*—Herbaceous section by division; shrubs by cuttings in the early summer.

Arundinaria.—*See* **Bamboo.**

Aster (Michaelmas Daisy).—By careful breeding this plant has been improved out of all recognition, and many first-class varieties are available in the trade. Responsive to good cultivation, it is used for its colour late in season and properties as a cut flower, particularly *A. yunnanensis* 'Napsbury' and *A.* 'Barr's Pink.' A wide range of colours are available besides some fine, low-growing forms. In the border one pleasing combination can be made with *A.* 'Harrington's Pink' and *Scabious* 'Dinkie.' *Prop.*—The clumps should be split up *annually* in the spring, and only the plumpest pieces of outer root replanted.

Aster, China or Common.—*See* **Callistephus.**

Astilbe.—Allied to the *Spiraea* and useful for planting in moist, rich soils; flowers white, pink, and crimson; height 2 ft. *Prop.*—Division of clumps.

Aubrieta.—A name often misspelt. Throughout the country it is used as edging or for dry walls. Many lovely sorts available apart from the commonly found, pale-blue variety. It is a lime lover. *Prop.*—After flowering the plants should be severely trimmed and, as necessary, stock increased by division.

Aucuba japonica.—Much maligned and overplanted shrub, but one tolerant of neglect and sunless or smoky conditions. Interesting variants of the type, like 'Crotonifolia,' may be found in trade lists. *Prop.*—Cuttings rooted in the open in July

Auricula.—Correctly known botanically as *Primula auricula*. Flowers of alpine auriculas are white or yellow, while in those of florists' auriculas are to be found some of the most delicate colourings among hardy plants. Choice varieties are grown in pots under glass; others in moist, shady borders. *Prop.*—Seed or division in the spring.

Azalea.—*See* **Rhododendron.**

Bamboo.—The common name for the large group of woody grasses, reference to which is difficult owing to the confusion in their nomenclature. Often grown for screening and wind breaks, and is a favourite shelter for small birds; the best for home-grown canes are *Phyllostachys viridiglaucescens* and *Sinarundinaria nitida*. An interesting account of bamboo growing is found in the *Jour. Roy. Hort. Soc.* (June 1957). Growth can be encouraged by feeding with sulphate of ammonia and mulching with leaf-mould in the spring. *Prop.*—Division of clumps in late spring; transplants must be kept watered until established.

Begonia.—A genus showing wide diversity of form and much horticultural value. Of particular interest is the tuberous-rooted section, of which many of the loveliest varieties have originated in the nurseries of Messrs. Blackmore and Landon at Bath. For bedding schemes, the tubers are started in boxes of rich soil under glass in late March and planted out 9 in. apart in June. During the summer feed with liquid manure of any sort and keep moist in dry periods. *Prop.*—Cuttings in early spring in a warm case.

Berberis.—An extensive genus of beautiful and easily grown shrubs, evergeen and deciduous; the former used mainly for beauty of flower, and the latter for autumn colouring and ornamental fruits. *B. stenophylla* makes a fine evergreen hedge; invaluable for preventing illicit entry by dogs and, even, unruly children. *B. aggregata* and *B. jamesiana* are among the best berrying kinds. Prune in the winter by removing old wood. *Prop.*—Seed in spring or layering in autumn.

Buddleia.—Deciduous shrubs of easy culture for sunny positions. Varieties of *B. davidii* available in range of colours from purple to white; best when pruned hard by cutting all previous year's growth back to main stems in February. The weeping species, *B. alternifolia*, often grown as a standard; good specimens at R.H.S. Gardens, Wisley. This sort must be pruned in the summer by cutting off the dead flowering stems. *Prop.*—Cuttings in July–August in cold frame.

Cactus.—In the main grown in cool greenhouses or as house plants and, if cultivated well, many will flower every year. As a general guide, plants should be watered fairly freely in the summer and little in the winter, but there are exceptions. A detailed account of growing these fascinating plants will be found in *The Cactus Grower's Guide*, by Vera Higgings (Latimer House), 1946.

Calceolaria.—Seed of the greenhouse biennials sown in June or July for flowering in the following year. Mixed seed provides a wide range of colour. *C. integrifolia* is a half-hardy perennial, raised by cuttings or seed, for greenhouse or bedding work.

Calendula (Marigold).—This common hardy annual is freely raised from seed sown in August. Of easy culture in any sort of soil, although it is worth getting seed of new varieties now available. *See* **Annuals.**

Callistephus.—The China asters are among the best half-hardy annuals for garden and indoor decoration, but good soil and full sun are necessary for best results. *See* **Annuals.**

Camellia japonica.—Hardy, evergreen shrub rightly beloved by connoisseurs and cultivated in gardens for many centuries. May be grown in cold greenhouses, woodland gardens, and against north- and west-facing walls; under all conditions camellias must have a moist, acid soil. Best varieties for outdoors are 'Althaeaflora' (dark red), 'Donckelarii' (red, white marbling), and 'C. M. Wilson' (pink). Of recent introduction is the desirable *C. williamsii* bred from *C. japonica* in part; often the subject of television and gardening notes. The dropping of buds is thought due to dryness at the roots at some time

or sharp fluctuation in temperature. *Prop.*—Cuttings under glass in early July.

Campsis grandiflora.—Sometimes found listed as *Bignonia* or *Tecoma*; choice deciduous climber for warm wall, large reddish-orange flowers in autumn. To encourage flowering growth, prune hard back to old growth in spring. *Prop.*—Cuttings in April struck in a warm case.

Canary Creeper.—*See* **Tropaeolum.**

Candytuft.—Hardy annual (*q.v.*) and perennials with white, crimson, blue, or purple flowers. The perennial—*Iberis sempervirens*—is a fine plant for a rock wall. *Prop.*—Seed or, perennials, from cuttings.

Canterbury Bells.—*See* **Campanula.**

Carnation.—*See* **Dianthus.**

Centaurea (Cornflower).—The perennial species are valuable for cutting and border use, and may be found in such colours as pink, crimson, and yellow. *Prop.*—Lift and divide every third or fourth year. The hardy annual, *C. cyanus*, is often sold as a cut flower. *See* **Annuals.**

Cheiranthus cheiri (Wallflower).—Among the finest displays of this biennial are those found each year in the public gardens of Southend-on-Sea, where it is used in conjunction with bulbs and forget-me-nots. *Prop.*—Seed sown thinly in rows in May and seedlings thinned or lined out and then transplanted in late autumn. The so-called Siberian wallflower, *Erysimun asperum*, which has bright orange flowers, is grown in the same way, but it is intolerant of wet soils. Both sorts are lime lovers, and on acid soils plants may receive treatment with 1 oz. of lime in a gallon of water.

Chimonanthus (Winter Sweet).—Hardy, winter-flowering shrub with heavily scented flowers. Although brought to this country from the Far East in the mid-eighteenth century, its garden value is not widely appreciated. The large-flowered, yellow sort, *C. praecox*, is particularly fine, but like all the varieties, it is best grown against a sunny wall and where the soil tends to be poor. If growth is excessive and flowering poor, trim back young growth severely in March to encourage short, spur-like shoots. *Prop.*—Easily raised from seed or layers.

Chionodoxa.—Blue-flowered bulbs useful for under-planting shrubs such as forsythia. Will tolerate shade and may be left undisturbed to naturalise. Height 6 in.

Christmas Rose.—*See* **Helleborus.**

Chrysanthemum.—Hardy annual sorts are available in a wide range of colours and give a fine display in the summer months. *See* **Annuals.** There are also a number of perennials such as the shafta daisy and the oxeye daisy for sunny, herbaceous borders; all do well in ordinary soil, but should be lifted and split up about every three years. The plant sold by florists in the autumn is the Japanese chrysanthemum. Many are hardy out-of-doors, but no plant is more responsive to good cultivation and normally is best left to the specialist grower. For ordinary garden work, the best sorts are the Korean and Otley types. Under a brief reference the interesting details of cultivation cannot be dealt with fairly, and reference to specialist books is recommended.

Cistus.—Hardy and half-hardy evergreen shrubs, mainly native of Southern Europe. Well worth growing in light, sandy soils in reasonably sheltered positions. Pruning should be limited to the removal of any shoots killed in the winter. Among the hardiest sorts are *C. laurifolius*, white flowers, 6 ft., and *C. purpureus* 'Silver Pink,' 3–4 ft. *Prop.*—Easily raised from seed.

Clarkia elegans.—A Californian, hardy annual of easy culture and mixed seeds will give a wide range of colours in white, pink, scarlet, and crimson. *See* **Annuals.**

Clematis.—A hardy climber for walls, screens, pergolas, and the like. Best kinds are to be found among named varieties in nurserymen's lists. A light, well-drained soil is necessary and if fed annually with a bucketful of manure or compost the plant will thrive for many years. Occasionally plants will be found on north walls, and if grown in full sun some light protection from the sun is desirable for the roots. Varieties which flower on the *current* season's growth, like *C. jackmanii*, should be pruned in late February to within a foot of the ground; other sorts should have sufficient old growth removed, after flowering, to keep them within bounds.

Unfortunately, the climber is sometimes killed by clematis wilt, a disease about which very little is known, and the premature death of young plants should not be blamed automatically on the supplier. *Prop.*—Layering, by which means one shoot will often give three or four plants.

Convallaria majalis (Lily of the Valley).—Well-known perennial that will thrive in any damp, shady position. For best results lift every four or five years and mulch annually with old manure. *Prop.*—Division when foliage fades.

Coreopsis.—The hardy annuals are found in catalogues under "Callipsis," and all will thrive in ordinary soil. The flowers are mainly bright yellow, and many are good for cutting. *See* **Annuals.** Similarly, the perennials have the same predominant colour and are useful because of their long flowering season and abundance of flower. *Prop.*—Division.

Cornflower.—*See* **Centaurea.**

Cosmos.—Tall-growing, half-hardy annuals that are best grown in full sun in a dryish border. The large, daisy-like flowers can be had in a variety of colours, including white, yellow, pink, and crimson. *See* **Annuals.**

Cotoneaster.—Hardy evergreen and deciduous shrubs or small trees bearing scarlet or sometimes yellow berries in the autumn. All may be grown in ordinary or poor soil and planted in open or shady shrubberies and trailing species used against walls, over banks, or as ground cover. For shrubberies *C. lacteus* and *C.* 'Cornubia' with red berries and *C. rothchildianus* with yellow berries are among the best sorts; *C. conspicuus* 'Decora' is a strong grower for banks, while *C. horizontalis* is an excellent cover for any wall. Planting may be done in the autumn or spring, and no pruning, apart from occasional shaping, is required. *Prop.*—Seeds and layering.

Crataegus (Hawthorn).—There are many good varieties of our British hawthorn, *C. oxyacantha*, worthy of attention, particularly 'Coccinea' (crimson) and 'Paulii' (double, red). All will do well on poor soils, and no pruning is required. The common hawthorn makes a stout, impenetrable hedge planted 9 in. apart in a double row 9 in. asunder. *Prop.*—Common sort by seed; choice varieties by budding.

Crocus.—A hardy bulb of great beauty which was studied for many years by one of the greatest horticulturists of the twentieth century, the late E. A. Bowles. Does best in rich soil planted in bold groups around margins of beds or borders and naturalised in grass. When required, feed in early spring with bone meal at 2 oz. per sq. yd. *C. sieberi* and *C. tomasinianus* very early flowering; large-flowered, garden forms about three weeks later. *C. zonatus* flowers in the autumn and is often naturalised in grass. *Prop.*—Clumps may be lifted and divided about every five years, in July. The so-called autumn crocus is *Colchicum autumnale*. This bears large, lustrous leaves in the summer, followed by mauve or white flowers—of fleeting duration—in the autumn.

Crown Imperial.—*See* **Fritillaria.**

Cyclamen.—*See* **House plants (T39).**

Cytisus (Broom).—Only does really well in dry, poor soils in full sun; choice, procumbent sorts, like *C. kewensis*, used in rock gardens and tall ones

in open shrubberies. Pruning is important; shoots should be shortened after flowering, but old wood must never be cut. *Prop.*—Seed and cuttings in August in a sandy soil.

Daffodil.—*See* **Narcissus.**

Dahlia.—The cultivation of this plant is a special study, and there are probably more garden varieties of it than any other plant. Ordinary soil enriched with manure and an open position is required. Tubers may be planted 3 in. deep in April or young plants in late May. During the summer feed with soot water and liquid manure. After the first frosts lift, dry, and then store tubers in peat or straw in frost-proof place. Many stocks of dahlia are affected by virus (T30), and purchasers should be careful to check source of supply.

Daphne.—Shrubby plants, giving some of the most richly scented of all flowers. In particular, there is *D. mezereum*, which requires a damp soil; failure with the shrub is due usually to root disturbance or virus disease (T30) *D. odora* is one of the evergreen, fragrant species. Some references have suggested that this lovely shrub is not hardy, but there is no evidence to support the supposition. *Prop.*—Seed or layering.

Delphinium.—Hardy annuals and perennials. The latter sorts have gained popularity enormously since the War, due in the main to the activities of the Delphinium Society but also to the introduction of many very fine new varieties. American hybrids, like the 'Pacific Strain,' are very large but tend to die out and, consequently, lack the true, perennial habit of European sorts, albeit some of these have been weakened by the introduction of poor lines. It is important therefore to select stocks of strong constitution. Delphiniums need a deep, rich soil and a sunny position protected from wind. Plant in autumn 3 ft. apart, feed in the summer with liquid soot water, and mulch with decayed compost or manure in the spring. When growth starts, thin out weak growths to leave not more than five stems per plant. In winter take steps against possible slug damage (T28), and on this point it is beneficial to protect crowns with a covering of ashes. *Prop.*—Cuttings in the spring or seed; division of clumps is a poor alternative.

The hardy annual sorts are the well-known larkspurs, which grow to a height of 18 in. to 2 ft. and may be found in a range of colours including pink, red, white, and shades of blue. *See* **Annuals.**

Deutzia.—Hardy deciduous shrubs thriving in any soil and valuable for their summer flowers of white or whitish-pink shade. To keep the plants vigorous, shoots should be shortened after flowering and old or weak wood cut out. *D. scabra* is of robust habit, reaching about 7 ft., and *D. elegantissima* 'Fasciculata' proves a graceful shrub some 5 ft. tall with clusters of about twenty flowers coloured rosy-pink and each nearly an inch across. *Prop.*—Cuttings made from firm young growths about 10 in. long in sandy soil out-of-doors.

Dianthus.—This name covers a wide range of annual, biennial, and perennial plants. At one time often grown for their fragrance, but to a large extent this has been lost with the introduction of wider ranges of colour. Border carnations and picotees grown out-of-doors need a limy, fairly rich soil in full sun. Plant in the autumn or spring and, as the buds appear, feed with soot water or liquid animal manure, if necessary. These groups are *not* of good perennial habit and should be propagated annually to ensure continuation of stock.

The common pink requires the same soil conditions, and should be propagated when the stock gets weak; good scented varieties should be sought, and include the 'Imperial Pinks,' 'Mrs. Simkins,' and 'White Ladies.' *Prop.*—The best method is by layering in July so that the new plants can be put in their flowering position by mid-September. The lower leaves are pulled off selected shoots and a slit passing through a joint is made in the stem. Each layer is then pegged down with a hair-pin, the pin being placed above the cut. The layers are then covered with an inch of sandy compost and well watered.

In this genus is the sweet william; although truly a perennial, it is generally grown as a biennial and, consequently, the plant is raised from seed in May out-of-doors. In gardens where it is prone to rust disease control is most difficult and it is not worth a place.

LAYERING CARNATIONS—This is a typical example of how many plants can be propagated. A strong, new growth is pegged down into sandy soil after a cut has been made in the stem, at the point of pegging. Once rooted the layer can be severed from the parent and transplanted a week or two later.

Digitalis.—The biennial sort generally found in gardens is the common foxglove, which is grown in light shade in fairly rich, moist soil. In the past many named forms have been offered in the trade, but undoubtedly the best one is *D.* 'Sutton's Excelsior.' *Prop.*—Seed sown in May out-of-doors.

Doronicum.—Hardy perennials with yellow flowers; warrants wider planting, as they are among the earliest perennials to bloom and will thrive in poor soil or in some shade. The best is *D. austriacum* flowering in March, height 9 in. *Prop.*—Division after flowering.

Echinops.—Name appropriately derived from *echinos*, a hedgehog, in reference to the spiny, long scales of the flowers. The plant does well in an open position, where the globular heads of steely-blue flowers can be seen to advantage. *Prop.*—Division in March, but best left undisturbed as long as possible, as it must be moved with care.

Elaeagnus.—Hardy deciduous and evergreen shrubs generally grown in rather dry positions as foliage plants. Of the evergreen sort, *E. pungens* 'Aureo-Variegata' has bright golden variegation, and is therefore valuable for indoor decoration during the winter. *Prop.*—Layering in late summer.

Erica.—The heathers are native plants to Britain, and many variants found in the wild have been introduced into gardens to good purpose. Indeed, heathers have become so popular that special Heather Gardens have been made, and two fine examples may be found in the Royal Gardens, Windsor, where the planting is new and the Royal Horticultural Society's Gardens, Wisley. Here, different sorts reaching the dimensions of small trees, dwarf kinds, and many scores of interesting variants, to supply flower throughout the year, will be found.

The Scottish heather is, botanically, *Calluna vulgaris*, and, like all British heathers, it is intolerang of lime or chalk. Where alkaline conditions exist, planters can try *E. carnea*—a winter-flowering heather—or *E. darleyensis*, but the results are usually disappointing. When planting all heathers, clumps must be well firmed and after-

wards kept moist; subsequently, mulch all types annually with peat. *Prop.*—Division and layering.

Erigeron.—Hardy perennial for sunny borders; daisy-like flowers freely develop and are good for cutting. *Prop.*—Division in the autumn.

Escallonia.—Slightly tender evergreen and deciduous shrubs. In the Midlands protection of a south wall is necessary; suitable for open shrubbery in the South. Ideal for maritime conditions, and here may be used to good effect as hedges. Many of the best varieties originated in the nursery of Messrs. The Slieve Donard Co. in County Down. *Prop.*—Cuttings under a glass jar in summer; layers in September.

Eschscholzia californica.—A hardy annual of easy culture; height 18 in., flowers mainly shades of orange. *See* **Annuals.**

Everlasting Flowers.—*See* **Helichrysum.**

Ferns.—A large number of plants are included under this name and, as they grow wild in many parts of the world, some need hothouse conditions. They are distinguished from flowering plants by their method of reproduction; instead of producing seeds, ferns develop spores, usually on the back of their leaves. The hardy kinds may be grown in equal parts of leaf-mould and soil, and the fronds of leaf-losing kinds should not be removed until the spring, as they offer some protection from the cold. Tender ferns should be repotted when new growth starts in the spring in a compost of equal parts soil, leaf-mould, and sand, using a pot just large enough for the purpose. During the growing season, in particular, keep the roots moist and plants free from a dry or smokey atmosphere. *Prop.*—Division of clumps when growth starts in the spring.

Forget-me-nots.—*See* **Myosotis.**

Forsythia.—Commonly found in many gardens, as it is of easy culture in any soil. Flowers bright yellow in early spring. To keep in good shape prune directly after flowering by cutting out old wood. *F. intermedia* 'Lynwood' is upright in growth and *F. suspensa* of weeping habit; both types make good wall plants for North aspects. *Prop.*—Cuttings in the autumn.

Foxglove.—*See* **Digitalis.**

Freesia.—Greenhouse bulbous plant and, if grown for scent, care must be taken to select fragrant varieties. Pot in the autumn in a fairly rich compost and keep as cold as possible until growth is seen. Then bring into a frost-free greenhouse and water freely. When flower stems appear, feed with liquid manure; after flowering, gradually dry-off until time for repotting. Failures almost invariably traced to premature forcing before root growth has been made or growing in excessively high temperature. *Prop.*—Offsets at potting time.

Fritillaria.—The one mainly used in gardens is *F. imperialis*, a handsome, spring-flowering bulb. To grow it *really* well, this species must be given a deep, rich soil and, contrary to some views, it is best lifted every year as soon as the foliage fades. If growth is poor or plants do not flower, feed when growth starts in the following spring with equal parts of bone meal and superphosphate at 3 oz. per sq. yd. *Prop.*—Offsets removed from parent bulb at lifting time. The old bulb should then be replanted at once and any offsets lined out in a nursery row.

Fuchsia.—Greenhouse and tender flowering shrubs. The outdoor sorts (of which *F. riccartonii* is the best) may be grown in light soil in full sun. In the spring prune all growth down to ground level; protect, if necessary, in winter with covering of cut bracken or dry straw. Greenhouse varieties are potted firmly before growth starts in the spring and, when buds burst, all the previous year's growth can be cut back hard. To encourage flowering, feed with a liquid manure, such as dried blood, and syringe foliage in hot weather. During the winter keep plants dry and house in a cool greenhouse. *Prop.*—Cuttings of new growth taken about 1 in. long and inserted in sand under a bell jar.

Gaillardia.—Hardy annuals and perennials 18 in. to 3 ft. high which bear large, richly coloured flowers invaluable for cutting in mid- and late-summer. Unfortunately, on heavy soil the perennials are liable to die after flowering, and even on well-drained soils they cannot be considered long-lived plants. *Prop.*—Normally it is necessary to raise a fresh stock in alternate years; seed is sown in May in a cold frame and the young plants lined out in a reserve border prior to planting in the autumn.

Galanthus (Snowdrop).—Hardy bulbs well worth growing if given a moist, shady position where stock can be left undisturbed. Planting should be done in fairly bold clumps; bulbs are not expensive, and many variants, like double-flowered and tall-stemmed ones, are well worth a trial. *Prop.*—Lift and divide clumps in August.

Gentiana.—The gentians comprise some of the most fascinating of all rock-garden plants partly, perhaps, because some are difficult to manage. In particular, *G. acaulis*—which has true "gentian blue" flowers—is exacting in its requirements, and in many gardens flowering can never be induced. What controls flowering has not been discovered, and the plant can be grown well in acid or limy soils. On the other hand, *G. sino-ornata* must have an acid soil and is best in a position out of the direct sun. Beginners with the genus are advised to start with easily grown sorts, like *G. lagodechina* and *G. septemfida*. *Prop.*—Seed sown in cold frame in March or division in early spring.

Geranium.—The true geranium or cranesbill is a hardy floriferous perennial for rock garden or open border. In the latter case *G. ibericum* (blue flowers) and *G. sanguineum* 'Lancastriense' (rosy-pink flowers) are exceptionally good, and both do well in dry, sunny positions. The so-called "bedding" or "greenhouse" geranium is a pelargonium (*q.v.*). *Prop.*—Seed in March.

Gladiolus.—Dutch hybridists have done much work on this bulbous plant, and many new and lovely varieties are now available. The plant is responsive to good cultivation, and corms may be planted 4 in. deep and 6 in. apart during the spring in well-prepared ground. When the blooms fade remove the dead spikes of flower and lift the corms in September. After a month—and this point is important—pull off the old shrivelled corm and clean the new one. By doing this there is less likelihood of spores of diseases overwintering on the new stock. Finally, the corms should be stored in a dry, frost-free shed, and if given proper attention can be kept for a number of years. *Prop.*—Bulbils, removed when the corms are cleaned, can be sown in the spring in nursery rows and will flower within two years.

Godetia.—Hardy annual of easy culture and tolerant of poor soil conditions and even some shade. There are many varieties, mainly with bright flowers of rosy-pink and crimson. *See* **Annuals.**

Guernsey Lily.—*See* **Nerine.**

Gypsophila.—The favourite sort is *G. paniculata*, which is often grown for cutting, together with its double-flowered form, 'Bristol Fairy.' To do well gypsophila must be given a dryish soil which the roots can penetrate undisturbed; if growth is poor mulch in the spring with animal manure. *Prop.*—Generally done by seed in spring; special forms by grafting.

Hamamelis.—A lovely, but little grown, winter-flowering, heavily-scented shrub. The delicate, lemon-coloured flowers appear interminably from December to February. Although it flowers in its young stage, hamamelis is slow to get established and must be left free of root disturbance. The best sort is *H. mollis* introduced from China in 1879. *Prop.*—Usually by grafting; can be layered.

Heather.—*See* **Erica.**

Hedera.—Although ivy is seldom planted nowadays, there are a few evergreens to equal it for covering buildings. The large-leaved ivy with golden variegation, *H. colchica* 'Dentato-Variegata,' is invaluable for cold or shady walls. *Prop.*—Cuttings in August in shady border out-of-doors.

Helianthus.—The perennial sunflowers are tall, yellow-flowered plants of vigorous habit. They spread quickly and become a nuisance, and therefore clumps should be lifted and single, rooted pieces replanted every other year. The annual sunflower may reach a height of 10 ft. or so; seed is sown out-of-doors in April or seedlings raised under glass in the spring. When the flower bud appears, feed with soot water. The seed may be used as food for large birds like parrots.

Helichrysum.—Although this is a large group of plants, the most interesting is the half-hardy annual, *H. bracteatum*, the everlasting flower. When the flowers are fully developed they are cut with long stems and hung up to dry for winter decoration. *See* **Annuals.**

Heliotropium peruvianum (**Cherry Pie**).—Scented, shrubby plants used for greenhouse decoration or summer bedding. *H.* 'Sir Edward Fry' is among the scented varieties and *H.* 'Princess Marina' is the best dark-purple variety. For really good results, heliotropes need a rich soil and plenty of water in summer. *Prop.*—Cuttings 2–3 in. long in early autumn or spring, struck in sandy loam in a warm greenhouse.

Helleborus.—The Christmas rose, *H. niger*, should be planted out of the direct sun in a moist soil which has been liberally enriched with leaf-mould and old manure and here left free from root disturbance. Its large, white flowers appear irregularly from December to February with early flowering encouraged by protection with cloches. The Lenten rose, *H. orientalis*, flowers from February to April, and it is well worth searching nurserymens' lists for varieties with a wide range of colours. *Prop.*—Division of clumps in the spring, with each piece having four or five growth buds; the clumps should not be split into small pieces.

Hemerocallis.—Hardy perennial for moist border either open or slightly shaded. Mulch established clumps in the spring with compost or manure. Many new varieties are coming on the market as a result of introductions from America, where the plant is popular. *Prop.*—Division.

Hibiscus.—The evergreen, shrubby sorts with large exotic flowers are widely grown in the tropics and can be seen under glass in botanic gardens in Britain. *H. syriacus* is a deciduous, hardy species; little pruning is required, and in full sun it will reach 8–10 ft. Normally, it is a free-flowering plant of great beauty and, in cases where the flowers fail to develop, the stock is best replaced with good varieties, like 'Coeleste' (single, blue) and 'Woodbridge' (single, red). *Prop.*—Cuttings under glass; grafting.

Holly.—*See* **Ilex.**

Hollyhock.—*See* **Althaea.**

Honeysuckle.—*See* **Lonicera.**

House Leek.—*See* **Sempervivum.**

Hyacinth.—Bulbs generally used for bowl culture; often results are disappointing, but responsibility does not necessarily rest with the nurseryman, as poor cultivation is the most probable cause. Plant in September–early October (not later) in peat, loam, and sand, and keep as cool as possible until growth starts, when bowls may be brought into a warm room. Care must be taken with watering, as the bulbs must not dry out nor the compost allowed to become wet and soggy. After flowering, plant out-of-doors and lift annually in June for replanting in the autumn; for bowls a fresh stock is required every year. Failures are mostly due to late planting or faulty watering.

Hydrangea.—A favourite shrub introduced from the Far East. Of the many forms, the one offered by florists, *H. macrophylla*, is the most popular. This can be bought in a wide range of shades, from white and pink through to crimson and blue. The colour will depend on soil reaction: in alkaline or neutral soils *only* white and pink shades can be grown, and blue flowers will be found *only* on acid soil. The intensity of colour can be improved by adding lime in the first instance and flowers of sulphur in the second, but it is not possible to make an alkaline garden soil acid in reaction. Lack of flower is generally the result of buds being killed by cold weather. For this reason, hydrangeas are best not pruned until the late spring; then old flower-heads and any weak or unwanted growth can be cut out. During the summer the plants must not suffer from lack of water.

Among the many other sorts are *H. paniculata*, with large, cone-shaped panicles of flower and *H. petiolaris*. The latter plant is a vigorous climber, well suited to cover cold walls or for climbing over dead trees. *Prop.*—Cuttings in July–August in a cold frame.

Iberis (**Candytuft**).—The hardy annual sorts will thrive in any soil, and may be had in a range of colours. *See* **Annuals.** The perennial candytuft (*I. sempervirens*) is a good plant for a rock wall and has white flowers in early spring. *Prop.*—Seeds in spring and cuttings in summer.

Ilex.—The ornamental value of our native holly is rarely fully appreciated, bearing in mind that, on good varieties, the berries sometimes persist until March. The greenish flowers are sometimes bisexual, and sometimes male and female flowers are on *separate* plants. For this reason hollies should be planted in groups, and at least one plant of good berrying habit, like *I. aquifolium* 'Pyramidalis,' grown. Some varieties have yellow berries and gold or silver variegations on their leaves. *Prop.*—Seed; special forms by budding.

Iris.—This plant is divided into two main sections: those types which grow from bulbs and those which grow from fleshy rhizomes, with many subdivisions in each of them. Of the latter type, there are the commonly grown bearded flag irises, which, owing to their ease of cultivation and wide range of colours, are appropriately known as the poor man's orchid. Notwithstanding, these irises respond to good treatment, doing best in well-dug soil to which a little manure has been added and a dressing of rough chalk forked into the surface. The site should be in full sun for preference and one that never lies wet in winter. Planting or division of established clumps is done in July, setting the rhizome on the surface of the soil but firming the roots well. To maintain growth and flower, feed annually in the spring with equal parts of superphosphate and bone meal at 3–4 oz. per sq. yd. Iris gardens are not often seen nowadays, but the fine example still maintained at Kew is well worth close inspection.

In the bulbous section the Siberian iris is a graceful plant with delicate foliage, though much smaller-flowered than the flags. They make a fine waterside planting or may be grown in the herbaceous border. The Japanese iris is another water lover, and this has delicate-coloured, clematis-like flowers. On the other hand, for dry, poor stony soils in full sun the lovely, winter-flowering Algerian iris, *I. unguicularis* (*stylosa*), is an ideal plant, flowering as it does in December and January. This is a plant which must be left undisturbed after planting in June and if leaf growth is excessive the foliage can be cut back by half in August. Spanish, Dutch, and English types of bulbous iris are often used as cut flowers. These may be planted in ordinary garden soil in the autumn and left undisturbed until signs of deterioration are found.

Japonica.—Common misnomer of *Chaenomeles* (*q.v.*).

Jasminum.—The yellow-flowered, sweetly scented winter jasmine blooms intermittently

from November to February. It grows in any soil, and is best trained up a wall or grown on a trellis. Pruning consists of cutting out the flowering shoots as soon as the blossoms fade. The summer jasmine is a vigorous climbing plant with white, scented flowers. It needs a sunny position and should be well thinned after flowering. *Prop.*—Layering in summer.

Kalmia.—Hardy American shrubs with clusters of waxy, rose or pink blossoms in early summer. Although slow to get established and requiring a damp, acid soil, the plant is well worth growing. It constitutes a feature of the gardens of the National Trust at Sheffield Park, Sussex. *Prop.*—Seed or layering.

Kerria japonica.—A hardy shrub which will thrive in any garden but is best fed with manure to encourage strong growth. When the yellow flowers fade, the stock should be kept vigorous by cutting out old or weak growth. The plant is named after William Kerr, a young man despatched from Kew to collect plants in China. *Prop.*—Division in autumn.

Kniphofia (Red-hot Poker).—Although these plants are so commonly seen, their full value as late-flowering subjects is not often fully explored. There are a number of good varieties worth growing, such as 'Maid of Orleans' (white, 4 ft.), 'Mount Etna' (scarlet, 5 ft.), and 'Royal Standard' (gold and scarlet, 4 ft.). Of equal value is the dwarf variety with grass-like foliage, *K. nelsonii*. *Prop.*—Division in March; easily raised from seed if so desired.

Laburnum.—Handsome trees with long racemes of yellow flowers, the seeds of which are very poisonous. It is not advisable to remove branches, as wounds do not heal well or quickly, and once a specimen shows signs of deterioration it is best replaced with little delay. *Prop.*—Seed or grafting.

Larkspur.—*See* **Delphinium.**

Lathyrus (Sweet Pea).—For general garden decoration, seed may be sown in pots in a warm greenhouse in early February prior to transplanting out-of-doors in April. When heat is not available sowing can be done in the open in October, setting the seed 4–6 in. apart and 2 in. deep where the plants are to grow. In this case the rows are best protected by cloches. As the plants flower with great freedom and make strong growth, a rich, deep soil is required. During the summer water should be given freely and liquid animal manure or soot water applied weekly when flowering starts. When raised for exhibition, special cultural treatment is necessary. The cause of the condition referred to as bud drop is not known, but it is thought to be connected with low temperature and faulty root action.

There is also the hardy, perennial sweet pea, an old-world plant usually seen at its best in cottage gardens. This plant requires the same cultural conditions, except that the old stems are cut down in the autumn. Three or four different species are available, and all are easily raised from seed sown in the spring.

Lavandula.—The lavender is one of the best known of garden plants. It thrives in full sun in a light soil; old flower heads should be clipped off in the summer, but any cutting back into old growth must be left until the spring. The best garden form is *L. spica* 'Nana Atropurpurea'; it has a neat, dwarf habit, with deep purple flowers, and is available from leading nurserymen. *Prop.*—Cuttings out-of-doors in August–September.

Leucojum.—The spring snowflake flowers in February and is a charming plant for any damp, shady border. Although it has a large flower, it has never become as popular as the snowdrop, despite its ease of culture. It should be grown by everyone who values early spring flowers. *Prop.*—Lift clumps and replant after removing offsets in August.

Lilac.—*See* **Syringa.**

Lilium.—The lilies constitute a large genus of plants, some of easy culture, some demanding the most exacting of conditions. For a soil containing chalk two of the best lilies are *L. candidum*, the Madonna lily, and *L. regale*. The former is a feature of many gardens in South Wales, where bulbs are planted near the surface of the soil and the clumps eventually left to develop undisturbed. Only the easiest-grown lilies are suitable for the herbaceous border and, here, apart from the Madonna lily, the tiger and martagon lilies should be first choices for beginners in the cultivation of this genus. *Prop.*—Those referred to above may all be raised from seed sown out-of-doors (or in deep boxes in a cold frame) in the spring. In the following April line out into nursery rows prior to transplanting to flowering positions. Also propagated by offsets and bulbils.

Lily of the Valley.—*See* **Convallaria.**

Lobelia.—The bedding lobelias are perennial plants best raised as annuals (*q.v.*). They do well in a light soil, but should be firmed at planting time to prevent plants dying off during a hot spell. The handsome, tall-growing lobelias with scarlet flowers, like *L. fulgens* 'Huntsman,' may be used in herbaceous borders with great effect, but the roots must be lifted and overwintered in a cold frame. These sorts grow to a height of 2–3 ft. and will do well only on a wet, heavily manured soil.

Lonicera.—The honeysuckles make effective climbing plants if grown on the shady side of arches or tree stumps or against north or west walls. Care should be taken to train young growth before it becomes hard. Old shoots may be cut out each spring to keep the plant within bounds, although space must be available for free development. If growth and flowering is poor mulch the roots in the spring with old manure. *Prop.*—Easily done by layering in late summer.

Lupins.—There are two sorts of lupins, perennial and annual. The herbaceous perennials are among the most colourful of plants as a result of the famous 'Russell' strain being introduced. Of late years, however, the constitution of the plant has been weakened through, perhaps, breeding and virus diseases, and it should be taken for granted that most stocks have to be replaced every two years or even annually in some cases. The plant requires a rich soil and is best in ground free of lime. Conversely, in poor soil the tree lupin thrives and will reach a height of 7–9 ft.; plant in full sun and lightly prune into shape after flowering. *Prop.*—Both sorts are best raised from seed sown in May out-of-doors and transferred to flowering positions in October. The annual lupin may be obtained in a range of colours, and should be grown in full sun. *See* **Annuals.**

Magnolia.—Rightly said to be one of the most beautiful of all flowering plants. Contrary to popular belief, some kinds are of easy culture, flowering when young and suitable for small gardens. Of course, careful selection is necessary and for a specimen on a lawn *M.* 'Soulangeana' (large, white or white, purple-stained flowers) is ideal. *M. stellata* freely flowers in the young stage, and may be planted in an ordinary border if the soil is lime free. To encourage growth, mulch annually with peat or leaf mould, but never dig near the roots. The evergreen magnolia is often seen as a fine wall plant in old gardens. This is the only species which may be pruned, and long shoots can be cut back hard in April. There are a number of non-flowering strains of the evergreen one, and unsatisfactory plants are best destroyed, as flowering cannot be induced; in buying a replacement care is necessary in order to avoid *another* dud. *Prop.*—Seed sown as soon as it is ripe in October; layering.

Mahonia.—Hardy evergreen shrub. *M. aquifolium* is useful as ground cover, and will thrive in any soil and in any cold, shady position providing the soil is not waterlogged. *M. japonica* has long racemes of lemon-scented flowers in the winter; inferior sorts are often offered by nurserymen

under this name. *Prop.*—Seed, suckers, and layers.

Marigold.—*See* Calandula.

Mathiola.—The night-scented stock is a hardy annual with insignificant purplish flowers which open at dusk; grown primarily for its perfume. Conversely, the so-called Ten-Week stocks and a selection of these, the East Lothian stocks, have a wide range of colours. If sown in March they may be used for summer bedding or if sown in August overwintered in a sunny frame and grown as a biennial.

Brompton stocks flower earlier than the other sorts, and are grown as a biennial by sowing seed in June or early July and, after pricking out into boxes, are overwintered in a sunny frame. In mild districts, if the soil is well drained, stocks may be planted out-of-doors in the autumn, but a reserve should be kept for filling up gaps in the spring.

Meconopsis.—This genus includes the famous "blue poppy," introduced from the Himalayas. It is not a plant of easy culture, albeit large groups are grown in many woodland gardens where soil conditions permit. After flowering the plants generally die, although an occasional plant may persist. *Prop.*—Seed sown in March.

Michaelmas Daisy.—*See* Aster.

Montbretia.—This bulbous plant is of easy culture and has a long season of flowering. Many new varieties with large flowers are now available, and growth can be kept vigorous by lifting and dividing the clumps every three or four years. Plant in early spring 4 in. deep and 6 in. apart and in cold gardens protect clumps in winter with a covering of ashes.

Myosotis.—The forget-me-not is grown as a biennial by sowing seed in May and planting out in the autumn in conjunction with spring-flowering bulbs and wallflowers. Poor varieties freely establish themselves, and these should be destroyed before planting any of the really good sorts offered by seedsmen.

Narcissus.—This botanical name includes plants commonly known as "daffodil" and "narcissus." Although often grown, the wide garden value of these spring-flowering bulbs is not fully realised, as by careful selection of varieties a long season of flower can be obtained when they are grown in formal borders or naturalised. Thus, a season may be extended with 'Peeping Tom' and 'Covent Garden' (early) and 'Geranium' and 'Buttermilk' (late). The bulbs can be left undisturbed until flowering is affected by over-crowding; the clumps should then be lifted and be divided in the late summer. To maintain vigour, feed annually in February with 2 parts bone meal, 1 part hoof and horn meal, and 1 part sulphate of potash at 2 oz. per sq. yd. The chief troubles with narcissi are due to eelworm (**T29**) and the narcissus bulb fly (**T28**). For indoor work, plant in bowls in October and keep in cold place until growth is an inch high; failure is invariably due to premature forcing or faulty watering.

Nasturtium.—*See* Tropaeolum.

WATER LILIES IN TUBS—Drawing (A) shows a cross-section with correct percentage of water and soil together with water lilies and fish. Drawing (B) illustrates marginal planting with primulas, Japanese irises, and a dwarf coniferous tree.

Nepeta (Catmint).—In recent years this edging plant with silvery foliage and mauve flowers has become increasingly popular. When flowering in mid-summer there is no finer display of colour. It grows freely on any light, well-drained soil in full sun. The best sort is *N. faassenii*. *Prop.*—Division of clumps in March.

Nerine.—Lately this lovely bulbous plant has increased in popularity mainly through the varieties introduced from the late Lionel de Rothschild's garden at Exbury. The hardy sort *N. bowdenii* flowers in the autumn and should be planted at the foot of a warm wall in August or September and left undisturbed for many years. As the bulbs gradually multiply and work to the surface, a light dressing of sandy compost, to which has been added a little bone meal, can be applied. *Prop.*—Separation of bulbs in August.

Nicotiana (Tobacco Plant).—This half-hardy annual is grown mainly for its heavily scented flowers, which open in the evening. It is worth remembering that the white-flowered sorts are the best in this respect; scarlets and pinks are very much inferior. *See* **Annuals.** The tobacco of commerce is a different plant, namely, *N. tabacum*.

Nymphaea.—No branch of gardening is more fascinating than the water garden, and for it the chief plant must be the water lily. Basically, the main reason for failure is in the fact that in most pools the *average* depth of water is less than 18 in.; this means that the water is liable to be adversely

affected by extremes of temperature. All nymphaeas should be grown in full sun and where the water is still; in streams it is necessary to utilise a little backwater out of the current. Water lilies are planted in May in large wicker baskets with a compost of three-quarters of loam and a quarter of peat; alternatively, planting sites can be built up with bricks to the desired height. If growth is poor, mould Clay's Fertiliser into the size of pigeons' eggs and drop one around each clump. To maintain a healthy condition in the water, fish should be introduced as soon as the plants are established. *Prop.*—Division of tuberous roots in late May.

Orchids.—In the main, this large group of plants needs greenhouse conditions and specialised knowledge. Their cultivation has attracted the attention of some of the greatest of horticulturists, and detailed references may be found in books like *Orchids, their Description and Cultivation*, by C. H. Curtis (Putnam), 1950.

Paeonia.—There are two sorts of paeony, the tree paeony and the herbaceous paeony. The former needs a sheltered, warm position and takes about three years to flower from planting time. The latter sort needs a moist, rich soil, and should be mulched annually in the spring with well-rotted manure; some are known not to flower, and as such plants cannot be induced to do so they should be destroyed. The old-fashioned variety of paeony has been superseded by many fine new varieties found listed by specialists. *Prop.*—Tree paeonies by layering or seed sown in the autumn; herbaceous sorts by seed or division.

Pansy.—*See* **Viola.**

Papaver (Poppy).—The oriental poppy is a hardy herbaceous perennial with striking flowers, intolerant of shade and root disturbance. As it blooms early, it should be set near the back of a border, as the large leaves look untidy later in the year. Apart from the commonly grown, red-flowered sort there are others in shades of crimson, pink, and lavender. *Prop.*—A wide range of colours can be obtained by sowing mixed seeds in May. This is a better method than division. The Shirley poppy is a hardy annual (*q.v.*), while *P. nudicale* is a biennial needing a warm, sheltered position.

Parthenocissus (Virginia Creeper).—This climber, with its brilliantly-coloured leaves, makes a fine sight in the autumn, and there is no better plant for covering brickwork or unsightly buildings with a south or west aspect. It has been suggested (mainly by builders) that the plant will damage stonework or cause dampness. There is little evidence to support these suppositions, and reasons for damage can usually be traced—often without difficulty—to other sources. The plant has had a number of names—*Ampelopsis veitchii* is one—but up-to-date nurserymen are listing it correctly as *P. tricuspidata*. *Prop.*—Cuttings out-of-doors in the late summer; layering.

Passiflora caerulea (Passion Flower).—A south wall in favoured gardens is needed to grow this plant. It is of vigorous habit and, once the framework of branches has been produced, it should be pruned annually in the early spring, by cutting back all the previous season's growth to 2–3 in. of the main stem. *Prop.*—Layering.

Pelargonium (Geranium).—So-called "bedding geraniums," such as 'Paul Crampel,' are really zonal pelargoniums. To maintain a stock, take cuttings in early August and insert in sandy soil around the edge of a pot and overwinter in a frost-free greenhouse. In the spring pot-up singly and use for bedding. Otherwise pot-on after two months and, if early buds are nipped off, plants can be adopted for late flowering indoors. Pelargoniums are easy to grow, but for best results a position in full sun is necessary, and cuttings should be rooted *before* the autumn so that overwintering constitutes no great difficulty.

Petunia.—Although really perennials, these plants, native of South America, are treated as annuals (*q.v.*). They are sun lovers and do best on light soils. Petunias make fine plants for sunny window boxes, and particularly happy combinations can be made by planting together varieties such as 'Violacea' (deep violet) and 'Cheerful' (pale pink) or 'Flaming Velvet' (crimson) and 'Cream Star' (pale cream). The violet-flowered sorts are faintly scented.

Philadelphus (Mock Orange).—Although some fine varieties of this shrub are available in the trade, it is not grown as widely as its merit deserves. As a scented shrub it has few equals, while it is tolerant of poor soil conditions and shade. Particularly good sorts worth searching for are 'Albatre' (double), 'Beauclerk' (single), and 'Sybille,' which, at 3 ft., is about half the height of the others. After flowering, prune annually by removing as much old flowering wood as possible. *Prop.*—Hard-wood cuttings out-of-doors in November.

Phlox.—A wide range of varieties of the border phlox are offered to make an impressive display late in the season. If grown on light soils some shade is desirable, as phloxes do well where only the soil is damp. For this reason, mulching should be done annually in the spring with compost or animal manure. Failures are usually due to eelworm (**T29**). *Prop.*—Seeds in autumn; division.

Poppy.—*See* **Papaver.**

Polyanthus.—*See* **Primula.**

Polygonium.—In the main these plants are weeds of gardens, although originally they were introduced from the Orient for ornamental purposes at a time when their invasive habits were not fully appreciated. The one woody climber in the genus, *P. baldschuanicum*, makes an admirable cover where a very vigorous plant is wanted. Rampant and unwanted species may be eradicated by hormone treatment (**T33**).

Primula.—Polyanthuses, primroses, greenhouse primulas, and the hardy primulas all belong in this genus. The first two are the most popular; both will do well only in damp soil and respond to generous manurial treatment; both are available in a wide range of colours. *Prop.*—The Blackmore and Langdon strains of seed will give a magnificent display of mixed colours. Sow in warm greenhouse in early March or cold frame in April; prick out into boxes and transfer to flowering positions in the autumn.

Prunus.—A large genus which includes the flowering peaches, Japanese cherries, and flowering almonds. All of them are best left to develop

REMOVAL OF SUCKERS—As illustrated, these must be sawn off into the root or pulled off the root with a sharp tug and never so removed that dormant buds are left.

naturally and are not responsive to pruning or cutting back in any way. A few sorts are over-planted in gardens and as street trees (by Park Superintendents), but anybody wishing to be a little out of the ordinary would do well to see the wide range of some of these lovely trees flowering in April and May in our botanic gardens and many of the large gardens now under the jurisdiction of the National Trust. The selection offered by nurserymen is often strictly along conventional lines. Lack of flower in some seasons can often be traced to bird damage.

Red-hot Poker.—*See* **Kniphofia.**

Rhododendron.—Greenhouse and hardy, evergreen and deciduous shrubs, including *Azalea.* With something like ten thousand different sorts, it is impossible to deal with individual requirements. General cultivation; an acidic soil is essential, with adequate moisture in summer. If growth is poor on established plants, mulch liberally with animal manure. Beginners should plant from the accepted list of hardy garden hybrids. Since the turn of the century widely planted and fine examples are to be found, for instance, in many gardens of the National Trust. *Prop.*—Seed and layering.

Romneya.—Since its introduction from California in about 1850 the plant has proved a fascination to gardeners, as sometimes it fails completely or does exceedingly well. It apears to require a light soil and a sheltered position, preferably against a sunny wall, and there is no point in trying to grow a romneya on a heavy, wet soil. Usually the annual stems die off in the winter and may be cut down at ground level in the early spring; if persistent the stems can be cut back to sound growth. The new growth is susceptible to slug damage, and appropriate steps must be taken (**T28**). *Prop.*—Seed or suckers taken off in the spring.

PRUNING ROSES—(A) A vigorous unpruned plant. (B) The same plant pruned for the production of exhibition blooms, (C) and pruned for garden decoration.

Rosa (Rose).—Undoubtedly the rose is the most popular of all garden flowers, and it may be found in a multitude of forms. The dwarf roses for bedding may be grown on most soils, but are best on a rich, heavy loam. Planting is done from early November onwards when soil conditions permit and the first pruning carried out in the following spring, when the extent of any winter damage can be seen. Opinions differ sharply on pruning; a sound, general rule is to do the work in March and—unless there are special circumstances—to prune on the light side. Thus, for Hybrid Teas and the like, reduce strong stems by about one-third of their length, medium ones by a half, and weak ones to within two or three buds of the main stem.

Whatever sorts of soil roses are grown in, feeding is important, but, of course, it is particularly so on poor ones. It is in soils of *low* fertility that diseases such as rust and black spot are most prevalent and, in some measure, persistence of the disease is due to bad cultivation and lack of treatment with fertilisers. Where black spot is established, spray with "Captan." For a manurial programme, an application of 2 parts of superphosphate and 1 part of sulphate of potash can be applied at 3 oz. per sq. yd. after pruning. Following this, a surface mulch of animal manure, compost, peat, or leaf-mould or a mixture of all of them is given about 2–3 in. thick. Subsequently, if growth is poor, a dressing of nitro-chalk can be made at 1 oz. per sq. yd. Some other manurial treatments, like the so-called "Foliar Feeding" and use of "special" (and often expensive) compounds, have little to commend them.

Where soil conditions are poor and disease prevalent, it is important to buy plants only from nurserymen who take special precautions to ensure that their customers have disease-free stock. Likewise, varieties of robust constitution are essential, and a selection list may include: *Hybrid Teas:* 'Christopher Stone' (crimson), 'Dame Edith Helen' (pink), 'Eden Rose' (magenta pink), 'Granmere Jenny' (yellow, rose-pink flush), 'Madam Henri Guillot' (salmon pink), 'Quebec' (yellow), and 'Tzigane' (bicolor: vermilion and yellow). *Floribundas:* 'Dainty Maid' (rose pink), 'Dusky Maiden' (dark red), 'Tantau's Surprise' (deep crimson), and 'Yellow Holstein' (yellow).

In most of the modern hybrids scent is almost absent. The true rose perfume is found only in the Old Fashion or shrub roses and, normally, these are planted in a mixed shrub border. For the richest perfume varieties like 'Mrs. John Laing' and 'Conrad F. Meyer' should be sought. *Prop.*—Nurserymen's plants are budded; many varieties are easily raised from cuttings taken in the autumn and struck in sandy soil out-of-doors.

Salvia.—Annuals, perennials, and tender shrubs. The most popular one is the scarlet sort used for bedding. It requires careful attention, and seed should be sown in February in a temperature of 60° Fahrenheit and seedlings put into single pots when large enough. Gradually the young plants are hardened off and finally planted out in rich soil in a sunny bed.

Saxifraga.—A large genus of plants suitable for the rock garden and valued for their bright flowers in the spring. The encrusted saxifrages are cushion-forming plants requiring sharp, surface drainage and an open position out of the direct

sun. The mossy saxifrages are mat-forming in growth and of easy culture. In time old clumps develop brown patches and then require splitting up and replanting in the spring.

Scabiosa.—The commonly grown perennial sort is *S. caucasica* and is invaluable as a cut flower. It is not at home on all soils, and only does really well in a deep, rich loam containing plenty of chalk. In addition, it must be grown in full sun and particular care taken against slugs. *Prop.*—Old plants divided in the spring and rooted pieces replanted in their flowering positions. A wide range of shades in white, blue, and purple can be had normally from sowing mixed seed in April.

Sedum.—The stonecrops make up a large group of hardy and tender plants, but comparatively few are of horticultural value. Notwithstanding, *Sedum spectabile* is to be found in most herbaceous borders, where its fine, flat heads of pink flowers are a feature for many weeks. It is beloved by bees and butterflies. *S. sieboldii* was introduced from Japan about 100 years ago and, although hardy, it is usually grown as a house plant. In the winter it can be stood out-of-doors, and every two or three years repotted in the spring; keep well watered during the summer and feed with liquid manure occasionally. *Prop.*—Division in the spring.

Sempervivum (House leek).—These hardy plants with succulent leaves often decorate the crevices of old walls and are regular features of trough or sink gardens. If given a light poor soil and a position in full sun a fascinating collection of house leeks can be built up. The species which gives the plant its common name can be established easily on a sunny roof by planting in a mixture of cow manure and clay during the spring. *Prop.*—Division in the spring.

Skimmia.—A hardy evergreen 2–3 ft. tall which is tolerant of shade and some degree of dryness. If growth is poor water with a liquid manure and mulch with peat or leaf mould. Some forms bear only male flowers and to ensure a good crop of berries plant an hermaphrodite like *S. foremanii*. *Prop.*—Layering in the autumn.

Snowdrop.—*See* **Galanthus.**

Snowflake.—*See* **Leucojum.**

Solanum capsicastrum (Winter Cherry).—A berrying plant with bright-red fruits which is often used for house decoration. To maintain the plant in a healthy condition it should be clear of draughts and fumes of gas fires and the foliage kept fresh and free of dust by vigorous syringing. If the stock is to be kept for more than one season water should be given only sparingly in the New Year, and in early March all the side shoots pruned back hard to within a bud or two of the main stems. As new growth develops, water can be given more freely and syringing started when the flowers first appear; liquid manure will prove beneficial when berries develop.

Spiraea.—Hardy deciduous shrubs for open borders; tolerant of poor soil conditions. The commonly grown one is *Spiraea bumalda* (syn. *japonica*). After flowering, a percentage of the old wood should be removed together with any weak growth, and development of new shoots encouraged by mulching with compost or animal manure. *Prop.*—Cuttings rooted in sandy soil under a hand light in summer; suckers thinned out in winter.

Stocks.—*See* **Mathiola.**

Sunflower.—*See* **Helianthus.**

Sweet William.—*See* **Dianthus.**

Symphoricarpos (Snowberry).—Often found existing in deep shade and in competition with roots of overhanging trees, presumably as a result of the generalisation that the shrub is a shade lover. Certainly a useful one in this respect, but it is responsive to good treatment. Given an average soil and if growth is thinned annually in the early spring, then *S. albus* 'Laevigatus' is well worth having. Its large white fruits are untouched by birds and hang well into the winter, and are thus beloved by the floral decorator. *Prop.*—Suckers removed in the winter.

Syringa (Lilac).—The botanical name of *Syringa* is often erroneously applied to the Mock Orange, correctly named *Philadelphus* (*q.v.*). A wide selection of first-class varieties are available in nurserymen's lists. To obtain heavy crops of flowers nip off all dead flower-heads as the blossom fades, but do *not* cut back into the old stem, as this will prevent flowering. At the same time any branches causing overcrowding can be removed. Annually feed with "National Growmore" at 2 oz. per sq. yd. and on poor soils mulch with any sort of manure or compost. *Prop.*—Layering in the autumn.

Tagetes (African and French Marigolds).—Half-hardy annuals of free-flowering habit and easiest culture. Best if fed generously with soot water or other nitrogenous manure during growing season. *See* **Annuals.**

Tropaeolum.—The common nasturtium and the flame flower (*T. speciosum*) belong to this genus. The former is easily grown from seed sown in May in a sunny position. The latter is a very difficult plant to grow outside the conditions which it demands. To be successful, this perennial climber must be planted in acid soil which is naturally damp and lightly shaded but yet where the new growth can reach full sun. Much disappointment often results from planting it in eastern England, for instance, after seeing it flourishing almost as a weed where the rainfall is high in Ireland and the west of Scotland.

In the genus will also be found the canary creeper, which can be used for screening purposes and will thrive in full sun or shade. Seed is sown in May in open ground and light supports supplied by way of pea sticks or strings; failure is normally due to nothing more than lack of moisture.

Tulipa (Tulip).—Thrives in a deep, rich loam, but will do well for one season in ordinary garden soil. When used for bedding, bulbs must be lifted after flowering, replanted in a trench, and thoroughly watered. Sometimes tulips may be left in the ground *if* conditions are favourable, and then the stock only needs lifting and replanting every three years. To check the incidence of tulip fire plant in late November or early December, covering the bulbs with 4–5 in. of soil and treat the ground with a fungicide like "Botrilex." Before doing so rake in a dressing of 2 oz. superphosphate and 1 oz. sulphate of potash per square yard. A small collection of wild tulips is being got together at Cambridge and grown there in the University Botanic Garden.

Viola.—This name embraces pansies, violas, and violets. Although the viola has not got the rich colours of the pansy (or its attractive markings), it has got a remarkably long season of flower, and for this reason it is invaluable as an edging plant or as ground cover for roses. *Prop.*—Both plants are easily raised from seed sown in a frame in the spring, pricked out, and then transferred to their flowering positions in late May. Alternatively, seed may be sown in July for planting out in October. Named varieties increased by cuttings in a frame in late summer.

Virginia creeper.—*See* **Parthenocissus.**

Wallflower.—*See* **Cheirianthus.**

Water Lily.—*See* **Nymphaea.**

Winter Sweet.—*See* **Chimonanthus.**

Wisteria.—One of the finest of all climbing plants for south or west walls or stout pergolas. Plants which do not flower, or only do so poorly, are probably seedlings and the true flowering habit cannot be induced; the only solution is to replace with a *grafted* plant of known flowering capacity from a reliable nurseryman. All young shoots not required for the extension of branches should be shortened to within 3 in. of the old stem in the

autumn. Wisterias growing over trees do not require pruning. *Prop.*—Layer shoots of current season's growth in the autumn.

Zinnia.—Half-hardy annual, ideally grown on moist, deep loam liberally enriched with well-decayed manure. Mulch with manure after planting and apply liquid fertiliser as buds appear; plants must not suffer from lack of water. *See* **Annuals.**

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MAKING A LAWN

In almost every garden the most prominent feature is the lawn, and often a lot of work is put into making one without any great measure of success. Usually, the reason for failure may be found in faulty preparation of the soil or premature sowing, albeit the blame is often placed on bird damage or poor seed.

For anything like a reasonable turf, the site must be thoroughly dug and the content of organic matter increased by incorporating generous quantities of materials like peat, leaf-mould, compost, sewage sludge, and animal manure. A dressing of these ingredients can be applied in a layer 3–4 in. thick and buried in the bottom of the top spit of soil. As the ground is dug to incorporate the organic matter, roots of perennial weeds should be removed.

If the site is one on which water tends to lie or if the soil is heavy, then surface drainage should be sharpened by forking into the top 2 or 3 in. a liberal application of some coarse material such as builders' rubble, road grit, screened ashes, or coarse sand. In some cases this treatment will not be sufficient, and then the installation of land drains must be resorted to. This particular task is not as difficult as is sometimes imagined, but, before a start is made, it is always a good plan to discuss the matter with an experienced man.

After the initial work a fine tilth on the soil may be obtained by thoroughly raking and cross-raking and at the same time establishing a level surface. On this point, it should be remembered that good lawns can be made on undulating ground or on natural slopes, but the things to avoid are the shallow depressions where water will naturally tend to lie. Finally, ten to fourteen days before sowing the subsequent growth of grass can be encouraged by making an application of "National Growmore" at 2 oz. per sq. yd.

Sowing is best done in the late summer at a time when the soil is moist. For the purpose, a good mixture of seed should be obtained from a reliable seedsman, and it is worth paying a reasonable price for it, as, by and large, the coarsest and roughest grasses have the largest and heaviest seeds. Opinions differ on rates of sowing, but, with care and in a well-prepared soil, 1 oz. per sq. yd. is ample; heavier rates may give quicker results, but the density of seedlings in such cases often leads to the finer grasses being choked by the coarser ones.

After sowing, the ground should be lightly raked, but not rolled. At this stage the important point is to protect the seed bed from birds by the use of hazel sticks, strings of papers tied to stakes after they have been dipped in lime-wash, and strands of black cotton. Subsequently, annual weeds may appear in quantity; these are of no consequence, and they will be eliminated once the grass is cut regularly. Until a good turf is formed—usually about twelve months after sowing—it is not desirable (or probably necessary) to use hormone weed-killers.

Care of Established Lawns.

Most turf is never manured from year to year, and the soil may seriously lack plant foods. In the first place this can be corrected by making an application annually in the spring of "National Growmore" at 1 oz. per sq. yd. Subsequently, if growth is below par in the early part of the year an application of sulphate of ammonia can be made at the same rate. To avoid scorching or blackening of the foliage, each fertiliser can be mixed with equal parts of dry soil or sand as a carrier to ensure even distribution and, what is most important, each one should be applied only when the turf is wet and there is the prospect of rain to follow. Linked with this treatment, turf is always responsive to top dressings. A compost for the purpose can be made up with:

2 parts of loam;
1 part of sieved compost;
1 part of fine peat or leaf soil.

This may be used in the spring at 3–5 lb. per sq. yd. and if the soil is heavy 1–2 parts of gritty sand may be added.

With the introduction of new designs in motor mowers, most lawns are seriously overcut, and this has led to a sharp decline in the quality of the grass and the appearance of one or two pernicious weeds. It is appreciated that special turf, such as that found on a bowling green, may be shaved off to $\frac{1}{16}$ in., but if a utility lawn is cut below half to 1 in., then the quality of the grass will deteriorate. Of course, it is a good thing to occasionally cut the grass very short, but, conversely, if the blades of the mower are set as low as possible and left like it throughout the season nothing but harm can result. The reason for this hard fact is that when the turf is cut very close the grasses simply cannot develop and spread, and weeds will gradually establish themselves. Eventually the cultivator will be faced with the difficult problem of trying to deal with such plants as pearlwort, yarrow, and various mosses, all of which are resistant to hormones.

As for the vexed question of whether or not to remove the mowings, there is no doubt that the best turf is found where the mowings are collected up, although in very dry weather they can be left on the surface. If the clippings are not removed the surface of the turf tends to become choked with semi-decayed organic matter, and conditions are brought about which are inducive to the spread of moss.

Finally, it is worth noting that the finest turf is found on acidic—not alkaline—soils. For this reason, lime should not be applied as a general rule, for apart from helping the development of coarse grasses, it encourages the growth of clover. Of course, there are times when lime is necessary, but the occasions are rare and before it is used it is a good plan to test the soil by chemical means.

THE FRUIT GARDEN.

The guidance of an expert is probably more important in the growing of fruit than for most of the commoner vegetables and ornamentals. This is primarily because the majority of fruit trees and bushes are long-lived, and only in the case of strawberries can a change of site or variety be made easily and inexpensively.

Gardens which are low-lying are very prone to damage from spring frosts, and should not have too much space devoted to fruit, as returns may well prove unprofitable. Here, as with the selection of varieties, advice of a local expert is invaluable. Some varieties do better in certain localities and on certain soils than others, although personal preferences will naturally be met where possible. Varieties chosen should cover as long a season as is practicable so that the fruit can be used and enjoyed to the full.

Tree fruits are grown on a rootstock, and for apples and pears special dwarfing stocks make these a possibility for the small garden. It is therefore important to explain to the nurseryman what type of tree is required. As a general rule, however, the smaller gardens will gain by concentrating on currants, gooseberries, raspberries, and strawberries. Plums and cherries have no

dwarfing stocks, and should be included only where sufficient room is available.

Adequate preparation of the ground is important, and this, followed by good management, can result in worth-while crops from most soils, providing they are reasonably free of frost, well-drained, and sufficiently sunny.

Apples.—Can be grown on most soils. Manure should not be used when planting, except in sandy and chalky gardens. Obtain trees on dwarfing rootstocks, such as M.IX, M.VII, or MM.106. Always stake trees on M.IX, otherwise this practice is necessary only in exposed sites. The tie must be rigid, with a "cushion" between tree and stake to avoid chafing, and must be renewed annually to avoid constriction. Plant between late October and early March, preferably before Christmas if soil and weather allow. Make the hole large enough to spread the roots evenly; firm thoroughly while filling in and plant level with the nursery soil mark already on the tree. Mulch around each tree with manure or compost, mainly to avoid drying out, and supplement with watering during the summer when necessary.

In the first year any flowers produced are best pinched out to encourage root and shoot development. For walls or fences use oblique cordons or espaliers; these are also useful for flanking paths and lawns. Plant cordons 2½ ft. apart with 6 ft. between rows, and espaliers 12–15 ft. apart. For larger areas use bush trees 12–15 ft. apart.

Manuring for cropping trees should be varied according to growth. Generally apply 1 oz. sulphate of ammonia (or nitro chalk on acid soils) in early March, repeating this in early April if trees are growing in grass. Give ½ oz. sulphate of potash in February and add 3 oz. of superphosphate every third year. The above rates are per square yard, and a complete fertiliser can be used in lieu if preferred.

Young bush trees should have main shoots reduced by half in early years to produce strong branches. Thereafter prune side shoots to three to six buds. For weak growers prune harder, and for strong growers prune less. It is wiser to leave a strong tree unpruned than to prune it too severely, the latter merely encouraging even stronger growth. A few varieties (*e.g.*, 'Bramley's Seedling,' 'Worcester Pearmain') fruit at shoot tips, and here a proportion of side shoots should be left unpruned. Summer pruning is advisable on restricted trees, such as cordons; for details see pears. Very few varieties are self-fertile, and at least two sorts should be planted to ensure satisfactory crops. Good combinations are 'Cox's Orange Pippin' with 'Laxton's Fortune' and 'Winston' with the cooker 'Lord Derby.' Seek expert advice on pairings if in doubt.

Apricots.—These are often an unreliable fruit to grow, needing a well-drained, calcareous loam and a warm wall for success. Train the tree as a fan, and once established pinch unwanted side shoots to four leaves in summer. Thin fruits when young, these developing mainly on spurs on older wood. 'Moor Park' and 'Hemskirk' are good varieties.

Blackberries.—Allow plenty of room and train against fences or wires. Autumn planting is preferable, using good, well-manured soil and cutting back the cane to 9 in. from the ground. Mulch with manure each spring, water freely in drought, and cut out old canes as soon as they have fruited. Good varieties are 'Himalaya,' 'Merton Thornless,' and the parsley-leaved blackberry. Increase by tip layering.

Cherries.—Sweet cherries are unsuited to most gardens. The trees become too large, and *must* be planted in selected pairs to fruit satisfactorily, as all varieties are self-sterile. Large wall spaces are ideal for fan trees, as the fruit can then be protected from birds by the use of nets. Pinch side shoots on fans to four leaves in July; further pruning details being as for plums. Expert advice is essential to ensure that suitable varieties are grown together, the factors involved being complicated. 'Early Rivers' with 'Bigarreau Schrecken' and 'Merton Heart' with 'Waterloo' are good combinations.

For the small garden the dwarf-growing, acid 'Morello' cherry is more useful, being infinitely superior for preserves as well as self-fertile. It also succeeds on a north wall, but unlike sweet varieties, fruits *only* on one-year-old wood.

Currants, Black.—These are perhaps the most valuable of all hardy fruits, and bushes will give up to 10 lb. and more of currants with correct treatment. Plant from November to February, preferably autumn, at 5 ft. square on clean, heavily manured ground. Then cut all shoots to one bud above soil level. Mulch each spring with well-rotted manure and supplement with fertilisers if necessary. The mulch is essential as much for keeping the soil moist as for a general feed.

On established bushes prune preferably after fruiting or in winter, retaining strong young wood and cutting out older shoots, where possible from ground level. If necessary, alternate bushes can be cut down completely every other year to maintain vigour, as the bulk of the crop is always borne on young wood. Increase by 8-in. cuttings of one-year-old wood taken in late September from healthy bushes. Remove lower leaves and insert firmly with one bud above ground. Good varieties: 'Boskoop Giant,' 'Wellington XXX,' 'Baldwin.'

Currants, Red and White.—One or two well-grown bushes are usually sufficient for the average household. Plant between November and March at a minimum of 5 ft. square on well-manured ground and mulch each spring. Supplement with fertilisers if necessary, potash being particularly important in the form of sulphate of potash at 1 oz. per sq. yd. in February. Can be grown as cordons or fans against walls or fences, on which the pinching of young side shoots to four leaves in mid-June is essential. Winter pruning of all types simply involves cutting side shoots to one bud and tip pruning branch leaders. Propagate by 12-in. cuttings of young shoots in late September inserted to half their length with all buds removed except the top four. This enables the bush to be grown on a "leg." A permanent framework of branches is then developed, as, in contrast to the black currant, fruit is borne on spurs on the old wood. Good varieties: 'Laxton's No. 1,' 'Red Lake,' 'White Grape.'

Damson.—*See* Plums.

Figs.—A warm south wall is usually essential, 'Brown Turkey' being one of the few reliable outdoor varieties. Plant in a brick or concrete trough (with drainage holes) about 2½ ft. wide, 5 ft. long, and 2½ ft. deep so that the root run is restricted. This will curb excessive growth (which otherwise is difficult to control) and encourage fruiting. Plant in March for preference, to avoid frost injury to young shoots, and then train fan-wise. A rich soil is not essential. Figs visible as such in the autumn will never overwinter, and should be rubbed out. Those the size of a pea and less at the tips of short, well-ripened shoots, on the other hand, are the potential crop for the following year, and should be covered in severe weather to avoid frost damage. To encourage the formation of these embryo fruits pinch young shoots back to the fifth leaf in late August. Winter prune in March, removing any wood that is frosted, overcrowded, or worn out; growths should be spaced at about 1 ft. Apply a spring mulch and water freely when required to avoid premature fruit drop.

Gooseberries.—Need conditions and spacing very similar to red currants, but with rather more moisture to ensure ample new wood, as this bears fruit as well as the older wood. Apply sulphate of ammonia and sulphate of potash annually in late February at up to 1 oz. per sq. yd. of each in addition to mulching. Can also be grown as cordons, etc., as for red currants. Pruning is also similar, though not quite so severe, as the young wood is productive of fruit. Cuttings are more difficult to root, and for best results should

be taken in mid-September, again as for red currants. Good varieties: 'Lancer,' 'Leveller,' 'Whinham's Industry.'

Grapes.—Outdoor vines should be grown against a warm south- or south-west-facing wall. With good cultivation, the grapes should then ripen successfully providing suitable varieties are chosen. In preparing the site ensure that it is well drained and break up the soil to a depth of about 2 ft. Add bone meal to the top few inches at 4 oz. per sq. yd. and incorporate mortar rubble, particularly on the heavier soils. Do not dig in any manure except on poor, light soils, but always apply some as a mulch after planting, repeating this every spring. On poor, hungry soils the importation of some fibrous loam is advisable where possible.

Plant in November or, failing this, before early March, with the stem about 6–9 in. away from the wall. Firm well and then wait a further two months before tying to any wires or stakes, in case of soil sinkage. Cut the vine back in winter to well-ripened wood and to just above a bud. The training of subsequent growth will then depend on the space available, single and double cordons being the most convenient. Unwanted shoots should be pinched at about 2 ft. in summer and leading shoots carefully tied in to wire or bamboo supports. The following winter (December) prune leading shoots back to well-ripened wood so as to leave 3–4 ft. of new growth. Then cut all laterals hard back to one bud. In spring reduce young side shoots to one at each bud, stop laterals at about 12 in., and pinch any sub-laterals that may develop to the first leaf. Do not allow any crop to develop, except perhaps one bunch if growth is adequate; others should be pinched off. As fruit develops, thinning should be done as required. Winter prune as before, and then in the third summer four or five bunches of grapes can be allowed if the vine is healthy, the crop then increasing annually. Shoots carrying bunches should be pinched to two leaves beyond the bunch. Winter pruning is repeated each year as already described. Sour top-soil should be carefully removed when necessary and replaced with good loam while the vine is dormant. Good varieties: 'Black Hamburgh' and 'Foster's Seedling.'

Loganberries.—A very popular hybrid berry which should be treated as for blackberries. A thornless form is now available. Suitable for a north wall.

Medlars.—A tree of spreading habit, the peculiar fruits of which are best used for jelly before they are fully ripened. Most soils are suitable, and no pruning is needed except to keep in shape.

Nectarines.—A fruit very closely allied to the peach but with a richer flavour and needing rather more warmth. The skin is smooth, as distinct from the hairiness of the peach. For full details see **Peach.**

Nuts.—The most important kinds grown are cobnuts, the closely related filberts, and walnuts, but none of these is cultivated to any great extent. The two former kinds flower very early in February, and are therefore predisposed to frost damage; similarly, the young shoots of walnuts are easily injured by spring frosts, and all are therefore inadvisable for frosty areas.

Cobnuts and filberts.—Highly developed forms of the ordinary hazel nut. The nut of a cob is only partially covered by the husk, whereas a filbert is completely enclosed by it, this being the essential difference between the two. Will grow on most soils, including the poorer ones, and spacing should be about 15 ft., choosing sites sheltered from the colder winds. Plant during the autumn. Prune established bushes in March, cutting back shoots that have borne nuts to two or three buds; strong young shoots are cut back to a catkin near their base, and the weaker ones are left untouched. In August any strong new side growths are "brutted"—that is, broken off—and left hanging until the March pruning. Gather the nuts as they fall and allow to dry. Then store in jars for Christmas use, packing salt and coconut fibre between each layer of nuts.

Walnuts.—Special, grafted varieties are now available which produce early crops compared with the unreliable seedling trees that used to be planted. Plant between October and March and water well in spring and summer. Do not prune, as walnuts bleed badly. Gather nuts in mid-July for pickling. For storing allow to drop naturally and remove outer husk immediately, scrubbing the shell clean and then drying thoroughly. The shells can be bleached if necessary before storing the nuts as for cobs above.

Peaches.—This fruit along with its close ally, the nectarine, is best grown against a warm south or south-west wall, but two varieties of peach, 'Peregrine' and more particularly 'Rochester,' will succeed as bushes in the open in southern England. The fan-trained peach is one of the most difficult trees to keep in order, as sufficient new shoots must be retained annually to replace old wood. This is essential, as it is only the previous year's shoots which bear fruit. Badly placed shoots are rubbed out when only an inch long, and the principle is to allow one young replacement shoot to develop near the base of each fruiting shoot, pruning back to the former and tying it in as soon as all fruit has been picked. Other shoots may be used to extend the fan where space allows or to replace any branches or parts of them which may have become worn out. Other unwanted shoots are bound to arise during each summer, and these are either removed immediately or pinched to three leaves and then removed when pruning in late summer. Those shoots retained are spaced at about 4 in. apart.

Most peaches are self-fertile, but hand-pollinating on sunny days can improve the set. Excessive feeding should be avoided, varying this according to each tree's performance, but as a general rule a surface mulch of well-rotted manure or compost should always be given each spring, together with sulphate of potash at ½ oz. per sq. yd. Prick over and rake off top-soil and replace with good loam every few years. Never allow the sub-soil to dry out—this can quickly occur against warm walls—and water thoroughly when doing so to ensure an even distribution of moisture. On the other hand, drainage must be satisfactory to avoid waterlogging.

There are numerous other essential operations in the growing of trained peach trees (for example, fruit thinning), and it is impossible to deal with these adequately in brief notes. Would-be growers should therefore seek expert advice and obtain literature dealing specifically with the crop rather than risk disappointment. Good varieties for outside wall training include: *Peaches:* 'Peregrine,' 'Bellegarde.' *Nectarines:* 'Early Rivers,' 'Lord Napier.'

Pears.—The requirements for pears are similar to those for apples, but the necessity for adequate summer and autumn warmth rules out many varieties for northern areas. In these less-favoured localities enquire which varieites do succeed, and where possible make use of a warm, south-facing wall. Protection from wind is very important, particularly from the cold easterlies of spring. Many soil types grow pears satisfactorily, providing drainage is good and the trees are looked after. Plant as for apples. Fertiliser requirements are also similar once cropping commences, except that pears may require a little more nitrogen.

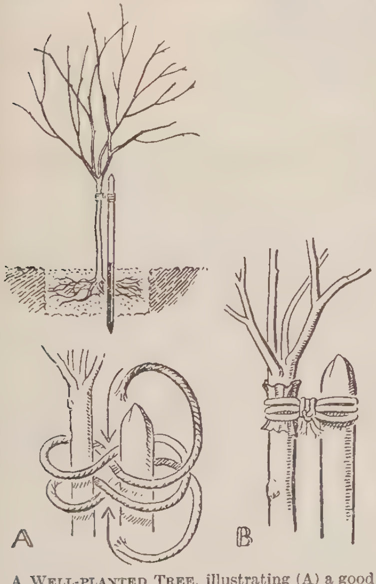
Pruning (winter) is comparatively simple, the spur pruning given for apples suiting all except a very few pears. Initial shaping is essential, cutting the stronger shoots selected to form branches by about half their length and keeping the centre of the tree open. For cordons and other restricted forms of tree, to which pears lend themselves particularly well, summer pruning is advisable. This involves shortening all young shoots more than 10 in. in length to about 5 in. from the base. Do this when the base of such shoots is hardening and turning brown in colour, usually late July–early August. Pruned shoots may then be further reduced in winter. Such summer treatment may also be given to trained apple trees with advantage during August.

Only a few pears are self-fertile and 'Con-

ference' is the most reliable if only one tree can be planted. Good pollinating pairings include 'Laxton's Superb' with 'Doyenné du Comice' and 'Conference' with 'Williams' Bon Chrétien.' Early varieties should be picked a little before ripening and used quickly.

Plums.—This general term includes gages and damsons. Numerous varieties are easy to grow but are unsuited to small gardens because of the amount of space required. Unlike apples and pears, there are no dwarfing rootstocks, and a minimum spacing of 14 ft. should be allowed for, growing the trees as half standards, or fan-trained against a south or west wall. Flowering is during April, and frost damage can be serious in some seasons. Plant preferably in the autumn, and by early March at the latest, using no manure unless soil is distinctly poor. Young trees should be staked during their early years, and must not be allowed to rub against the support.

Pruning should be reduced to a minimum, as the spores of silver leaf disease gain entry through wounds such as pruning cuts and stake rubs. Shorten branch leaders on young trees just as buds are bursting, but on older trees prune only when branches become overcrowded. Do this between June and August, when the risk of silver leaf is at a minimum. Cut cleanly and coat the wounds thoroughly with a bituminous paint; treat broken branches similarly immediately they are noticed. Trees fruiting heavily should have the branches supported and the fruit thinned in late June. Side shoots on fans must be cut to four to five leaves in late June and reduced still further following picking if necessary. Feed cropping trees regularly to encourage new growth, using well-rotted manure or sulphate of ammonia at 1 oz. per sq. yd. in early spring. Some varieties are self-fertile including 'Victoria,' 'Oullin's Golden Gage,' and 'Merryweather Damson.'



A Well-planted Tree, illustrating (A) a good method of tying and (B) sapling firmly secured with sacking around the trunk and held with stout cord.

Raspberries.—These are an ideal fruit for the small garden, but because of virus disease always buy certified canes from a fruit nursery. Plant between November and March on clean, well-manured ground, allowing 18 in. between canes and 6 ft. between rows. After planting prune each cane back to 12 in. Do not attempt to crop them in their first year, or the production of young canes for the following year's fruit will suffer.

A semi-shaded position will answer, but full sun is preferable for quality fruit. New canes should be looped with string to a post-and-wire fence and later tied individually to each wire when fully hardened. Space them at about 4 in. and remove any weak or diseased canes at ground level. In late February cut each cane to just above the top wire, which is usually 5–6 ft. high. This removes any damaged tips and may encourage fruiting over a longer length of cane. In the second summer a fair crop should result, and netting against birds is essential. Regular watering is imperative in dry weather, and spring and summer mulches of well-rotted manure or compost should always be applied. Supplement this in March with nitrogen and potash (fertilisers) if required, this depending on how well the ground was manured before planting. After fruiting cut out all old canes and tie in the new ones as already described. 'Malling Promise' and 'Lloyd George' are good varieties.

For autumn-fruiting varieties prune all canes to the ground in late February and tie in the best during the summer for cropping in September–October. 'September' is a good variety, and 'Lloyd George' can also be used.

Strawberries.—This is the one fruit that should be included in the vegetable garden. Fresh ground can then be used regularly for establishing new beds. Plants more than two years old are seldom profitable, and the best fruit is always picked from healthy one-year-olds planted the previous August or September. Runners put in later than early October should be deblossomed the following spring, the reward being a much heavier crop in the second year. This wastes ground, however, and early planting is preferable on all counts. Prepare the ground well in advance of planting and dig in plenty of well-rotted manure or compost or both, as this is the key to success.

Because of virus diseases order certified plants from a fruit nursery and burn any unhealthy ones in old beds before planting. Insert firmly with the base of the crown of each plant just at soil level and refirm after winter frosts; space at 20 in. in rows and 2 ft. 6 in. between rows (3 ft. if possible). A mulch of rotted manure or compost is beneficial each autumn, and if this is lacking apply sulphate of potash at 1 oz. per sq. yd. instead. Bonemeal is also advisable in spring and again in July, but quick-acting *nitrogenous* fertilisers should normally be avoided.

During flowering cover the plants where possible to guard against frost damage reducing the crop. Keep the ground weed-free and remove runners regularly; a few plants should always be grown away from the main bed, deblossomed and kept purely for runner production, as this then helps to reduce the spread of virus. Ruthlessly burn any plant that remains stunted, including its runners, as this is usually a symptom of virus disease. When the young fruits are just forming spread clean straw underneath them to avoid splashing from the soil; it is a mistake to do this too early, as it increases the risk of frost damage. Net the fruit against birds and remove any rotting specimens when picking.

After fruiting remove and burn all old foliage, weeds, and straw, and feed as already described. Plant a percentage of new, vigorous runners each year on fresh ground, at the same time burning the old ones they are replacing. Good varieties include 'Royal Sovereign,' 'Cambridge Favourite,' and 'Talisman.'

Alpine strawberries require similar treatment, preferably with a semi-shaded position, and should be raised from seed. Perpetual fruiting types continue fruiting on and off well into the autumn, and should be treated as for ordinary varieties. In all cases cloches can be used from late February onwards to obtain early fruit.

Standard References:

Fruit Growing: Modern Cultural Methods, by N. B. Bagenal, 2nd edition (Ward Lock), 1945 (30*s*.).

The Fruit Garden Displayed (Royal Horticultural Society), 1951 (6*s*. 6*d*.).

THE VEGETABLE GARDEN.

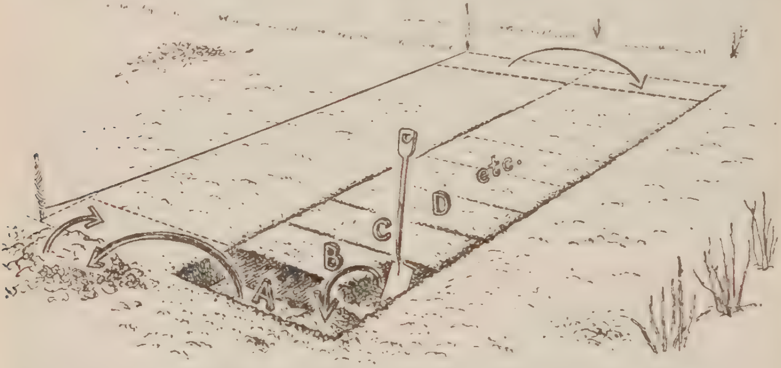
The vegetable garden is, or should be, an integral part of home economy nowadays. Home-grown vegetables, although requiring considerable labour, are cheaper and fresher than most shop supplies. The ideal site is in an open, sunny position sheltered from cold winds with the soil a deep, rich loam well supplied with humus; quite obviously very few gardens have the ideal site, and we have to do the best we can with the ground available. In laying out the vegetable plot, ease of working should be considered; the lines of vegetables should go from north to south, and paths should be wide enough for a barrow to pass. The vegetable lines should not be too long, or the soil will be trodden down too much.

Each individual will have to decide the size of his plot according to the amount and types of vegetables required, and the land available. Shelter from a hedge or wall is desirable, and a plot about 90 ft. by 30 ft. can be made to produce a succession of vegetables to feed an average family over the year. Land preparation is important; on a new site the weeds should be cut down and removed, but any turf can be left and dug in. The land should be dug two spits deep (" double digging ") in winter, and for this the plot is divided into two longitudinally and a trench 2 ft. wide and 10 in. deep is dug out at one end, as shown on the accompanying diagram. The sub-soil below the trench is then broken up and manure or compost incorporated (or turf if grassland is being dug). The next strip is then dealt with in a similar manner, and this continues down the plot until the last trench, which is then filled with the loose soil from the first trench.

Clay soils which are sticky are much improved by humus and constant working, but should not be dug in wet weather. Sandy soils also require plenty of humus to conserve moisture, but are less fertile, though often warmer and earlier. For the majority of vegetables a slightly acid soil is best, and a dressing of lime is only desirable if the soil is too acid. Double digging is not necessary each year, and single digging, carried out in a similar manner without breaking up the second spit, or a light forking over is sufficient for some crops, provided the ground has been well cultivated previously.

The lay-out with vegetables must be designed to provide a succession through the year and to utilise the full capacity of the ground by catch crops and a suitable succession. The land can be divided into four plots; one is used for the more or less permanent crops, such as asparagus, rhubarb, and globe artichokes, and the other three will provide a rotation. This is used to stop any group of vegetables being grown on the same land more than once in every three years, so preventing the carry-over of some pests and diseases and providing for a full use of the manures in the soil, as different groups of vegetables need more of some nutrients than others. It also allows the clearance of one section to enable winter digging and manuring to be carried out. On this freshly manured plot peas, beans, onions, leeks, and lettuces, all revelling in rich ground, should be grown. The next plot, manured for the *previous* crop, can be used for root crops—early potatoes, carrots, parsnip, and beet. A light dressing of artificial fertiliser such as " National Growmore " should be applied before sowing. On the third plot the green vegetables should be grown; a dressing of fertilisers is desirable, and lime should also be applied.

In the following season the root crops can be grown on the plot which was manured the previous year, and the brassicas grown on the land vacated by the root crops. The plot on which the brassicas were growing is double dug and manured ready for the peas, beans, and onions. A system of this type proves very satisfactory, but numerous variations can be devised, and it is really a matter for the gardener to decide his best method. The growing of maincrop potatoes will complicate the system, as a large area is usually required. They are better grown separately in another part of the vegetable garden.



DOUBLE DIGGING—A sound cultural practice. A trench 2 ft. wide and the depth of a spade is taken out at A and placed as shown. The bottom of trench A is then forked up and filled in with soil from B and the process repeated with C and D, etc. In double digging the sub-soil is *always* left on the bottom and never brought to the surface.

Usually it is wise to have a small piece of ground available for a nursery bed. This should be of good, fine soil in which seeds can be sown to supply the main plot. In all cases seed should be sown very thinly to prevent the necessity for much pricking out, and a slug-killer is often a wise precaution to use before sowing. Sowing dates, as given, are mainly for growers in the South. In the North sowing dates in spring will be generally two weeks or more later and autumn operations the same amount earlier. Any gardener must adjust his work to suit local conditions of soil and climate, and this knowledge is only gained by experience of the particular area.

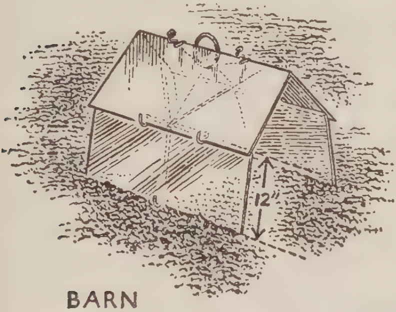
General cleanliness in the vegetable garden is at all times desirable; weeds and rubbish only harbour pests and diseases, and the hoe should be busy whenever possible. Waste material can be utilised in that essential of the modern garden—the compost heap. *See* **Manures and Fertilisers** for description.

Frames and Cloches.—The gardener is able to extend the season of many crops by protecting them under frames and cloches; this is particularly useful where spring or early autumn frosts are prevalent. The use of frames is limited, as they are in a fixed position, but nevertheless they are very useful for obtaining out-of-season salad crops, especially if they are heated by electricity or a hot bed.

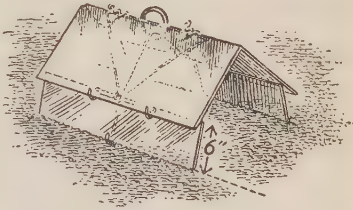
Cloches have the advantage of mobility and can be used on a number of crops in succession. Essentially, each is a number of pieces of glass in a tent or barn shape held together by wire. Pattern, size, and height vary according to the crop to be covered and the manufacturer's design. A good cloche should be of simple design, rigid and capable of standing up to ordinary winds, easily transported, and well ventilated.

The low barn cloche is probably the most economical type. This is 23 in. wide and 13 in. high when erected, and will allow two rows of lettuce to be grown, with an intercrop of another vegetable. The large barn or barn cloche of similar design, but with 12-in. side is 19 in. high in the centre, enabling taller crops, *e.g.*, peas and dwarf beans, to be grown on, almost to maturity.

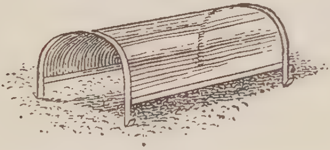
Dwarf varieties should be used for growing under cloches, although methods of raising the cloches another foot or so have been devised and are on the market, which allow the use of taller growing varieties. Many different vegetables can be helped to some extent in the early stages, besides those crops which can be grown entirely under cloches; the grower must decide what crops he needs and fit a rotation to cover as many crops as possible with the cloches available. This is mainly a matter of experience, but books on the subject will suggest many variations that can be tried. Intercropping with quick-maturing crops can also be practised. As instances, radish or mustard and cress can be cropped between two rows of lettuce, or a row of cos lettuce can be grown between two rows of cabbage lettuce.



BARN



LOW BARN



PLASTIC

TYPES OF CLOCHES—The most popular is the barn cloche; with 12-in. sides it will cover strawberries and peas and beans in their early stages. The low barn will accommodate three rows of lettuce in winter and cucumbers in the summer. Plastic cloches are growing in popularity, especially those patterns using toughened plastic, and have some decided advantages over glass ones.

The tomato cloche has sides 24 in. square and a basal width of 26 in. Many others of various shapes and sizes are offered; the amateur should buy to suit his own requirements. Other materials have been tried instead of glass with varying success. Plastic cloches are on the market, but their lightness entails very safe anchoring, and at the moment glass still seems to be the best material in most instances.

Gardening under cloches obviously is a subject too large to be dealt with in a few sentences, and the reader would be well advised to refer to one of the books mentioned in the bibliography for fuller information. A few of the main points are mentioned here and also under the individual crops.

Cloche cultivation is an intensive method of production, and this means that the land must be well cultivated and manured to ensure good-quality crops at all times. About ten days before crops are sown or planted the cloches should be put in the position where they are to be used, to warm the soil. The crop is sometimes sown a month before the normal date, and this prewarming ensures that the soil can be cultivated to a good tilth, as well as giving the plants a good start. Watering is a problem that often bothers the amateur. Provided the soil is well watered at sowing time, there should be no need to decloche to water. Rain seeping under the cloches and a spray directed over them occasionally will provide enough for the crop in normal weather; on dry, sandy soils it may be necessary to spray over the cloches more often. A mulch of compost is also very useful to help retain water.

It must be remembered that the glass of cloches will need cleaning from time to time; the crop still needs the maximum light available, although shading of certain crops may be necessary in hot sun.

Artichokes.—Two different plants are grown as artichokes. One, the Jerusalem artichoke (*Helianthus tuberosus*), is related to the sunflower and is grown for its tuberous roots, which are second in food value only to the potato. It will grow in poor soil, but amply repays good cultivation, and may be placed at the more exposed end of the vegetable plot as a windbreak and screen. Tubers should be planted during February or March, on well-manured ground in drills 4–6 in. deep, and 2 ft. 6 in. apart, with 15 in. between the tubers. Hoe frequently during the summer and cut the stalks down in early winter. The tubers may then be lifted and stored, or better dug as required, reserving a number for replanting the following February.

The other type, the globe artichoke (*Cynara scolymus*), is often grown as an ornamental plant, but is esteemed as a vegetable for its young, fleshy flower-heads, which must be cut before the scales begin to open, after which they become hard and unpalatable. A deep, rich, well-manured soil is required, and after planting in early spring in rows 4 ft. apart, with 2 ft. between the plants, a compost or manure mulch is beneficial. A good crop may be expected for five or six years provided an annual dressing of manure is applied. After this time they should be replaced by young suckers,

planted in a fresh position. A covering of straw or bracken on the crowns is advisable during winter.

Asparagus.—This will grow on most types of soil provided that drainage is good and that plenty of organic matter is available. The site for the asparagus bed should be double dug in the autumn prior to planting, and a generous dressing of about half a barrow load of manure per square yard incorporated. Crowns up to three years old may be bought, but it is found that one-year-old crowns give the best results. Plants may be obtained cheaply by sowing seed in late March in drills 1½ in. deep and 18 in. apart and thinning the seedlings to 4 in. apart. It is thought that male plants produce more stalks of better quality than female plants, but at present no supplies of male crowns alone are available.

Planting may be on the single-row system or the wide-bed system. In the single-row system crowns are planted 18 in. apart in rows 4½ ft. apart; the wide-bed system consists of 5-ft. beds, with three rows of crowns 15 in. apart each way, and 2 ft. between each bed. Planting is best done during April and the plants are placed in a trench 8 in. deep and 1 ft. wide, with a slight ridge at the base, and covered with 3 in. of soil. The remaining soil is worked in during the summer. The roots should never be allowed to dry out.

The following March 2 oz. per sq. yd. of sulphate of ammonia should be applied; in subsequent years 3 oz. per sq. yd. of "National Growmore" applied at the same time, followed by 2 oz. per sq. yd. of sulphate of ammonia in June, after cutting, can be used. Salt, as a fertiliser, is not recommended nowadays. An annual dressing of manure or compost in November is desirable.

No cutting should be done for the first two years after planting and only a light cut taken in the third year. After this a six-to-eight-week season beginning in early May is usual. The spears should be cut when about 4 in. above soil level and severed about 2 or 3 in. below the soil, giving an overall length of 6–7 in. The fronds should be cut in October before the seeds drop, but not during the summer, as the plant is weakened. Weeds should be kept down, and in the autumn the plant may be earthed up.

Varieties: 'Connover's Colossal' and 'Kidner's Pedigree.'

Beans. Three types are commonly grown.

Broad Beans are the hardiest and can, in warm gardens, be sown during autumn to obtain an early crop. Little is gained by this as a rule, and sowing in well-manured ground in February, when the soil is frost free, with successional sowings during March and April, is generally better in most gardens. The soil is broken down, finely raked, and the seed sown 9 in. apart in drills 3 in. deep, with 18 in. between each row. If double rows are sown 10 in. should be left between the rows, and 2 ft. between each pair of rows. Staking may be necessary. Plants from sowings under glass or under cloches in January may be used to obtain an earlier crop; the cloches should be removed in March and a further crop sown, and recloched.

Black aphis was a serious pest, but is now easily checked by pinching out the young tips and applying malathion or lindane as soon as any are seen. The pods may be used before the beans are fully developed and sliced as are runner beans, but normally they are picked when the beans are well formed but not tough.

Varieties: 'Aquadulce' and 'Seville Longpod.'

Dwarf Beans (which include French, Kidney, and Haricot Beans) may be either used as young pods in a similar manner to runner beans or ripened in the pod for winter use. A rich well-manured soil gives the best results, and seeds sown during the first week in May, 2 in. deep and 6 in. apart, in drills 18 in. apart, may be followed by a second sowing at the end of May. The young plants should be thinned out to 1 ft. apart and small twigs used to stake them. If sown earlier, frost damage may occur. Seeds may also be sown in the greenhouse and the seedlings transplanted, or sown under cloches in the last week in March, provided the soil has been prewarmed.

The plants, as long as the pods are picked over frequently, will continue to bear until the frosts; a little liquid manure will be beneficial during the summer. A late sowing in July, cloched in September, will continue the season into the autumn.

If required for winter use (Haricot varieties) certain plants should be left unpicked and the pods allowed to ripen on the plants. They should not be picked green; if unripe when frosts come, the plants should be pulled up and dried in a shed.

Varieties: 'The Prince' (Cloche), 'Masterpiece,' and 'Comtesse de Chambord' (Haricot).

Runner Beans are the most popular type, and can be grown in two ways: either without stakes, in which case the tips of main and side shoots are regularly pinched out to make a bushy, dwarf plant, a method often used by farmers, or staked, with cross poles, allowing the plants to climb to the tops of the poles before pinching. Seed is sown from early May (mid-April under cloches) until late June, depending on the danger of frost, usually in a double row with drills 15 in. apart, and with seeds 3 in. deep and 6 in. apart in the rows, alternate plants being removed later.

Staking should be done as soon as the first pair of leaves unfolds, and a surface mulch is then applied. If the beans are to be dwarfed the rows should be about 18 in. or 2 ft. apart, and pinching may be required about once a week. A good, well-manured soil is essential, and plenty of moisture is required. The flowers may fail to set in dry weather, and an evening spray of water is helpful in preventing this "running off." Harvesting should be carried out regularly while the pods are young, before the seeds swell; older pods are stringy and seldom worth eating.

Varieties: 'Achievement,' 'Goliath,' and 'Princeps.'

Beetroot.—From mid-April onwards varieties of beet may be sown on soil that has not recently been manured but is in good heart; on freshly manured soils coarse, forked roots subject to cracking occur. If in poor condition a light dressing of a complete fertiliser should be given before sowing. Sow in drills 1 in. deep and 12 in. apart and make a first thinning to 4 in. apart when the first rough leaf appears, and a second later, leaving 9 in. between the plants. Transplanting is inadvisable. Early roots for summer pulling may be obtained from a sowing of a Globe type in mid-April, and the main sowing should be made during May or early June for the winter supply. A sowing under cloches in late February will provide roots for pulling in late May.

On a heavy soil the oval-rooted types are best, but on a lighter soil the long-rooted types may be used. A sowing in late July of the Globe type will provide beet for use at the end of winter. Salad beet from early sowings may be pulled as required; the main crop should be allowed to mature and is lifted in October before the roots become woody and tough. Any damaged roots should not be stored. Twist off the tops just above the roots, shake the soil from the roots, and store in boxes of sand or peat in a frost-free shed. If clamped outside, straw and a thick layer of soil should be used; if frost reaches them they are spoilt.

Varieties: globe—'Early Model', 'Red Globe' and 'Crimson Globe'; oval—'Cobham Early'; long—'Cheltenham Greentop.'

Sugar beet is similar but is white, not red-fleshed, and is mainly a farm crop; if desired it may be grown in a similar manner. Care should be taken in hoeing all beet crops to avoid damage to the small surface roots which feed the swollen rootstock.

Borecole.—*See* **Kale.**

Brassica.—A generic name of vegetables usually known to gardeners as "greens." This group includes brussels sprouts, cabbages, cauliflowers, kale, turnips, kohl-rabi, broccoli, and couve tronchuda. As they are all related, similar soil and cultural treatment is needed, and many pests

and diseases are common to them. Each is dealt with under a separate heading.

Broccoli.—*See* Cauliflower.

Brussels Sprouts.—Young plants from seed sown thinly in a nursery seed bed during mid-March can be transplanted during May or June. The soil should be firm, well drained, in good heart, and contain adequate lime, some manure preferably having been dug in during the winter; a supplementary dressing of 2 oz. superphosphate and 1 oz. of sulphate of potash per square yard is given before planting. The young plants should be set out 3 ft. apart both ways, planted firmly, and watered in thoroughly. Regular hoeing is necessary, and about a month after planting a little soil should be drawn round the stems.

If growth seems weak a top dressing of nitro-chalk should be given and this repeated in early September. As the lower leaves yellow, cut them off and gather the sprouts as they mature, picking from the bottom of the stem. Where space is available a succession of sowings from March to June can be made to lengthen the cropping period.

Club root, the worst disease of brassicas, is kept in check by only using well-limed, well-drained soil, and dipping the roots in 4% calomel before planting, and cabbage root fly, a frequent insect pest, by using dieldrin.

Varieties: early—'Cambridge No. 1' and 'Masterman'; mid-season—'Evesham Special'; late—'Feltham Longstanding.'

Cabbage.—Sowings in March and April for summer use, in May or June for winter use, and in late July or August for spring use will give a succession of cabbages all the year round. Seed is sown thinly in a nursery bed of well-firmed, limed soil, clear of weeds, in drills ¾ in. deep and 6 in. apart, and the seedlings are dusted with D.D.T. to check flea beetle attack (prevalent with all brassica seedlings). All cabbages are gross feeders, and a well-drained soil in good heart, with adequate lime, is required.

"Spring cabbage" should be sown during late July (north) and August (south). If sown too early the plants may "bolt" without making a heart. The young plants are set out in mid-September 18 in. apart and with 18 in. between the rows if for hearting, or 9 in. apart with 18 in. between the rows, in which case the alternate plants are cut for "spring greens." On a heavy soil ridging along the rows of plants keeps the soil round the roots drained and helps to prevent loosening by frosts. In cold districts cloches may be used with advantage to help plants through the winter. In early March a dressing of 1 oz. per sq. yd. of sulphate of ammonia or nitro-chalk is a good stimulant.

Seed of "summer" and "autumn cabbage" is sown in March and April and planted during late May and June, 18 in. to 2 ft. each way between the plants, depending on the variety. The plants should be thoroughly watered, both before and after transplanting. A top dressing of 1 oz. per sq. yd. nitro-chalk may be given if required.

"Winter cabbage," maturing from October to February from sowings during May and early June, are set out 2 ft. apart each way in July or early August, usually on ground which has been cropped with early potatoes or peas. No nitrogen fertiliser should be given late in the season, as soft growth, liable to frost damage, is encouraged. A balanced fertiliser, such as "National Growmore," may be used if needed. When the stalks of cabbage are left standing over winter a common practice is to cut across the tops to obtain bunches of leaves, for use as greens during early spring.

"Savoy cabbages" mature during winter and early spring from seed sown in May. Seedlings are transplanted in late July and early August on to land manured for the previous crop, to which a dressing of 2 oz. superphosphate and 1 oz. sulphate of potash per square yard has been given. The young plants should be set out 2 ft. apart each way; they are exceptionally hardy, and should be grown in every garden in case of a hard winter.

Varieties: spring—'Early April' and 'Wheeler's Imperial'; summer—'Golden Acre' and 'Primo'; winter—'January King' and 'Xmas Drumhead'; savoy—'Best of All' and 'Ormskirk.'

Red Cabbage is slow to mature; plants from sowings in August are transplanted 6 in. each way in autumn and set out in early spring 18 in. each way. They are ready to cut in late summer.

Cardoon (Cynara cardunculus).—Closely related to the globe artichoke and grown for the blanched hearts. Seed is sown in trenches 18 in. wide and 1 ft. deep; 3 in. of manure is worked into the bottom soil and covered with 3 in. of fine soil. Three or four seeds are dibbled in every 18 in. and covered with a flower pot till visible, and then thinned out, leaving one strong seedling at each station. Protection from sun and late frosts is provided by twigs over the trench, and copious watering is given during the summer. On a fine day in September the plants are blanched by tieing the leaves together and covering with dry hay, 3 in. thick, kept in position by raffia, and earthed up in the same way as celery. Blanching is completed in about a month. Litter over the top protects them from frost.

Carrots.—A light, well-drained soil, enriched with decayed organic matter, is suitable for carrots. No fresh manure should be given, but a light dressing of "National Growmore" fertiliser can be applied prior to sowing. The surface is left rough until sowing time and then broken down to a fine tilth. The first sowing is made in early April in drills ¾ in. deep and 12 in. apart, and a succession is obtained by sowing at intervals of a month until the end of July.

On heavy, unfavourable soils stump-rooted varieties are best grown, long-rooted varieties needing a light soil. Thin out the stump-rooted varieties to 4 in. apart and the longer varieties to 6 in. Thinnings should be removed and the soil pressed firmly back to minimise damage by carrot fly. The early sowings are pulled as required, but the later sowings for winter use should be lifted in October and stored in slightly damp sand in a frost-proof shed, or clamped in the open.

Frames and cloches are sometimes used to obtain early and late carrots. Seed of a quick-growing variety, such as 'Amsterdam Forcing' or 'Early Nantes,' sown in late January under cloches or in frames will provide an early crop; the same varieties sown in frames or cloches in early August will provide young carrots for the autumn. Carrot fly is a bad pest, especially on light soils; the seedlings should be dusted with lindane or dieldrin when 2–4 in. high to prevent the flies from egg laying.

Varieties: globular—'Early Gem'; stump-rooted—'French Short Horn'; intermediate—'Amsterdam Forcing' and 'Early Nantes'; long—'St. Valery' and 'Long Red Surrey.'

Catch Crops.—A term used for quick-growing crops interplanted between rows of other crops. Radishes between rows of broad beans, and lettuce between celery rows provide examples. In this way the best use of a limited amount of land can be made.

Cauliflower.—Broccoli is for all practical purposes a hardy winter cauliflower. Seed is sown ¾ in. deep in a nursery bed from mid-April to mid-May, depending on the variety, and transplanted during June and July on to firm soil, well manured for the previous crop. The plants are set out 2 ft. apart each way; 2 oz. superphosphate and ¾ oz. of sulphate of potash per square yard may be hoed in before transplanting. No nitrogenous manure should be given late in the year.

Varieties: November—'Michaelmas White'; December—'Winter Mammoth'; January—'Snow's Winter White'; February—'Penzance'; March—'Leamington'; April—'St. George'; May—'Late Queen.'

Sprouting broccoli is very hardy, has a more leafy head, and is cultivated in the same way. Purple and green sprouting varieties are grown.

Summer Cauliflowers require a soil which has been limed and manured during the winter; 1–2 oz. per sq. yd. of superphosphate should be given before transplanting. An early sowing in frames

in February or March will provide plants for cropping in June. These should be hardened off and planted in March or April from 18 to 24 in. square, depending on the variety. Seed sown outdoors in April in drills ¾ in. deep will give plants for transplanting in May or June, for cropping from late July onwards. If growth is slow a dressing of 1 oz. per sq. yd. of sulphate of ammonia should be given. Leaves broken over the curds will help to prevent any damage from early frosts.

Varieties: 'Early London' and 'Snowball.'

Celeriac.—A plant allied to celery grown for its edible root, which resembles a turnip but has the flavour of celery; the stems are bitter to the taste and are not eaten. It is used in salads or boiled as other root crops. Seed is sown in gentle heat in March and seedlings pricked out into seed-boxes, 2 in. apart each way. In June, after hardening off, the seedlings are planted out in shallow drills 18 in. apart, leaving 12 in. between each plant in the row. Water freely during the summer and remove side shoots as they appear. Lift the roots in October or November and store in a frost-free shed.

Celery.—Richly prepared ground is required. A trench 15 in. wide and 1 ft. deep is taken out and manure worked into the bottom of the trench. The soil is then returned to within 3 in. of the ground level. Seed should be sown in early March at about 60° Fahrenheit and the seedlings pricked out in deep boxes 3 in. each way and gradually hardened off. Celery seed is very fine, and care should be taken to cover it with only a fine layer of soil; if covered too deeply it may not germinate.

In late May or June set the plants out in staggered double rows 1 ft. apart, with 10 in. between the plants, and water them in. Frequent watering during the summer is required, and a light dressing of nitrate of soda will stimulate them if growth is poor. Before earthing up to blanch the plants, tie the stems loosely below the leaves and remove any suckers. Earthing up begins when the plants are about 15 in. high; the ground should be moist, and the first earthing should only be slight. The second and third earthings, at intervals of about three weeks, should be more generous, but should never reach higher than the base of the leaves, and no earth should fall into the heart. For exhibition purposes brown-paper collars may be tied round the stalks before earthing. The final earthing should cover all the stems right up to the leaves, and the soil should slope away neatly. In winter litter or bracken spread over the plants will help protect them from frost.

Celery fly is a serious pest, and the brown leaf-blisters should be pinched to kill the maggot inside and lindane applied two or three times at fortnightly intervals. Slugs should be discouraged with a good slug killer. Leaf spot, a seed-borne disease, can be prevented by spraying with Bordeaux mixture.

Varieties: white—'Solid White'; pink—'Ideal'; red—'Standard Bearer' self-blanching—'Golden Plume.'

Chervil.—An annual herb sown during March in drills 10 in. apart, and thinned to 6 in. in the rows. Further sowings can be made during the summer. Used in salads and soups.

Chicory.—The young, blanched growths are used in winter salads. Seeds are sown in drills 1 ft. apart in May; the young seedlings are thinned to 8 in. apart and grown on until October or November, when they are lifted and the roots trimmed to 8 or 10 in. long. They are then planted in deep boxes in a moist, sandy soil 5 in. apart each way, leaving 1 in. above the soil surface, and the boxes put in a warm greenhouse or cellar. No light must reach the crowns; one method sometimes used is to cover the crowns with 6 in. of sand. When the blanched growths show through they are about 6 in. high and ready for cutting.

Chives.—These are like small onions, and the leaves are used for flavouring salads and soups. They are easily grown in window boxes and town gardens. Bulbs can be planted in March 6 in. apart and divided when the clusters become too large.

Corn Salad or Lamb's Lettuce.—Occasionally grown for the leaves, which are used in early spring salads. Seed sown from August to October will provide plants for winter and spring use.

Couve Tronchuda.—A large brassica known as "Portugal cabbage," not generally suitable for smaller gardens. Seed is sown in March and the plants set out 2–3 ft. apart each way. The hearts may be cooked in the same way as cabbage.

Cress.—An annual growing rapidly from seed and used as a salad when only the seed leaves have developed. Seed sown as required, in boxes of light, moist soil and covered with brown paper until germination, when it is removed, will provide salad all the year round. The seed is merely pressed into the soil and the boxes kept moist. Cress may even be grown on damp flannel in a window.

Cucumber.—The cucumber of the shops is grown as a specialist crop under glass. Temperatures of 85° Fahrenheit or more may be required, and only occasionally are they grown by the amateur, although cloche and frame culture is now popular.

Ridge cucumbers, which are smaller and prickly outside, may be grown outdoors in summer. Plants from seed sown singly in pots under glass can be planted during late May on ridges of good, well-manured soil or, alternatively, sown on the ridges 1 in. deep at the same date. Water freely during the summer and cut the cucumbers while young to encourage further production.

If cloches are available greenhouse-raised cucumbers can be planted under them, in mid-April. Frame cucumbers are less hardy, but young plants raised under glass can be planted under cloches in early May.

Varieties: ridge—'King of the Ridge' and 'Stockwood Ridge'; frame—'Telegraph' and 'Conqueror.'

Endive.—Used in winter or autumn salads. Seed is sown during April in drills 18 in. apart and the seedlings thinned to 12–15 in. apart. Sowings in June and August will provide a succession. A rich soil and plenty of moisture are the main requirements; before eating blanching is necessary, as the leaves are very bitter. This is achieved by tieing the leaves loosely together and covering the plants with inverted flower pots (with the holes blocked) to exclude the light; frost should be kept out by piling litter over the pots in winter. If cloches are used they can be coated inside with lime-wash to achieve the same effect. Alternatively, plants may be lifted in October and blanched in darkened frames.

Varieties: summer—'Green Curled Paris'; autumn—'Stag's Horn'; winter—'Batavian.'

Fennel.—A perennial culinary herb used in fish sauces and salads. Blanched stems may also be cooked in the same way as celery. Seed is sown in drills 2 ft. apart in rich soil and the seedlings thinned to 18 in.

French Beans.—*See* **Dwarf Beans.**

Garlic.—One or two "cloves" planted in February, 9 in. apart, will provide ample garlic for salads, as only a little is required. After growth is complete in summer the bulbs can be lifted, dried, and stored and some saved for re-planting.

Haricot Beans.—*See* **Dwarf Beans.**

Herbs.—Many herbs are useful in small quantities for flavouring and garnishing, as well as being decorative. If possible, a separate herb garden should be made as a feature in the garden, or they

may be used as edging plants. Perennial herbs, of which borage, caraway, chamomile, chives, fennel, garlic, horseradish, lavender, mint, pennyroyal, marjoram, rosemary, rue, sage, tansy, tarragon, and thymes are the main types grown, should be given a permanent position. Those grown as annuals—anise, basil, coriander, dill, parsley, purslane, and summer savory—can be used as "fill-ins" on the vegetable garden. Brick and cobble paths associate well with herbs, imparting something of the character of the gardens of bygone days, when herb gardens were considered one of the most important features.

Horseradish.—A deep-rooting perennial herb which appreciates a well-manured, moist soil. It is easily propagated from root cuttings and can become a nuisance, as pieces of root left in the soil will make a new plant; care should be taken to lift the complete root when digging it for use. Straight roots planted in spring with the crowns 6 in. below soil level and 1 ft. apart can be lifted for use in autumn; no further treatment is required, apart from keeping weeds in check. Some of the roots should be kept for planting the following spring.

Kale.—Very useful during a cold winter, when other green vegetables are scarce, because of its hardiness. Seed sown in April or May will provide young plants for transplanting 18 in. apart each way in July or early August, on to a site used for peas or early potatoes, in good heart. A catch crop of lettuce can usually be taken from between the rows. The variety 'Hungry Gap' is usually sown in rows 18 in. apart where it is to mature and thinned, leaving 18 in. between the plants. There are many varieties; which types are grown is a matter of personal preference.
Varieties: 'Curled Kale' and 'Hungry Gap.'

Kidney Beans.—*See* **Dwarf Beans.**

Kohl Rabi.—A brassica with a swollen stem base, in flavour and appearance something between a turnip and a cabbage. Seeds sown in April in rows 1 ft. apart are thinned to 1 ft. apart in the rows, and the swollen stem harvested when about the size of a tennis ball. If left to grow it becomes coarse.

Lamb's Lettuce.—*See* **Corn Salad.**

Leeks.—A vegetable which repays planting on a well-manured soil. If they are to follow winter greens, then manure or compost should be dug in after the previous crop is cleared. Leeks may be sown from early March to April in lines 8 in. apart on a prepared seed bed, and the seedlings transplanted as land becomes available during June and July, when about 6 in. high. Thinning in the seed bed should be unnecessary provided the sowing has been correct. The seedlings are set out 9 in. apart in rows 15 in. apart; a hole is made with a dibber, and each seedling dropped in and watered thoroughly. No firming is needed, the watering should tighten the plants sufficiently. Alternatively, drills 4 in. deep and 15 in. apart can be drawn out with a hoe and the plants put in 9 in. apart in the drills.
Regular hoeing is required, and a feed of sulphate of ammonia (1 oz. per gallon of water) can be applied if in poor growth. In September a little earth should be drawn up around the roots, which should, by then, be almost full grown. Leeks are very hardy and can be left in the soil until required for use.
Varieties: 'Lyon' and 'Musselburgh.'

Lettuce.—Two main types are grown: cos lettuce, a summer crop with long, straight leaves that curl inwards naturally or are tied in so that the heart is more or less blanched; and cabbage lettuce, which are broad and spreading, with round cabbage-like hearts, and are grown to supply salad all the year round. Lettuce should be grown on ground manured during autumn or winter, dug and left rough till planting time, when it is broken down and raked to a fine tilth.
Seed, sown in January in frames and cloches, or outdoors in March and at fortnightly intervals thereafter, a little at a time, until September outdoors, or October in frames and cloches will provide lettuce for most of the year. Sow thinly in drills ½ in. deep, in rows 1 ft. apart, and thin out or transplant young seedlings so that they are 9–12 in. apart, depending on the variety. Quick, unchecked growth with adequate moisture is required; a dressing of bonemeal worked into the soil before planting and a light dressing of sulphate of ammonia in water on poor soils will help growth considerably. Aphids may be troublesome, and should be checked by using lindane or malathion.
Varieties: summer—'All the Year Round' and 'Continuity'; early spring—'Arctic King' and 'Cobham Green.'

Maize.—*See* **Sweet Corn.**

Marrows.—Pumpkins, gourds, bush, and trailing marrows all require similar treatment; plenty of sun and water and a rich soil, such as an old hotbed or compost heap, which will provide a porous medium of humus. Seed can be sown singly in pots under glass in March, or outdoors on the site in May. For cloches a bush variety must be used, and greenhouse-raised plants are cloched in mid-April. Plant four or five seeds in groups about 6 in. apart and 1 in. deep and finally thin to two plants 15 in. apart. Protection from late frosts may be necessary. Water copiously and hoe regularly. Cut marrows when about 12 in. long to encourage further fruits. Some can be left until they are full size and cut before the frosts, for storing in a dry, frost-proof place.
Varieties: 'Tender and True' and 'Table Dainty.'

Melons.—Although usually a glasshouse crop, melons can be grown outdoors under cloches and in frames. Seed is sown under glass in April at 60° Fahrenheit, and seedlings can be set out 3 ft. apart in early May. The soil should be manured generously and the seedlings planted on a mound of compost mixed with soil. The plants must be stopped at the fourth or fifth leaf to encourage laterals. Two can be selected to grow on and, when 18 in. long, pinched out to obtain sub-laterals, which will bear the fruit. The female flowers may require pollinating, and on a sunny day a male flower or rabbit's tail can be used to transfer the pollen; as soon as the young fruits swell, remove all but two or three per plant and pinch back the laterals bearing fruit to two leaves from the melon. A feed of dried blood once a week, with plenty of watering (though not saturation!) will help the developing fruits. Light shading may be necessary.
Varieties: 'Dutch Net' and 'Tiger.'

Mint.—Easily grown from suckers in any soil. For winter use a few pieces can be planted in a frame. A number of varieties—'Apple Mint,' 'Peppermint,' and 'Spearmint'—can be grown besides common mint.

Mushrooms.—Growing mushrooms is really a specialist occupation. For the experimental amateur, beds of composted stable-manure are made up in a warm, damp cellar or disused air-raid shelter. Pieces of spawn are inserted when the temperature of the compost has dropped to about 70° Fahrenheit and the whole bed covered with an inch of inert sub-soil. The air temperature should be from 60° to 70° Fahrenheit, and in a few weeks mushrooms may appear. Full instructions will be given with the spawn, but it is advisable to consult a text-book dealing with the culture, as even for professional growers a crop is never certain.

Mustard.—Grown exactly in the same way as cress, but is ready two or three days earlier. If used together, mustard seed should be sown two or three days after cress. Again it is the seed leaves which are eaten.

Onions.—These respond well to good cultivation. The site is dug deeply in winter, manure

incorporated, and left rough until February, when it is broken down to a fine tilth and firmed well. Seed can be sown ¾ in. deep in drills during August and planted in March for exhibition onions, but the usual practice is to sow seed in late February outdoors or under glass in January and transplant during April in rows 12 in. apart with 6 in. between the onions, taking care to keep the bases about ½ in. below the surface. If sown outdoors and thinned the thinnings may be used in salads. Autumn-sown onions are liable to bolt, but less liable to attack by onion fly than spring-sown plants.

Dressings of sulphate of ammonia or nitrate of potash may be given during the growing season, but not later than July. In August the tops are bent over to hasten ripening and the bulbs harvested in a dry spell at the end of the month, first laying them on the ground for a day or two to dry off. They should be stored in a dry, airy place. The chief pest is onion fly, controlled by dusting the seedlings with aldrin at the loop stage. Onion sets are small onions produced the previous summer, stored and replanted in spring to obtain very large bulbs. They are particularly valuable on poor soils.

Varieties: spring sowing—'Bedfordshire Champion,' 'Best of All,' and 'White Silverskin' (pickling); autumn sowing—'Giant Zittau,' 'Sutton's Solidity,' and 'White Lisbon' (salad onions); sets—'Ebenezer' and 'Rynsburger.'

Parsley.—Sow thinly in rows 8 in. apart during March and again in July for a succession of young foliage; thin to 4 in. between plants.

Parsnip.—Grow parsnips on ground manured for a previous crop; if given fresh manure splitting and forked roots occur. Dig the soil deeply, and at sowing time in March, work the soil to a fine tilth. On a soil unsuitable for deep-rooted crops special holes 10–12 in. apart, filled with sifted soil, may be prepared. If this method has to be used four or five seeds are sown per hole; normally drills 15 in. apart and 1 in. deep are made and four or five seeds sown every 9 in. The seedlings are thinned, leaving one at each station. Parsnips should be left in the ground until needed; litter over the rows will ease lifting in frosty weather.

Varieties: 'Evesham' and 'Student.'

Peas.—Dig the ground well in autumn and add a generous amount of manure or compost. Seed sowing begins at the end of February, and can be continued at three-weekly intervals until early July. Under cloches sowings in January and October will lengthen the season. Both early and late sowings should be of a quick-maturing variety. Seed is sown in drills 6–8 in. wide and 3 in. deep, with 2 ft. between drills; the seeds can be scattered thinly in the drill or spaced 3 in. apart in a treble row. Cover with 2 or 3 in. of soil and as soon as the peas are about 2 in. high stake with twigs.

Failures are often due to attacks by birds and field-mice. The former should be discouraged by netting and the latter by trapping. Pea-sticks will be necessary for the taller varieties which should have 3–4 ft. between the rows. With limited space only the dwarf quick-maturing varieties should be used. A summer mulch will keep the soil moist, and picking should be done regularly.

Varieties: 1½–2 ft.—'Kelvedon Wonder,' 'Kelvedon Triumph,' and 'Meteor' (cloches); 2½ ft.—'Onward'; 3½–4 ft.—'Achievement.'

Potatoes.—In general, it is only economic for the amateur to produce an early crop; the main winter supply can be grown if room and labour are available. They should be grown on land well manured the previous season, dressed at planting time with a mixed fertiliser, such as "National Growmore," at a rate of 1½ lb. to a 30-yd. row. The soil should not contain too much lime, as the damage of scab disease is increased.

"Seed" tubers about the size of a large egg are best used, and these can be bought or saved from the previous season's crop. Large potatoes may be cut leaving about three eyes to each part. New stocks should be bought occasionally if the "seed" is home saved to obviate risk of virus. "Seed" should be put in trays during February in a frost-proof shed to sprout, and in early April the "first-earlies" can be planted.

Drills 2 ft. apart and 4–5 in. deep are taken out and the sprouting "seed" planted 12 in. apart in the rows. Maincrop varieties are planted in early May 15 in. apart. The young growths should be protected from frost by earthing up slightly, and a further earthing is done as the potatoes mature. This practice of earthing prevents the tubers near the surface from becoming green when exposed to light, keeps weeds down, and protects the tubers from spores of potato blight, which are washed into the gullies. If growth is poor sulphate of ammonia can be applied at a rate of ½ lb. per 30-yd. row. Early varieties should mature in late July and later varieties in September and October; when the tops (haulm) turn yellow the crop can be lifted, dried for a few hours (too much light will turn them green), and stored in boxes in a frost-proof shed or clamps. No damaged tubers should be stored. Clamps outside can be made by laying straw on a flat site and building the potatoes into a ridge-shaped heap; this is then covered with a thick layer of straw and then by a 6-in. layer of soil, interspersed with straw "chimneys" to aerate the clamp.

SEED POTATOES—Good seed is essential for first-rate crops. Illustration shows (*left*) a well-sprouted tuber, (*centre*) a large well-sprouted tuber suitable for cutting, and (*right*) a poor, badly sprouted tuber.

Potato blight is a common disease, and control by spraying with "Bouisol" before the leaves touch in the rows is effective. Virus diseases, spread by greenfly, are checked by using "seed" from Scotland, where greenfly is less troublesome because of the lower temperatures. Colorado beetle should be watched for, and if found notified to the Ministry of Agriculture.

Varieties: early—'Arran Pilot,' 'Duke of York,' and 'Epicure'; main—'Arran Banner,' 'King Edward,' and 'Majestic.'

Pumpkin.—*See* Melon.

Radish.—Most cultivated ground is suitable for growing radishes; successional sowings at fortnightly intervals from early March until May in drills ½ in. deep should be made. Summer-sown radishes bolt and are hot and tough, but autumn sowings for late salads can be made. As radishes germinate very quickly, they can be sown together with another crop and used quickly, and also enable the rows to be seen and hoed early.

Varieties: 'French Breakfast' and 'Scarlet Globe.'

Rhubarb.—Before planting the ground should be generously manured and deeply dug. Crowns are planted in March, 3–4 ft. apart each way and mulched, but no rhubarb should be pulled until the following year, when a light pull can be taken. Remove any flowering shoots and give a dressing of sulphate of ammonia if growth is weak. Manure well each winter; if early supplies are needed, some of the crowns can be covered with inverted boxes or barrels and a packing of loose straw or bracken. An established, well-cultivated bed will continue almost indefinitely.

Sage.—A hardy shrub for the herb garden easily raised from cuttings. The leaves are harvested and dried in summer.

Salsify (Oyster Plant).—A winter root rather like a parsnip which requires similar growing conditions.

Savoy.—*See* **Cabbage.**

Scorzonera.—A winter root cultivated in the same way as salsify. It has a purplish root instead of the yellow-green one of salsify.

Sea-kale.—A perennial plant native to our sea-shores, which can be either grown from seed sown in March and left for two years to produce forcing crowns or from bought thongs, which are planted during March, 9 in. apart in groups of three, leaving 3 ft. between groups. During summer a manure mulch and nitrogenous fertiliser can be applied. When the tops die down in autumn the crowns are covered with boxes to force and blanch the new growths. Crowns can be covered in succession to keep a supply. Earlier sea-kale can be obtained by lifting crowns in November. These are planted in batches five or six to a pot, watered well, and a second pot, with the hole blocked, placed over them. In a warm green-house or similar position they should develop sufficiently for cutting in about three weeks. Slugs are the chief pest outside, and should be kept in check by a proprietary slug-killer.

Shallots.—A popular crop for the small garden. Shallots are purchased as bulbs, like small onions. A deep, well-manured soil is required, as for onions, and they are planted during February, the bulbs being pressed about half their length into soft soil, 6 in. apart in the rows, leaving 1 ft. between rows. In mid-July the little bunches of bulbs can be lifted. Leave them on the surface to dry for a few days and then store in a dry, frost-proof shed. Some, about the size of a shilling, should be kept for planting the following year.

Spinach.—Sowings from February to May on a well-manured soil will provide a succession during the summer. Sow in drills 1 in. deep and 12 in. apart and thin the young plants to 3 in., and then to 6 in., using the second thinning to eat. A sowing of the prickly variety in August at the same distances will provide a winter crop. When picking gather a few leaves from each plant in the row.

Varieties: 'America' and 'King of Denmark.'

Sprouting Broccoli.—*See* **Cauliflower.**

Sugar Beet.—*See* **Beetroot.**

Swede.—*See* **Turnip.**

Sweet Corn (Maize).—Gardeners should distinguish between the types of maize used for poultry food and those which supply sweet corn for human consumption. It is wise to use cloches for growing sweet corn, as it is only half-hardy and resents transplanting. Seeds sown under cloches in mid-April in two drills 12 in. apart and 1½ in. deep should be placed 1 ft. apart in staggered positions in the rows. More robust varieties may need 15 in. from plant to plant. A soil well manured for the previous crop is best used, and a mulch can be given as soon as the plants are a few inches high. The first cobs should be ready by mid-July, and should be eaten when the cob is milky.

Variety recommended: 'John Innes Hybrid.'

Tarragon.—A herb used for flavouring vinegar. Raised by root division in spring. Cut down and dried for use in winter.

Tomato.—A sunny, sheltered site is required, otherwise ripening outdoors in our climate is uncertain. Sow seeds under glass in late March and harden off the plants in a cold frame or buy plants for setting out in late May or early June. The soil should be thoroughly dug and some artificial manure applied before planting. Allow 18 in. between plants and 2½ ft. between rows, and put in a strong stake with each plant. Keep to a single stem, pinching out side shoots regularly. When four or five trusses are set pinch out the top of the main shoot.

Feed with a liquid manure during summer. Fruit which fails to ripen outdoors can be gathered and stored at about 50° Fahrenheit or the plants laid flat on the ground and covered with cloches, when the tomatoes should ripen. Under cloches plants can be planted out in mid-April instead of late May, gaining six weeks growing time, and the Cloches removed when they become too large.

Potato blight attacks tomatoes, and a spray of "Bouisol" during the first week in August and repeated after fourteen days will control this.

Varieties: 'Market King' and 'Money-maker'; some heavy-cropping sorts have little or no flavour.

Turnips.—Ground manured the previous season should be dug well and dressed with 2 oz. super-phosphate per square yard. An early variety can be sown during April in drills ¾ in. deep and 15 in. apart, followed by successional sowings at three-week intervals as required. The main crop for storage is sown in July and August, and seedlings should be thinned gradually to 10 in. apart. Use when about the size of tennis balls. A sowing can be made in September, left almost unthinned and the tops used as "greens" in spring. In autumn the storage crop is lifted and all undamaged roots put in sand in a shed or clamped. Flea beetle and turnip fly can be checked by D.D.T. at the seedling stage.

Swedes are grown in a similar manner.

Varieties: turnips—'Early Milan' (summer) and 'Green Top Stone' (winter storage); swedes—'Purple Top.'

Standard References.

Cloche Gardening, by J. L. H. Chase (Faber) (12*s*. 6*d*.).

Gardening with Cloches, by Louis Flawn (Gifford) (16*s*.).

Vegetable Garden Displayed (R.H.S.) (3*s*. 6*d*.)

FERTILISERS AND ORGANIC MANURES.

The elements essential for healthy plant growth may be roughly grouped into classes—first, those required in some quantity, the major elements, nitrogen, potassium, and phosphorus; secondly, calcium, magnesium, and sulphur, which are required in lesser quantities; and thirdly, the trace elements, boron, manganese, iron, zinc, copper, and molybdenum, of which only minute quantities are needed. As well as the elements mentioned, others, such as silicon, aluminium, chlorine, nickel, and sodium, are often found on plant analysis, but the evidence that these are essential is inconclusive, though they may be beneficial to certain crops.

It is important to remember, when adding fertilisers to the soil, that different crops may require relatively more of one element than another, but a balance between all the elements is essential. As an instance, brassicas (the cabbage family) are gross nitrogen feeders, while root crops (*e.g.*, carrots) require far less nitrogen, and an excess may be harmful. A further point to notice is that although an element may be present in the soil the plant may be unable to absorb any because it is being kept in an insoluble state by excess of another element. An instance of this is the frequent yellow and sickly appearance of plants on very chalky soils due to lack of iron, which is present, but locked in an insoluble state by too much calcium.

The elements needed by the plant are in the form of various compounds, such as nitrates and phosphates, and may be applied as artificial fertilisers, which are manufactured, or as humus, which contains most of the foods required and

also provides the essential soil micro-organisms or bacteria, without which the soil would be inert and no plants would grow. Bacteria break down the complicated animal and vegetable matter of which humus is composed to soluble compounds which plants can absorb. Humus can be supplied as farmyard and poultry manure, leaf mould, compost, sewage sludge, spent hops, and from animal by-products like hoof and horn, dried blood, meat and bone meal, and many others.

Nitrogen is mainly concerned with vegetative growth, encouraging leaf and stem formation. It is also contained in chlorophyll, the green colouring matter of the plant, and one of the symptoms of nitrogen starvation is a pale-green colour to the leaf, indicating a lack of chlorophyll. Most of the nitrogen compounds used are soluble, and it is a wise maxim to apply "little and often": if given in large doses much is washed through the soil and wasted.

Nitrogenous fertiliser should not be given to any plant late in the season, as sappy growth, easily damaged by winter cold and frosts, is encouraged. Similarly, at no time should large quantities be given to any plant, as this results in an excess of leafy growth, which is very susceptible to disease and adverse conditions of drought and cold; also plants tend to be later flowering.

Sulphate of ammonia is the most used inorganic nitrogenous fertiliser, and is excellent for spring use on seed beds, lawns, and early crops, and it is contained in most fertiliser mixtures. It makes soils acid in reaction, and if both lime and nitrogen are required, nitro-chalk should be used instead. Other nitrogen fertilisers used are potassium nitrate, which has the advantage of supplying two major elements at once, and is very soluble, and nitrate of soda, often used on beet and mangolds. The latter chemical should not be applied in excess, as too much sodium has a bad effect on soil structure. These inorganic fertilisers are all soluble and quick acting. As a general guide, 1 oz. of the fertiliser to a gallon of water, applied at 1 oz. to a square yard, is a good general summer dressing, given at intervals of two or three weeks. It should always be given after rain or watering, and should be applied to the soil and not to the foliage.

Among organic fertilisers containing a percentage of easily available nitrogen are dried blood, soot, and meat and fish meals. Slower to decompose, and so having a more lasting effect, are shoddy (wool waste) and hoof and horn.

Phosphorus is concerned in the plant with the production of young cells of the root and shoot, and also encourages flower and fruit production and early ripening. Most of the compounds are relatively insoluble (rendering absorption by the plant difficult), and so large amounts can be supplied without deleterious effects, especially on acid soils, where the availability is less than on alkaline soils.

Phosphorus is generally applied to the soil in the form of phosphates, and among these superphosphate of lime is quick acting, and is usually applied at 2–3 oz. per sq. yd. in spring and summer, when the need is greatest. More slow acting is basic slag, a by-product of the steel industry, sold as a fine black powder and containing, besides phosphates, many of the trace elements, as well as a considerable percentage of lime. This is good for application to acid, wet soils, but should not be applied to potatoes owing to the risk of scab disease with the increase in the content of lime. It should not be applied with sulphate of ammonia. Bonemeal is also slow acting and also contains some nitrogen. It is excellent for crops like tomatoes, and is also used extensively for ornamental and pot plants.

Potassium, the third major element, is essential for good flower colour and ripeness in fruits. Dessert apples, potatoes, cereals, and root crops all need potash in some quantity, and if excess nitrogen has been applied a dressing of potash may counterbalance the effect. Sulphate of potash is the main inorganic compound in use. Muriate of potash (potassium chloride), to which some crops are sensitive, is much less used; it should be applied as a winter dressing before the crop is sown to lose the impurities by weathering. Sulphate of potash is purer, and may be applied during the growing season at 1 oz. per sq. yd. on the vegetable plot, and is used in many proprietary fertiliser mixtures.

Wood ash contains variable quantities of potassium, and provided that the ash has not been washed by rain and the potassium leached out, is a useful addition to the soil; bracken, cut during June and July, when large amounts of potassium are present in the foliage, can be composted when green to provide a good supply of the element.

Elements Required in Lesser Quantity.—Calcium, although required in small quantities in the plant, has profound effects on the soil. Its main function in the plant is in the production of the cell walls, but in the soil it helps to bind light soils together and to make the structure of sticky clay soils finer and more workable. Also soils without calcium are acid and tend to lock up some elements in an insoluble form. Addition of calcium changes the acidity, making it slightly alkaline or neutral, and releases the locked elements.

Calcium is applied as some form or derivative of calcium carbonate, commonly known as lime, which can be obtained in various forms. Hydrated or slaked lime (calcium hydroxide) is commonly used on clay soils, and chalk or ground limestone on lighter soils. Calcium is gradually leached from the soil, and it is necessary to replace it, or the soil becomes too acid and many crops will fail to grow. A normal dressing of lime for a vegetable garden is about 4 oz. lime or ½ lb. chalk per square yard every two or three years, and is best applied in autumn as a surface dressing after digging. It should not be applied together with other fertilisers. The amount of lime will depend on the type of soil, but it must be remembered that most vegetables grow best on a slightly acid soil.

Gypsum, or calcium sulphate, is sometimes recommended to supply calcium, but its solubility is negligible, and it is preferable to chalk or limestone only on soils containing salt due to sea flooding. It has been used to help reclaim parts of East Anglia flooded by sea-water during recent years by improving the soil structure. Sulphur, as sulphates, and magnesium, as an impurity in limestone, are usually present in sufficient quantities for the plants' needs.

Trace Elements.—In the case of the trace elements most soils contain enough for the plant, but in certain circumstances deficiencies occur. Iron on very alkaline soils is insoluble and, as it is essential for the production of chlorophyll, deficiency results in the chlorosis of the leaves. It can be rectified by spraying the leaves with "Sequestrene Plus," as can the lack of magnesium and manganese, which may also be deficient on acid soils.

Chlorosis in brassicas and marsh spot of peas are due to magnesium deficiency. Boron deficiency, often occurring on light, calcareous soils, is responsible for brown heart of cauliflower and several other "diseases," mainly affecting the growing point. It can be rectified by applying borax to the soil at about 1 oz. per 15 sq. yd. Zinc and copper deficiencies are unusual in England, but lack of molybdenum has caused whiptail disease of cauliflower. Only minute quantities of the last three are required; more may be poisonous to plants and animals.

Organic Manures.—It should be noted that most of the deficiencies will not concern the amateur, especially if he keeps the ground in good heart with ample organic manure, which contains all the plant foods necessary. Well-rotted farmyard manure from cows and pigs is by far the best organic food, but is scarce now, good farmers returning it to their own land, and generally the material offered is low in nutrients. Poultry manure, which is rich in soluble nitrogen salts, is excellent either applied direct to the soil (not to the growing crop for fear of damage) or composted with straw.

Many substitutes have been devised to use in place of manure, among them sewage sludge, best applied some time before growing the crop, spent hops from breweries, dried seaweed, excellent for potatoes when supplemented by superphosphate, soot, rich in nitrogen, composted town refuse, and the waste organic animal products mentioned earlier. The organic matter in all these materials is essential for maintaining the soil structure and cannot be replaced simply by artificial fertilisers.

Liquid manure, produced by suspending an old sack of animal manure or soot in water for a few days, is useful for the amateur to apply to pot plants and to individual crops like sweet peas, tomatoes, and chrysanthemums. Leaf mould and peat can be used as a mulch and also to supply organic matter to the soil. Sawdust in a well-rotted condition is also useful for inclusion in compost and as a mulch. It is emphasised that it must be well-rotted, and it is advisable to apply a nitrogen fertiliser, such as sulphate of ammonia, at the same time.

Composting of organic refuse from house and garden is much practised by the amateur nowadays.

Compost-making.—The methods developed for making compost heaps are many and various; they depend on three basic principles, good aeration, plenty of moisture, and a nitrogen supply for the decomposition bacteria. A fairly simple method by which much garden and house refuse can be utilised is as follows. An area about 9 ft. by 4 ft. is marked out and all waste vegetable matter—weeds, lawn mowings, cabbage leaves, pea haulm, straw, dead leaves, and hedge clippings —are put in this area and trodden down. Care should be taken not to use diseased material but grass clippings and weeds which have been recently treated with hormone weed-killers may be applied. When the heap is about 9 in. thick it is sprinkled with sulphate of ammonia and superphosphate, at ½ oz. of each per square yard (2 oz. of each for a 9-ft. by 4-ft. plot) and any wood ash available, and then sprinkled with 4 gallons of water and covered with an inch of soil. This process is repeated with 9-in. layers of rubbish until the heap is about 4 ft. high, when it is better to begin a second heap. A sprinkling of ground lime may be given as each layer is added, but should not be applied until after watering to avoid reaction with the sulphate of ammonia.

The completed heap should be watered occasionally, and after about a month or six weeks, if time permits, it can be turned completely over, watered again, and re-covered with soil. The heap may then be left until rotted, and the compost can be dug in as required; any unrotted material can be used as a basis for a new heap. The time taken for rotting will vary with the time of year and material used, but generally a compost heap made during the summer should be available for autumn use, and one made during the autumn ready for spring use.

There are a number of compounds on the market, known as compost makers, which are said to accelerate the decomposition, but in general a heap made in the way described is eminently satisfactory, and although requiring a certain amount of labour, is the least expensive way of obtaining humus for the garden. This latter point is extremely important nowadays with the scarcity of animal manure and the high costs of both inorganic and organic fertilisers. Prices are, of course, not static, but comparatively the organic manures, such as dried blood, hoof and horn, and guano, are more expensive than the inorganic salts, but these lack humus, which is an essential of a well-cultivated soil.

General Fertiliser.—Many firms supply compound fertilisers containing given amounts of the main nutrients needed, in either liquid or powder form, and some are made up with quantities of nitrogen, potassium, and phosphorus suitable for specific crops like roses, tomatoes, and chrysanthemums. A general fertiliser which can be made up by the amateur is as follows:

7 parts by weight superphosphate.
5 parts by weight sulphate of ammonia.
2 parts by weight sulphate of potash.

All the ingredients are easily obtained from local sundriesmen, and a mixture of this sort will supply a good general feed.

Green Manuring.—Another method of enriching the soil with organic matter is green manuring, which has been practised for some time by farmers and can no doubt be adapted to the gardener's purpose. Green manuring consists of planting a fast-growing catch-crop and ploughing the mature crop back into the soil. Legumes are especially good for this, as certain bacteria in their roots can "fix" the nitrogen in the air. Field peas, sown at 4 oz. per sq. yd. and Italian rye grass at 2 oz. per sq. yd. are commonly used, and clover and annual lupins are also suitable.

If sown after an early crop on land needing organic matter the green manure may be dug in during late summer. Alternatively, if the land is not being cropped at all during the year two green-manure crops may be grown; an early sowing of field peas in April may be dug in during July, and a further sowing of field peas or Italian rye grass sown immediately after may be dug in following the first few frosts.

New chemicals often appear on the market at exorbitant prices and with fantastic claims as to their value as "soil conditioners" and the like. Contrary to this generalisation, in recent years a chemical known as "Gibberellin" has been used to increase the growth of certain plants. It is now available to the amateur, but should be used with care and mainly in a spirit of experimentation, as no conclusive proof of its efficacy has yet been put forward.

Standard References.

Gardener's Earth, by S. B. Whitehead (Dent), 1945 (9*s.* 6*d.*).

Manures and Fertilisers, by A. M. Smith (Nelson), 1952 (15*s.*).

GARDEN PESTS.

Every garden abounds in insects and other small creatures, but comparatively few species are pests which feed on plants. The great majority are quite harmless, while many are positively beneficial and help to keep the number of pests under control by catching and eating them. Every good gardener should make it his business to be able to differentiate between friend and foe. This is not always easy, but the speed of a creature's movements may often provide a clue. Fast-running, active creatures, such as the black ground-beetle or the centipede, are usually beneficial, while the slow-moving and sluggish ones, *e.g.*, wireworms, aphids and caterpillars, are usually pests. This is by no means an infallible rule, but it is handy to remember when in doubt.

The good gardener should also get to know the pests which are most prevalent in his district and which can be expected to crop up year after year. The first principle of good control measures is to act while an infestation is still in its early stages and before a great deal of damage is done. When one knows what to expect, steps can be taken to prevent an attack or to stop it developing to serious proportions.

Also, from the experience of past years one can often forecast whether a pest is likely to become numerous enough to make chemical treatment worthwhile. Remember, insecticides can become an expensive item, and there is little point in using them if the damage is negligible. In these circumstances insecticides may eventually increase the numbers of pests, since the treatment will also have killed off many of their natural enemies which had hitherto kept the pests under adequate control. In addition, good cultivation and general garden hygiene helps to reduce the numbers of pests.

The common pests of garden plants can be roughly divided into four main groups.

I. Root Pests.—These destroy the feeding mechanism of plants or tunnel into fleshy tap roots, tubers, and bulbs. Attacked plants make poor growth, and may eventually wilt and die.

Some insects are general root-feeders. These include (*a*) **Swift Moth Caterpillars**, soft, white caterpillars with reddish-brown heads; (*b*) **Chafer Grubs**, large, C-shaped, whitish grubs with chestnut-brown heads; (*c*) **Wireworms**, long, cylindrical, yellowish-brown grubs with a hard shiny skin; and (*d*) **Leatherjackets**, greyish-black grubs with a wrinkled, leathery skin. These are particularly prevalent in recently cultivated grassland or in gardens surrounded by fields, and will attack the roots of a wide range of plants. Chafer grubs, however, are particularly fond of the roots of shrubs, and wireworms will often tunnel in potato tubers and other fleshy roots, whereas leatherjackets prefer the roots of grasses, and may cause browning on large patches of lawn.

Badly infested ground should be dressed with aldrin or lindane dust when cultivating, working the dust into the top 4 in. of soil. Where this is not possible, *i.e.*, on lawns or around established shrubs, the liquid form of the insecticide should be watered into the soil.

Cutworms are stout, fleshy caterpillars, varying in colour from greyish-brown to dingy green. They feed on roots during the day, but at night come to the surface and feed at the base of the stems of plants, causing them suddenly to collapse and wither. Brassicas and lettuce are commonly damaged in this way. Infested ground should be dusted with aldrin or D.D.T.

Millepedes are hard-skinned, cylindrical creatures, brown or black, with numerous short, hair-like legs. They are slow-moving and curl up when disturbed. They should not be confused with the active, long-legged centipedes, which are beneficial. Millepedes commonly extend the damage made by other pests, such as slugs and wireworms. They also bore into the sown seeds of peas and beans. During the day they hide in dark, damp places, such as long vegetation or under stones and pieces of wood. Such hiding-places should be removed or dusted with lindane or aldrin. Drills for pea and bean seed should also be dusted before covering.

Weevil Grubs, small, curved, white grubs, may infest the roots of pot plants and plants in rockeries. Such plants should be removed, the roots cleaned, and replanted in soil which has been dressed or mixed with aldrin dust. Where it is not practicable to remove the plants they should be watered copiously with a liquid form of these insecticides and soil dressed properly at the earliest opportunity.

Slugs need no description. They vary greatly in colour. The most destructive are the underground keeled slugs, small, grey-black in colour, which tunnel in roots, tubers, and bulbs. There are also several foliage-feeding species which rasp holes in the top parts of plants. Slugs like wet conditions, and much can be done to control them by ensuring that the soil is well-drained and that long, tangled vegetation is removed.

Poison baits can be bought or made by mixing 1 oz. metaldehyde with 3 lb. bran (or bonemeal for keeled slugs). The bait is sprinkled over the infested ground or distributed in small heaps and protected from the rain. There is also available on the market a metaldehyde spray for dealing with the foliage-feeding types.

Cabbage Root Fly attacks brassicas and wallflowers. The small white maggot eats away the side roots and tunnels in the main root, causing the plant to wilt and collapse. The roots of young seedlings should be dipped in aldrin or dieldrin before planting out. Alternatively, the plants can be given a drench of aldrin or dieldrin within four days of planting out. The maggots also tunnel in radishes and turnips, and this can be avoided by dusting the seed drills with aldrin.

Carrot Fly.—The maggot of this fly tunnels in carrots and parsnips. Where the pest is serious it is best to delay sowing until the end of May. If possible, seeds should be sown in exposed, windy places, which are avoided by the egg-laying flies. Seedlings should be dusted or sprayed with lindane or dieldrin when 2–4 in. high, particularly in late May or early August, the peak periods for egg-laying.

Onion Fly maggots tunnel into the bulbs of onions, leeks, and shallots, causing the foliage to collapse. Dig out attacked plants carefully, ensuring that parts of them are not left in the soil, and burn them. To prevent attacks dust around the seedlings with lindane or aldrin when they are at the "loop" stage, *i.e.*, about 1 in. high, and again ten days later.

Narcissus Bulb Flies are serious pests of narcissi and also snowdrops and other bulbous plants. The maggots burrow in the centre of the bulbs, causing them to rot. All soft bulbs should be burned and the remainder immersed for three hours in a solution of lindane containing a wetter. To prevent future attacks immerse the bulbs in aldrin for fifteen minutes before planting out. Alternatively, dust around the necks of growing bulbs with lindane at fortnightly intervals from the end of April until the end of June.

Insects which feed above ground include:

II. Sucking Pests pierce the tissues of plants with needle-like mouth parts and suck the sap. This devitalises the plant, checks growth, and causes wilting. Some species cause distortion of leaves and young shoots, and aphids, suckers, scale insects, and mealy bugs excrete a sugary fluid which disfigures the foliage, attracts ants, and allows the growth of sooty moulds.

Aphids, *i.e.*, blackfly, greenfly, etc., are serious pests which attack almost all plants and multiply rapidly in warm weather. They feed on the shoots and undersides of the leaves, and many species are responsible for the transmission of virus diseases. Infestations should be treated as early as possible. Malathion, lindane, D.D.T. emulsion, and nicotine are all good sprays to use, and should be applied to the undersides of the leaves. With the advent of these sprays the control of aphids on roses and broad beans, for example, is no longer a serious problem.

Tree fruits should be sprayed when the buds are bursting and again when the flower buds are still green. Currants should be treated at the "grape" stage, but lindane should not be used on this fruit. Tar oil, applied to deciduous woody plants while they are completely dormant, will kill the overwintering stages of these and many other pests. It does not, however, give a good winter control for **Woolly Aphid** on apples. This pest is best controlled by spraying at the pink-bud stage with B.H.C. with a succinate spreader added. Small colonies on the bark can be eradicated by painting with 10% tar oil.

Some aphids feed underground on roots, particularly of lettuces, currants, and cacti. Where practicable, infested plants should be lifted and the roots cleaned and sprayed before replanting in clean soil. Otherwise water them copiously with malathion or lindane.

Scale Insects are often found in greenhouses, but also occur out-of-doors on trees and shrubs. Flat or dome-shaped, these creatures spend most of their lives immobile, and they do not at all resemble insects, or even appear to be alive. Again tar oil is useful for killing the overwintering stages on deciduous woody shrubs which are dormant. Plants which are in leaf should be sprayed with malathion or nicotine/white oil emulsion two or three times at fortnightly intervals. These substances are more effective if as much as possible of the scale is first removed by means of a sponge, brush, or scraper with water in which soft soap has been dissolved. **Mealy Bugs** are common pests of greenhouse plants, and should be given the same treatment as scale insects.

Capsid Bugs are very active insects which cause considerable damage to fruit trees and bushes and also to various ornamental plants, principally

chrysanthemums and dahlias. They feed on the young leaves, causing distortion and raggedness, and on the buds, which later produce misshapen blooms. These insects, green or reddish in colour, can be controlled by spraying with lindane or D.D.T. when the flower buds are still green (tree fruit) or with D.D.T. at the "grape" stage (currants). Herbaceous plants should be sprayed two or three times at three-weekly intervals, starting when the plants are young and before the damage is seen. The ground under the plants should also be sprayed to kill those insects which fall off during treatment.

Leafhoppers are small, yellowish-green insects like aphids but much more active. They feed on the undersides of the leaves of a variety of plants, causing them to become speckled with yellow. Roses are commonly attacked. The treatment given to capsids on herbaceous plants will control these also, the sprays being directed to the undersides of the leaves.

Whiteflies are serious pests in greenhouses, and also occur out-of-doors on rhododendrons and other evergreen shrubs. The adults are like miniature moths with white wings, and the young are small, scale-like creatures, generally greenish in colour, which feed without movement on the undersides of the leaves. To control this pest D.D.T., lindane, or malathion should be used as a spray or smoke, two to three applications being given at fortnightly intervals.

Red Spider Mites are extremely small creatures, red or greenish in colour and just visible with the naked eye. They feed on the undersides of the leaves of many greenhouse and outdoor plants, including fruit, causing the leaves to turn sickly yellow. Control is difficult, the most effective materials being malathion, derris, summer ovicides, or azobenzene smoke. The directions on the labels of these products should be followed carefully.

III. Biting Insects have chewing and biting mouth parts which are used to cut away pieces of plants.

Caterpillars (the young stages of moths and butterflies) are the best-known pests in this group. They vary in size and colour according to the species, and most plants are liable to be attacked. These should be sprayed or dusted with D.D.T. or derris as soon as damage is seen. On fruit trees D.D.T. should be used when the fruit buds are still green, and again at the pink-bud stage if the infestation is serious.

The **Codling Caterpillar**, which tunnels in apples, is controlled by spraying with D.D.T. at the end of June and again three weeks later. Since this latter treatment tends to encourage red spider mites, it is advisable to add to the D.D.T. one of the materials recommended for these pests.

Sawfly Caterpillars are very similar to those above, and commonly attack gooseberry and rose foliage. They can be controlled by spraying with D.D.T., derris, or lindane. Attacks by the **Apple Sawfly**, which burrows in young apples and forms ribbon-like scars on the skin, can be prevented by spraying with lindane seven days after 80% of the blossom has fallen.

Beetles and Weevils which feed on foliage are usually best controlled by spraying or dusting with D.D.T. To kill the tiny **Flea-beetles** which eat small holes in the seedlings of brassicas and turnips, treat the plants at fourteen-day intervals until they reach the "rough-leaf" stage.

The golden-brown **Raspberry Beetle**, which feeds on the flowers and whose grub tunnels in the fruit, is eradicated by D.D.T. or derris applied ten days after full bloom and again ten days later. For other common pests in this group, *e.g.*, **Vine Weevil, Clay-coloured Weevil, Pea and Bean Weevil**, etc., apply the D.D.T. as soon as the damage is first seen.

Earwigs feed at night on the foliage and flower petals of many plants. They hide by day inside flowers, in the folds of leaves, and in nooks and crannies on the ground, under flat stones, etc. These pests are killed by D.D.T., applied to the plants (but not to open flowers) and to their hiding-places.

Leaf Miners are very small grubs which tunnel between the upper and lower surfaces of leaves, forming pale blisters, as on lilac, holly, celery, etc., or long, twisting galleries, as on chrysanthemum, pea, and tomato. In small infestations the affected leaves should be picked off and burned. Otherwise spray with lindane as soon as the damage starts, giving three applications at fourteen-day intervals.

IV. Eelworms are microscopic pests which are invisible to the naked eye. They are able to live for very long periods without food and are extremely difficult to eradicate. The most common species are:

Stem and Bulb Eelworm, which infests narcissus, phlox, strawberry, hyacinth, onion, and other plants. Infested plants show distorted foliage and dwarfing and gradually deteriorate. They can only be sterilised by immersion in hot water kept at well-defined temperatures for one to three hours, but expert diagnosis and advice should be obtained before this or any other control is attempted. Infested ground must be kept clear of any host plants for at least three years to starve out the eelworms.

Chrysanthemum Eelworm causes the formation of yellowish blotches between the veins of chrysanthemum leaves, which later turn black and drop off. In severe infestations the blooms are undersized and malformed. Expert advice should be obtained before control measures are attempted.

Potato Root Eelworm is a serious and widespread pest of potatoes, causing the plants to become stunted and sickly, giving very poor yields. The pest can only be kept in check by crop rotation, potatoes being grown on the same ground only once in four years. This is difficult in small gardens, and where land becomes heavily infested the only remedy is to rest it from potatoes for at least five years.

The Purchase and Use of Insecticides.—To ensure that an insecticide will do what the maker claims, it is advisable only to buy brands which have been tested and approved by the Ministry of Agriculture. This can be ascertained by the presence of an Approval Mark (**T30**) on the label. Read the directions and follow them carefully. Over-strength insecticides can cause damage to plants, and certain plants (usually listed) can be injured by some insecticides at any concentration, *e.g.*, cucumbers, marrows, etc., by D.D.T. and lindane. Never apply insecticides to flowers in full bloom, otherwise many valuable pollinating insects will be killed.

Standard References.

Encyclopaedia of Garden Pests and Diseases, by van Konynenburg and Lawfield (Collingridge), 1958 (42*s*.).

Horticultural Pests: Detection and Control, by G. Fox Wilson, revised by P. Becker (Crosby Lockwood), 1960 (25*s*.).

DISEASES OF PLANTS.

Plant diseases are important because they can cause great loss not only in growing crops but also in the produce after it has been harvested and stored. The skill in growing crops is wasted if they are destroyed by disease, and many people know the wastage of potatoes through blight disease in winter stores and rotting of onions when they decay through neck rot disease. For these reasons the keen gardener must take notice of

diseases and use the knowledge available to him in checking them wherever possible.

The most important point to remember about plant diseases is to recognise the first signs so that the remedy can be applied at once. In greenhouses this is of great importance because the atmosphere is warm and moist, and in such conditions diseases flourish. It must also be remembered that the same crop is often grown in the same soil in a greenhouse so that we get a build-up of disease, and this causes the well-known "soil sickness." This means that new soil must be brought in or the old soil enriched and also sterilised by steam or by chemicals. Even frames and propagating pits require periodic cleaning up by a disinfection treatment.

Unlike insect pests, the actual cause of a plant disease cannot be seen with the naked eye, and microscopic examination is required for its detection. The scientists who study diseases are called plant pathologists, and these are stationed

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at universities and other institutes throughout the country, where they carry out research on various plant troubles and advise on suitable remedies for checking them. It is obviously necessary to understand the exact cause of a disease and how that cause operates before a means of checking the trouble can be devised. The advice can then be passed on to growers, farmers, and the gardening public.

The presence of disease in most cases can only be detected by the symptoms shown by the affected plant, which is called the "host" plant. The actual cause must then be determined by careful examination in the laboratory, which is done by the pathologist.

Plant diseases in general are divided into three classes as follows: 1. Fungus and Bacterial. 2. Virus. 3. Functional Disorders.

1. Fungus and Bacterial Diseases.—The first kind called fungus diseases are caused by the attack of fungus parasites; examples being the well-known club root of cabbages, potato scab, apple scab, and plum brown rot. These parasitic fungi are microscopic and composed of fine threads, but they attack plants and penetrate them either through wounds (insect bites, hail damage, pruning cuts) or directly through the surface cells (epidermis). The threads grow into the plant, killing the cells and absorbing their contents. There is usually some discoloration or even decay of the tissues around the point of infection, but it is possible for the plant to show distress in one part although the parasite is at work some distance away. Examples are silver leaf in plums and the honey fungus, which kills trees by attacking the roots.

The fungus spreads by means of spores which are equivalent to seeds in flowering plants but which are microscopic in size. These spores are produced on the surface of the plant in enormous numbers and are blown (wind), splashed (rain), or carried (insects, etc.) in all directions to alight on other healthy plants, where they germinate and spread the disease. This occurs in the growing season, but when winter approaches, the parasite forms tough, resting bodies of one kind or another, and these are resistant to extreme cold.

They overwinter in the soil or in the surface of tree bark, etc., so that in the following spring they can germinate and cause disease again. So we get the reappearance of such troubles as damping off in seedlings, scab in apples, brown rot in apples and plums, foot rot in peas, wart disease in potatoes, mildews on all kinds of plants, and so on. This question of soil contamination by overwintering spores is one of the most serious in the fight against plant disease.

The signs of fungus and bacterial diseases are varied, and may show as yellowing, silvering, brown spotting, or blackening of leaves (potato blight, rose black spot, celery leaf spot, antirrhinum rust), as stunting (cabbage wire stem), as pustules and cankers in stems (coral spot, apple canker), as gumming or dieback in branches (rose canker, plum dieback), as galls, warts, witches brooms, or other malformation (club root in cabbages, crown gall, leafy gall, peach leaf curl), as dry or soft rots of fruits, tubers, vegetable bulbs, and corms (gladiolus dry rot, potato dry rot, iris rhizome rot, celery heart rot), and many other abnormal conditions. Sometimes only a part of the plant is affected and can be removed, *e.g.*, branches showing attack by coral spot or one of the large bracket fungi seen on trees, these having gained entrance through a wound.

2. Virus Diseases.—This class of disease is becoming increasingly important as more is discovered about them, although research on them is a comparatively recent development. A virus disease is caused by infection with a virus, and the exact nature of this is not yet clearly understood, but it is so small that it cannot be seen with ordinary microscopes. Its detection is therefore not easy, but when the sap of a virus-diseased plant is injected into a healthy one it causes the disease.

In nature this spread is brought about by biting and sucking insects, which are referred to as **Vectors.** They transmit the virus by feeding on infected plants and then travelling to healthy ones, on which they feed and so spread the disease. Most viruses are transmitted by aphids (greenflies).

In the garden and nursery they can be carried from plant to plant by pruning knives or by the fingers in the process of trimming plants such as tomatoes, melons, and cucumbers or by the use of the knife in taking cuttings. In general, the virus does not kill a plant quickly but tends to cripple it and cause a slow deterioration. Infected plants cannot recover but remain, sometimes for years, as sources of infection on which insects feed and carry on the disease. So viruses may increase in lily stocks, strawberry beds, and raspberry plantations unless virus-infected plants are removed and aphids strictly suppressed.

The signs of virus disease are of different kinds, but the commonest are those of the type called mosaic, in which the leaves show a mottling with light-green or yellow patches scattered in irregular fashion on the darker green of the leaf. There may be also some reduction in the leaf blades. These symptoms can be seen in the mosaic of cucumber, vegetable marrow, lettuce, cabbage, turnip, tomato, delphinium, primula, dahlia, apple, raspberry, and many other common plants. In some, such as lilies, daffodils, and onions, the mosaic is more in the form of stripes down the leaf blades.

Another virus symptom is flower "breaking," where the normal colour of the petals is broken by streaks and spots of white, and this can be seen in tulip, wallflower, pansy, stocks, or carnations affected by the mosaic virus. Other viruses cause bronzing of the top leaves (as in tomato spotted wilt) or small light-coloured rings arranged in concentric circles (as in dahlia ring spot) or even reduction of leaves until they are tendril like (as in tomato fern leaf). Sometimes there is malformation or even proliferation, producing innumerable stunted shoots, as in blackberry dwarf disease.

The important point to note about these virus diseases is that every part of the plant is quickly

infected, so that the sap is infectious to other plants of the same kind. The virus is present in all parts, and for this reason it is useless to propagate from a virus-infected plant. This means that all the scales and offsets from bulbs such as lilies and tulips, all the tubers from potatoes, and all cuttings from herbaceous plants which are taken from a virus-infected plant are useless, because they will carry the virus. They should be destroyed, and the only exception is where the plant is greatly valued, in which case seed can be taken from it before it is destroyed. In general, viruses do not travel in the seed, and only in one or two cases is seed infected, and this only in negligible quantity.

3. Functional Disorders.—This third class of disease is often called non-parasitic, because unlike the previous two kinds there is no parasite involved, and these troubles are therefore not infectious. They are due to faulty cultivation or unsuitable environment, in which soil conditions or climate affect the plants adversely. In this group we include cases of unsatisfactory growth due to waterlogging, drought, frost, high temperature, damage by fumes or atmospheric pollution, or even excess lime.

Perhaps the most important kinds of trouble in this class are the so called **Deficiency Diseases**, where the plants suffer from shortage of some important food. This may be one of the common food substances, such as nitrogen, potash, or phosphate, and details will be found under the section on manures and fertilisers (**T25**).

CONTROL OF DISEASES.

1. Garden Hygiene.—The control of plant diseases can be dealt with only briefly, but to begin with we must emphasise the value of good cultivation as an insurance against losses from disease. Robust plants are better able to stand up to disease than sickly ones, and everything in the way of proper drainage, soil aeration, proper spacing, sensible feeding, and so on, will help to keep the plants vigorous, and this is the first line of defence against diseases. Garden hygiene is important, weeds need to be kept down, wounds in trees and shrubs covered with a good paint against infection, new stocks examined carefully, seed bought only from reliable sources, diseased plants burnt, and dead material regularly removed from plants, especially in greenhouses.

2. Soil Sterilisation.—There are other precautions, among which the sterilisation of the soil in greenhouses by means of steam or chemicals is of some importance. Outdoors this is not possible, but rotation of crops is a most useful system in helping to avoid disease. Disinfection of frames, propagating pits, and seed boxes by formalin or cresylic acid are other useful measures.

All these operations aim at destroying the resting spores of fungus parasites responsible for such diseases as tomato leaf mould, gladiolus dry rot, damping off in seedlings, root rots, and downy mildews of many kinds in young plants such as stocks, cheiranthus, cineraria, tomato, aster, and calceolaria when grown in boxes or pots.

3. Disease Resistant Plants.—The use of disease-resistant varieties of plants is very desirable, but there are not many kinds available, and often the resistant kind does not possess flowers or fruit of such fine quality or flavour as the more susceptible kind. The outstanding success of this kind is that of potatoes immune to the dreaded wart disease, and these can be grown safely in the most heavily infected land. There are antirrhinums resistant to rust disease, and there is resistance in some degree in the case of delphinium mildew, potato blight, tomato leaf mould, and some others. Research goes on to discover still more, because any such plants are always worth a trial.

4. Treatment of Seeds and Bulbs.—For seed-borne diseases seed treatments may be done with an organo-mercurial seed dressing, or even by immersion of the infected seed in warm water.

In some diseases, for example, tulip fire, we can protect the bulbs from the danger of infected soil by raking in a powder such as "Botrolex" when planting the bulbs, and a similar treatment is done with calomel dust against club root in beds intended for sowing brassica seeds.

5. Fungicides.—Even after all this, a disease may still appear in the crop, and more direct action must be taken. It is then necessary to protect the plants by means of a **Fungicide**. This is a chemical which is poisonous to fungus parasites but which will not harm the crop plant (host). Fungicides are used as wet sprays or in powder form as dusts, and they are sprayed or dusted all over the plants to protect them from infection by diseases.

The object of the treatment is to cover the plants with a film of the fungicide so as to protect the still healthy ones. To help the spray fluid to spread over and adhere to the foliage another substance, called a wetter, spreader, or sticker, is added to the spray, but sometimes this is already included by the manufacturer.

5. (*a*) Sprays.—Sprays are applied by means of machines called sprayers which vary from small, hand-syringe types giving a continuous jet of spray to those pumped up to a pressure and carried on the back (knapsack machines), and so on to the large machines driven by a petrol engine, which deliver the spray at a high pressure. It is necessary to have a suitable nozzle giving a fine mist-like cone of spray which settles on the foliage and is not wasted.

5. (*b*) Dusts.—Dusts are similar chemicals produced in such finely divided form that the powder can be blown over and on the foliage almost like a fog. This is best done after a shower of rain or after a heavy dew. The machines used are far more varied in design than spraying machines. There are small hand dusters worked either like a small pump or like a bellows, of which the "Acme" is a good example, and there are those which are carried on the back and worked as a double-bellows action or on the front of the body with a rotary-fan action. It is important in gardens to clean and dry the machines after use, and small sprayers may be best put upside down to drain for a time after use.

The substances used as sprays and dusts against plant diseases for many years have been copper and sulphur and their compounds. Perhaps the best known copper-containing spray is "Bordeaux Mixture," which is still a good spray, but which has been largely replaced by colloidal copper available under trade names such as "Bouisol" for such diseases as tomato blight, etc. Sulphur is used extensively as lime-sulphur against apple scab and as colloidal sulphur against the powdery mildew diseases. As dusts, copper is mixed with lime to give copper–lime dust and sulphur is used alone either as flowers of sulphur or green sulphur.

5. (*c*) The Newer Fungicides.—In recent years much research has been carried out in tests to see whether other chemicals have value as fungicides, and the search has been in the field of organic chemistry and among all kinds of these chemicals. Tests of this kind take a long time, but a few substances have already been picked out as showing great promise, and we can mention "Captan," which is so good against apple and pear scab, "Zineb" aginst tomato leaf mould, onion mildew, and tulip fire, "Karathane" against any of the powdery mildews, such as american gooseberry mildew, strawberry mildew, vine and peach mildews, as well as the same diseases on ornamental roses, delphiniums, michaelmas daisies, and the like.

6. Control of Viruses.—The control of virus diseases is very different, because in this case the only spray treatments likely to be of use are those designed to keep down insects. The other necessary control measure is to remove and destroy the virus-infected plants, which are a danger as sources of infection.

This is best done when the plants are young, so that any young marrows, cucumbers, dahlias, delphiniums, sweet peas, lupins, lilies, etc., which show virus symptoms as commonly revealed in leaf mottling and poor growth should be removed as soon as detected. Propagation should be done carefully, so that young stock is not propagated from stocks of strawberries, raspberries, and all kinds of herbaceous perennials which show signs of virus infection. Even the knife used for taking cuttings should be wiped occasionally on a rag dipped in a good disinfectant.

7. Prevention of Functional Disorders.—In the case of Functional Disorders (non-parasitic diseases) it is not always easy to advise remedies. Where the soil conditions are faulty attention can be directed to improving drainage if necessary or counteracting dryness by digging in humus, irrigating, and general mulching. Dryness at the roots of tomatoes causes loss of fruit, and so does extreme dryness in the air of the greenhouse, but these should be adjusted fairly easily.

Hail damage can spoil many crops, but robust foliage may help a little to lessen the damage. Late frost damage to fruit in some areas can be lessened by various methods of cultivation and planting. The effects of drought can be aggravated by shortage of certain foods, especially potash, so that even here some attempt can be made to avoid loss. Excess liming may cause food shortages by causing the appearance, in the leaves, of a yellowish or even whitish colour, which is known as lime-induced chlorosis. The real reason may be lack of iron or manganese due to the excess lime in the soil, but recently very good results at counteracting this condition have been obtained by using the substance known as "Sequestrene Plus."

Another method of treating these food shortages is to spray the young foliage in early summer with the required element in a very weak solution. They can even be included in sprays used for keeping down diseases or pests. It must not be forgotten that even the ordinary foods, such as nitrogen, potash, and phosphate, may sometimes be in short supply, and the effect can be seen by the trained plant pathologist. In these cases the effect may not always show clearly in the growing crop, but may appear long afterwards in the stored fruits and vegetables, which as a result deteriorate and break down long before they are required for use.

The present-day methods of cultivating large numbers of the same plant in one spot tend to increase the risk of large-scale disease attacks. Modern plants may be highly bred and selected for great purity of strain. Indeed, they have often been chosen for fine quality and flavour, with little regard to their ability to resist disease, so that the gardener must always be ready to give them the protection they may need.

Standard References.

Diseases of Vegetables, by Donald E. Green (Macmillan), 1946 (8*s*. 6*d*.).

Plant Diseases, by F. T. Brooks (Oxford), 1953 (38*s*.).

Diseases of Fruit and Hops, by H. Wormald (Crosby Lockwood), 1955 (25*s*.).

USES OF MODERN WEED-KILLERS.

The control of weeds by chemical means is one of the greatest advances of recent years, mainly resulting from a chance discovery made during the War. Occasionally, troubles have arisen in not following makers' instructions. Sometimes the damage has been most unfortunate, as the majority of herbicides are toxic, in varying degrees, to a wide range of plant life. In the main, controls are determined by circumstance, as typified in the following cases:

Open Ground.—On ground free of crops all plant life can normally be killed by watering the herbage with sodium chlorate at 1 lb. to a gallon of water. In some cases repetition may be necessary. In using this method it should be remembered that treated ground will remain toxic to plant life for a period of up to six months; where doubt exists about the presence of sodium chlorate still in the ground, then it is advisable to wait for the appearance of annual weeds. Further to this, the chlorate is liable to seep through the soil and affect plants for some distance away. It should always be handled with care and stored in closed metal containers. Clothes which have been saturated in the solution and then dried are highly inflammable.

At one time arsenical weed-killers—which are very poisonous to humans—were widely used, but they have now been superseded to a large extent. If a considerable area of open ground is to be treated and the foliage is dry a fair control can

A B

COUCH GRASS (A)—A shallow-rooting weed, nowadays easily eradicated by chemical means (see **T33**). HORSETAIL (B)—Usually a persistent weed of low-fertility soils. Botanically it is a poor, but interesting survivor of a large race of prehistoric plants. Details of its control will be found on **T34**.

be established sometimes with a ooded flame gun, but it is seldom possible to kil the roots of many weeds.

Cultivated Ground.—Where grasses of all sorts, including couch grass and annual grass, are growing on cultivated ground around woody or perennial crops a control may be established by watering with "Dalapon." This is a new herbicide of American origin and is of great interest, but full details about its use should be obtained from the manufacturers before making an application.

If annual plants like groundsel and chickweed are found under similar conditions the plants may be eliminated with "Herbon." Here again, it is important to have full information about the preparation and to apply with care.

Garden Paths.—On any surfaced path or drive a first-rate control of weeds can be maintained by watering with a residual herbicide such as "Weedex." As this preparation is virtually insoluble in water, it does not seep through the soil as sodium chlorate would, and therefore it can be used near garden crops and grass edgings. Further to this, it is not easily washed from the soil and remains active near the surface for up to twelve months. Notwithstanding, the herbicide should not be used carelessly.

A dilute solution of sodium chlorate with 4–6 oz. to a gallon of water may be applied, but it is liable to affect garden plants near by, and for this reason application should be confined to the centre of the path, thereby leaving room for the chlorate to seep through the soil.

Lawns.—The majority of weeds in turf can be easily eradicated with formulations of 2,4-D such as "Dicotox" or "Verdone." In particular, daisies, plantains, dandelions, and all broad-leaved plants are susceptible, although it may be necessary to repeat the dose after ten days. The best time to do the work is on a warm, fine day in the spring when the plants are growing actively and there is the prospect of fine weather to follow for twenty-four hours. The action of the herbicides is rapid, and grass may be cut after a couple of days, composting with mowings in the normal way. It appears that the hormones are not injurious to bacterial life in the soil and in a few weeks break down into harmless substances.

Where bulbs are naturalised in grass, steps to control weeds should not be taken until the foliage of the bulbs has died down and the bulbs are dormant. Thus, as a general rule, control measures are best applied throughout July.

To deal with weeds in turf where there arises the danger of the spray—or even drift from it—touching cultivated plants near by, as, for instance, on grass paths in a rose garden, then a wax bar impregnated with a hormone can be lightly drawn over the turf. Such bars are available at a reasonable price under the trade name "Wonderweeder."

Some weeds are resistant to normal doses of hormones and need special treatment. These are mostly mat-forming plants of low-growing habit which are not cut off by mowing. Typical examples include clover, moss of various sorts, pearlwort, speedwell, and yarrow. Here, the main control must be in the use of lawn sand, and a good mixture can be made up as required with:

3 parts of sulphate of ammonia.
1 part of calcined sulphate of iron.

Application to patches of the weed should be made when the turf is damp and there is the prospect of fine weather; if a period of drought follows an application, then water should be applied to avoid serious scorching. Repeat the treatment as necessary throughout the growing season. Linked with this "spot" treatment, the growth of grass must be encouraged, as this will tend to smother low-growing weeds. Thus, in the early spring when the turf is wet, feed with a mixture of equal parts of superphosphate and sulphate of ammonia at 1 oz. per sq. yd. over the whole area and repeat after a month, if desirable. In addition, do *not* shave off the grass by close cutting; instead, the blades of the mower should be set as high as possible for a whole season.

Ponds.—Problems of weed control in ornamental ponds are often not easy to solve. Where duckweed is prevalent this small floating plant can be eliminated by sweeping the surface of the water at regular intervals. If this practice is carried out thoroughly much of the vegetative growth will be eliminated, and the plant will not be able to form resting bodies whereby it overwinters. Once a control has been established, further spread of the plant can be prevented by introducing a few moorhens or ornamental ducks.

The most common of unwanted plants in pools is blanket weed. There is no single means of dealing with this plant, for its spread is governed, to a certain extent, by unbalanced plant and animal life in the water. With this fact in mind, water lilies should be established so that their foliage shades about 25% of the water. In addition, a few oxygenating plants should be introduced from ponds or streams and a supply of gold fish added. Blanket weed is usually found in pools where the water gets overheated in summer; for this reason, the average depth of garden ponds should be a minimum of 18 in. and preferably a minimum of 2 ft.

Large Expanse of Water.—It sometimes happens that aquatic plants with large floating leaves, such as water lilies, get out of hand. Here, control can be established by cutting off the foliage with a long-handled appliance like the "Corypu Water Scythe." The work should be done early in June and repeated as often as any fresh growth is seen. Bulrushes are difficult to eliminate, but can be destroyed by digging out the roots when the level of the water permits. "Dalapon" has been found to give a control. Application should be made, with a wetting agent added, when the rush reaches maturity.

SPECIAL PROBLEMS OF WEED CONTROL.

Bindweed is to be found in most gardens. Up to the present time the main control has been to carefully fork out the roots as new growth is seen; if this is done methodically the plant can be eliminated within a reasonable time. Lately, chemicals have come to the fore, and bindweed may now be eliminated by watering or painting the foliage with a formulation of 2,4-D when the annual growth has nearly reached maturity. Thus, first applications can be applied in July and the treatment repeated as necessary to good effect.

DUCKWEEDS—In limited numbers these make good oxygenating plants; in quantity they become a great nuisance. Controlled by methodical sweeping or introduction of ducks. *Top*, Ivy-leaved duckweed. *Below*, Lesser duckweed.

Bracken.—Horticulturally, control is not a big problem, and in limited places it is easily dealt with by repeatedly cutting the aerial stems with a grass hook as the first frond opens. This practice will exhaust the underground food supply of the plant, and gradually it will die out. The young fronds are rich in plant food and, while still green and fresh, they should be composted. No chemicals will offer a reasonable control of this plant and, indeed, it is best dealt with by cutting and final digging out of the roots.

Couch Grass.—Where the soil is light and tends to be low in fertility, it is often found that this is a difficult plant to eradicate. If the long, underground stems are forked out in the conventional manner and left on the surface to dry the roots may be composted to advantage and a good control established. To prevent reinfestation, manures and fertilisers should be applied generously and the ground kept hoed regularly. See note on **Cultivated Ground.**

Ground Elder.—Without question this is one of the worst garden weeds and, whether or not the fact is pleasant or acceptable, it is indubitably a weed of neglected ground. In varying degrees it is resistant to hormone weed-killers of all sorts. On ground free of crops it may be reduced by an application of sodium chlorate, as explained in the paragraph **Open Ground.** The first application

should be made as soon as growth starts in the spring and repeated if the desired effect is not abundantly clear. When ground elder is to be found among herbaceous plants they must be lifted out and the weed removed by repeated hand-forking. In shrubberies reasonable control can be had by smothering the young growth in the spring with a thick dressing of peat, leaf mould, baled straw, or sawdust. If growth penetrates the surface dressing it will be found that the etiolated shoots are not difficult to remove by hand, or a second layer can be applied to complete the treatment.

Horsetail.—This is sometimes erroneously called mare's-tail and on poor, sandy soils it is often a common weed. Fortunately, recent experiments have proved that it can be easily controlled by spraying or painting the mature growths with a formulation of 2,4-D, taking care, of course, to keep the spray off cultivated plants near by. As the appearance of horsetail is symptomatic of low fertility, manurial treatment should be carried out on a generous scale.

Perennial Nettle.—Although this is a common weed, it is easily eradicated by thoroughly watering the foliage in the spring with a solution of a hormone like 2,4-D or, preferably, 2,4,5-T. This treatment should be repeated once or twice until the plants are eliminated. Isolated clumps can be dealt with by repeated cutting of young growth with a grass hook. The annual nettle is controlled by regular hoeing throughout the summer months.

Oxalis.—Of all weeds this is probably the most difficult to destroy. It is easily identified by its large, trifoliolate leaves like that of clover. Unlike other weeds, oxalis cannot be efficiently removed by hand, as this disturbs the bulbils clustered around the base of the stem of mature plants. On ground free of crops, sodium chlorate can be applied in March (see paragraph on **Open Ground**). Perhaps a second application may be necessary, but, even so, control may not be complete. Among shrubby plants, it may be possible to eradicate the weed by smothering, as suggested in the paragraph on ground elder.

Woody Plants.—These may be killed with 2,4,5-T. This hormone is particularly useful on bramble, gorse, ivy, and other unwanted shrubby plants. It is necessary to thoroughly saturate the foliage of deciduous trees, and the best results are obtainable when the leaves are fully mature but not starting to die off. In the case of ivy, the dormant shoots should be generously sprayed for the best results.

To sum up, there are many, many aids for eradicating weeds. The important point is to get the *right* method for *each* plant. Equally important is it to check on the reason why certain weeds grow profusely under some conditions, and to counter this natural tendency by appropriate cultural treatment, such as in the application of manures where horsetail is to be found.

Standard References.

Garden Weeds and Their Control, by Stanley B. Whitehead (Dent), 1949 (7*s.* 6*d.*).

Weed Control Handbook, issued by the British Control Council (Blackwell), 1958 (12*s.* 6*d.*).

HORTICULTURAL SOCIETIES.

There are many specialist societies in Britain. Detailed information on particular plants is normally available from them, and membership is open to all wishing to join. The most prominent societies are:

Alpine Garden Society

Sec. C. B. Saunders, Husseys, Green Street Green, Farnborough, Kent.

Auricula and Primula Society, The National

Sec. G. Redvers Williams, Mount Pleasant, Eastbury, Newbury, Berks.

Cactus and Succulent Society of Great Britain

Sec. K. H. Walden, 152 Ardgowan Road, Catford, London, S.E.6.

Carnation Society, The British National

Sec. R. K. Dowdall, 83 Woodward Road, London, S.E.22.

Chrysanthemum Society, The National

Sec. S. G. Gosling, 65 St. Margaret's Avenue, Whetstone, London, N.20.

Daffodil Society, The Midland

Sec. J. H. White, 76 Windyridge Road, Walmley, Sutton Coldfield, Warwickshire.

Dahlia Society, The National

Sec. H. F. Newson, 93 Byng Road, High Barnet, Herts.

Delphinium Society, The

Sec. C. J. H. Topping, B.A., Ph.D., Spark Lane, Sevenoaks, Kent.

Floral Decoration Society, The London

Sec. Miss Edith Hembley Parker, Top Hill, Great Goddesden, Hemel Hempstead, Herts.

Fuchsia Society, The British

Sec. B. W. Rawlins, 256 Great West Road, Heston, Middx.

Geranium Society, The

Sec. D. Martin-Roberts, M.A., 124 Argyle Road, Ealing, London, W.13.

Gladiolus Society, The British

Sec. R. H. Jeffers, 147 Wood Street, Chelmsford, Essex.

Iris Society, The British

Sec. Mrs. E. G. Osborn, 144 Ellison Road, Streatham, London, S.W.16.

Pansy and Viola Society, The North of England

Sec. F. C. Marsland, 2 Jubilee Mount, West Lillands, Brighouse, Yorks.

Pansy and Viola Society, The Scottish

Sec Hugh Campbell, O.B.E., 960 Dalmuir Road, Clydebank, Glasgow.

Pteridological Society, The British

Sec. The Rev. E. A. Elliot, South Stoke Vicarage, Nr. Reading, Berks.

Rose Society, The National

Sec. H. Edland, 117, Victoria Street, London, S.W.1.

Royal Horticultural Society, The

Sec. A. Simmonds, O.B.E., M.C., V.M.H., Royal Horticultural Society's Offices, Vincent Square, London, S.W.1.

Royal Caldeonian Horticultural Society

Sec. John Turnbull, D.S.O., D.F.C., C.A., Royal Caledonian Horticultural Society, 44 Melville Street, Edinburgh 3.

Houseplant Society, The Saintpaulia and

Sec. Mrs. D. Rudland, 11 Hanover Square, London, W.1.

Scottish Rock Garden Club

Sec. Sqdn-Ldr. J. J. Boyd-Harvey, Boonslie, Dirleton, East Lothian.

Sweet Pea Society, The National

Sec. R. J. Huntley, Broadland, 104 Uxbridge Road, Slough, Bucks.

THE GARDEN CALENDAR.

January.—All digging should be finished this month. As the work is done, so generous applications of organic matter such as peat, compost, sewage sludge, leaf mould, animal manure, or a mixture of any of them, should be incorporated into the ground. On clay soils the physical condition can be improved by raking into the surface dressings of rough materials like screened ashes, road grit, or coarse sand.

Fork over ground between rows of fruit trees and in shrubberies and bury annual weeds; if land is not free of weeds in January it is unlikely to be so throughout the year.

A trench for runner beans can be made, the bottom forked over, a thick dressing of compost or kitchen waste added, and the soil replaced.

Rhubarb will require protection with compost or straw and early growth forced by covering with small tubs.

GROUND ELDER—A pernicious weed of neglected land. Best eradicated by methodical hand-forking early in the year (*see* T33).

Pruning of orchard trees and fruit bushes should be completed. When bird damage is severe gooseberries can be left until bud burst.

Autumn-planted shrubs and trees should be checked over, and any which have worked loose through the action of frost or wind should be firmed by thoroughly stamping over the soil.

February.—Broad beans can be sown if conditions are favourable and shallots planted by pressing the bulbs into the soil until only the tips show.

Jerusalem artichokes are an unusual crop well worth growing; plant tubers as early as possible to give a long season for maturity.

Parsnips should be lifted to check new growth and stored on the north side of a wall or fence.

"Seed" potatoes can be arranged in boxes and kept in a frost-proof shed; a light, airy position will encourage short, sturdy shoots.

Protective covering on half-hardy shrubs, like fuchsias and mimosa, should be removed as early as possible.

Herbaceous plants which do not over winter easily, such as delphiniums and gaillardias, may be planted at the end of the month.

Turf may be laid in February so that the grass can be established before the ground starts to dry out in the spring. Before laying, rake in a dressing of "National Growmore" at 1½ oz. per sq. yd. to encourage root action.

Vines under glass should still be kept as *cold* as possible to maintain the dormant period. As the buds swell the temperature can be higher, but ventilation must be increased if it reaches 45° Fahrenheit.

Fuchsias grown under glass should be pruned hard by cutting back all of last season's growth to within a bud or two of the old stems. Later, as new growth appears, take cuttings which will root easily in sand under a plastic bag.

Shrubby plants like the india-rubber plant and most pot plants grown indoors or under glass should be repotted or top dressed with fresh potting compost.

Early strawberries can be obtained by cloching rows at the beginning of the month.

March.—Sow round-seeded spinach and broad beans for a succession in cropping.

Brussels sprouts, cabbage, lettuce, leeks, onions, parsley, parsnips, peas, and radish should all be sown as the soil gradually warms up.

Asparagus is easily raised from seed sown this month. Sow the seeds individually 1 in. apart and mark the rows by sowing a pinch or two of radish seed at intervals, as the asparagus is slow to germinate.

Onion sets can be planted as early as possible on well-manured ground.

Spring cabbage will respond in the spring to an application of nitrate of soda at 1 oz. per sq. yd.

Tomato seed may be sown in a warm greenhouse at the end of the month. It is a mistake to sow early in the year, as then seedlings get drawn and weak before it is time for planting outdoors.

Seed of half-hardy annuals, such as antirrhinums, China asters and *Phlox drummondii*, may all be sown in a greenhouse or frame. Remember the seed should only be covered with a sugaring of fine soil sufficient to "anchor" the seedlings and to sow thinly.

Hedges, and particularly evergreen sorts which have outgrown their stations, should be cut back, and this is the *best* month for doing so. Often drastic reduction is necessary, and such treatment will save endless, unnecessary work in trimming later on in the year. As an example, privet may be safely reduced to a width of 9 in. and a height of 4–5 ft.

Evergreen shrubs, like some daphnes, rhododendrons, and hollies, may be planted and—what is most important—kept moist until growing freely.

Over-grown lavender may be reduced in size by cutting back into old wood.

Lawns should be fed with fertilisers to encourage new, strong growth when the turf is damp.

As buds burst on roses, so pruning and manuring can be started.

Planting time for all fruit trees is nearly over, and should be completed without delay.

As buds burst on early planted raspberries, so the already shortened canes can be cut down to just above the lowest bud in growth; as further growth develops so the old stems can be shortened further until, finally, cut to ground level.

April.—Potato planting for an early crop is done this month using well-sprouted "seed." Protect from late frosts by covering the first shoots with earth and, if necessary, applying a coating of straw or sacking.

Onions raised under glass in boxes can be planted outdoors.

Watch for germination of asparagus seed; as the fern-like growths appear, hand weed the rows with great care and thin seedlings to 2–3 in. apart.

Hardy annuals can be sown outdoors when soil conditions are right; lightly cover and protect from birds. Half-hardy sorts must be grown-on in frames.

New stocks of carnations, chrysanthemums, and violas may be planted outdoors.

Transplant autumn-raised sweet peas to open garden early in the month.

Lawns may be sown as the soil warms up, and a good surface tilth can be obtained by raking; *prior* to sowing, make arrangements to protect the seed bed from birds by use of pea sticks, wire netting, strips of newspaper dipped into lime-wash, or "Glitterbangs" or a combination of these scarers.

Evergreen shrubs, like bamboos, hollies, and rhododendrons, should be planted and kept moist until well established.

Gladioli and montbretias can be planted in sunny positions where soil is in good heart.

Prune winter-flowering shrubs, such as winter jasmine and forsythia, by cutting off the old flowering stems.

Weeds will be appearing on garden paths and drives; establish an early and efficient control by watering with "Weedex."

Early planted fruit trees should be mulched with organic matter to conserve moisture in the soil.

May.—Brussels sprouts should be planted early in the month and also late potatoes. Watch out for blackfly on broad beans, as the first infestations are the important ones to deal with promptly.

Encourage growth on leafy vegetables, like lettuce and spinach, by a dressing of nitrate of soda at 1 oz. per sq. yd.

Towards the end of month plant out tomatoes, or in the first week if cloches are available.

Sow sweet corn and vegetable marrows in the open. Bedding plants and half-hardy annuals may all be planted outdoors.

Roses should be checked over for first signs of greenfly infestation; spray with nicotine if necessary.

Garden pools in need of cleaning should be dealt with thoroughly. At the same time water lilies may be lifted and divided when growth in the previous year was excessive.

Delphiniums now develop rapidly; for best results cut out thin shoots to leave five to seven strong growths to each plant. Stake and tie each one and encourage healthy growth by feeding with liquid animal manure or soot water on one or two occasions.

Faded blooms on azaleas, lilacs, and rhododendrons should be removed.

Agapanthuses and hydrangeas grown in tubs can be brought into a sunny position. If repotting has not been necessary remove top 2 in. of soil and replace with fresh compost. Encourage new growth with applications of liquid animal manure.

Window boxes should be repaired, filled with fresh compost, and replanted. Remember a generous layer of peat or leaf soil placed in the bottom will do much to conserve moisture.

Lawns will need attention, and broad-leaved weeds can be eliminated by treatment with hormone weed-killers.

Small greenhouses are liable to get very hot and plants suffer accordingly especially if short of water; therefore keep staging and floors well damped. Conversely, sharp falls in temperature may be experienced and everyday the ventilators should be shut down in the late afternoon in order to conserve the heat from the sun.

June.—Plant cabbages, cauliflower, celery, marrows, and tomatoes.

Sow seed of garden swedes.

After thinning beet, carrots, onions, and parsnips, feed with nitrate of soda at ½ oz. per yd. run.

Asparagus raised from seed must be kept clear of weeds and watered thoroughly at the least sign of being dry. Beds cropping in their third season should not be cut after June 1st; on old beds cutting may continue until the third week of June.

Sweet corn should be thinned and a surface dressing of compost applied.

Aubrietas now past their best should be clipped back hard to the old stems, with a pair of shears.

Seed of delphiniums, hollyhocks, lupins, and wallflowers may be sown.

Phloxes, especially if grown on light soil should be mulched with compost and watered when necessary.

Herbaceous plants of all sorts respond to feeding if growth is below par; individual species may be fed with soot water or large beds given an application of sulphate of ammonia at 1 oz. per sq. yd., taking care to keep the crystals off the foliage of plants.

Old flower-heads on roses should be removed regularly by cutting back old flowering stems to within 4 or 5 in. of the mature wood.

Raspberries and similar berries should be mulched with compost or old manure to encourage new growth.

Strawberries may be layered if the stock is healthy and growth vigorous.

July.—Plant winter cabbage, leeks, sprouting broccoli, and kales as ground becomes available

Sow prickly spinach and turnips for autumn and winter use.

Water celery, marrows, and runner beans at first sign of dryness. If setting is poor, beans should be sprayed vigorously with water from a hose.

Shallots may be lifted and dried off as foliage gradually yellows.

Carnations may be layered as sturdy young shoots develop; remove sufficient leaves to make a horizontal cut up the stem passing through a joint, and peg down.

Flag irises can be lifted and divided as flowering finishes. After replanting, the tubers should be showing above ground but, nevertheless, firmly in the soil.

Wallflowers may be lined out in nursery rows. To avoid sappy, lush growth do not plant on rich soil. Where ground is acid water plants with lime-water (a large handful to a gallon).

Hydrangeas can be easily propagated in July by cuttings of short flowerless shoots. These should be inserted in pots in a sandy compost and kept under a plastic bag or hand light until rooted.

Transplant into nursery rows, seedlings of biennials and perennials sown earlier in the year.

Order supplies of daffodils, hyacinths, and other bulbous plants for delivering in September. Stocks in good trade houses are often soon exhausted.

Late in the month hedges of beech, holly, hornbeam, and yew can be clipped.

August.—Runner beans are now in full bearing, and the pods should be gathered while still young, to encourage further croppings; often beans are picked much too old. Water and feed with nitro-chalk at 2 oz. per yd. run if necessary. If properly grown this is one of the most profitable of *all* crops.

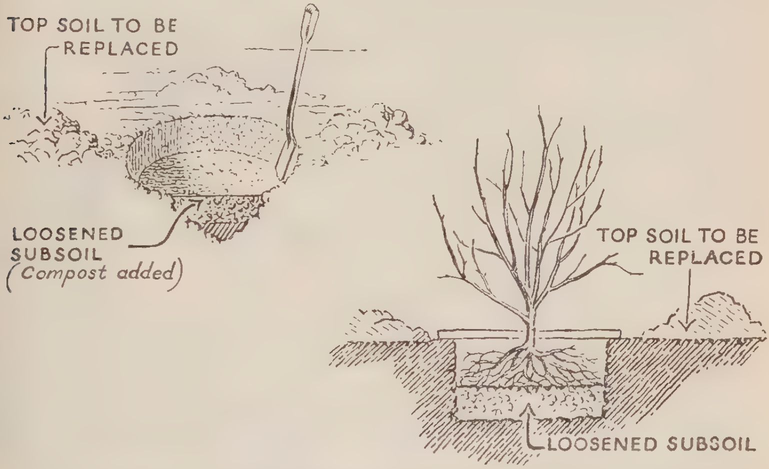
Marrows should also be gathered while still young and fresh; early development of seeds checks fruiting.

Strawberries layered in pots earlier in the year may be planted when the soil conditions are right. Use a well-manured site and plant at approved distances.

Raspberries and loganberries will now have finished cropping, and all the old fruiting canes may be cut out at ground level.

September.—Tomatoes can be gathered while still green and ripened easily and quickly by storing in open boxes, out of the direct sun, in a warm kitchen. Such a practice is better than putting the fruit in a dark, airless cupboard.

Ground recently cleared of onions and potatoes is admirable for planting out cabbages for spring cutting. Apart from removing any weeds, no preparation is desirable.



Correctly Planted Shrub, showing planting hole and bush in position. The loosened sub-soil must be firmed prior to planting, and any tree or shrub must never be planted deeper than it was in its previous position or nursery row.

Seed of prickly spinach—a valuable winter crop—may be sown. As seedlings develop, thin out and on acid soils apply lime-water.

Tomatoes should be sprayed with "Bouisol" at fortnightly intervals to prevent potato blight.

Winter greens, if not already planted, should be put in as soon as possible.

Pelargoniums ("Geraniums") should be propagated by cuttings taken throughout the month as young, short side-shoots develop. Rooting soon starts if the cuttings are inserted in sand or a mixture of sand and peat.

Border carnations may be layered; encourage rooting by not allowing the plants to suffer from a lack of water.

Madonna lilies may be planted this month in an open position where they will not be disturbed.

Flowering shrubs of a wide range may be propagated in August. Short side-shoots of the current season's growth should be taken off with a heel when the wood is still young but starting to harden at the base. Insert in sand and cover with a plastic bag.

Grass seed is best sown this month whenever the soil is moist but not wet, as in the notes for April. Before sowing, any perennial weeds must be removed by hand forking.

Brussel sprouts are heavy feeders and growth should be encouraged by an application of nitro-chalk at 1 oz. per sq. yd. early in the month.

Carnation layers will now be rooted and the young plants may be severed from the parents and transferred to their flowering positions.

Crocuses, daffodils, and snowdrops are often planted too late; September is the time for the job. Similarly, these, together with hyacinths, may all be planted in bowls for indoor decoration before the end of the month.

Lavender bushes can be trimmed when the flowers fade; do not, however, trim or cut back in any way the old stems or foliage.

Grass seed not sown last month should be put in without delay.

Roses of nearly every sort can be propagated by inserting cuttings 8–10 in. long in a shallow trench outdoors. A sprinkling of sand should be put in the bottom of the trench and the cuttings firmed well.

Brown rot is often prevalent on fruit. There is no remedy for the disease, and brown, rotten fruit on apple and other trees should be picked off and burnt.

October.—Jerusalem artichokes are safe left in the ground, but the stems should be cut down.

If a regular supply is wanted, then a store of tubers may be lifted to ensure against hard frost.

Parsnips may, similarly, be left in the ground until needed.

Asparagus stems should be cut down before the seeds drop. If "fern" is cut during the summer for indoor decoration, subsequent cropping is affected.

Lettuce for early cutting next spring should be sown, late in the month, under cloches.

Virgin ground which is to be taken into cultivation should be dug as soon as possible in order that it may be exposed to a *full* season of winter frosts. There is no doubt that the maximum value in digging virgin land can only be had if the work is completed well before Christmas.

Evergreen shrubs should be planted before the weather turns severely cold.

Lily-of-the-valley will respond to a top dressing of old animal manure or an application of bone meal at 2 oz. per sq. yd. followed by a mulch of leaf soil.

Clematis grown in pots may be planted in their permanent positions.

Lilies of various sorts can be planted early in the month.

Gladioli should be lifted, cleaned, and stored in a dry, frost-proof shed.

Polyanthuses and all sorts of primroses may be planted in moist, rich soil for flowering in the spring.

Sweet Williams and pansies may be transferred from nursery rows to their flowering positions.

Wallflowers should be planted without delay, firming the plants well. Forget-me-nots and daffodils may be used in conjunction with them and planted at the same time.

Most plants grown indoors have been watered freely during the summer; from now on care must be taken in applying water, as soil only dries out slowly in winter, and growth has virtually stopped.

Bulbs in bowls must be kept as cold as possible, and up to early November not more than about ½ in. of growth should be showing. Damp the peat as it shows signs of drying out.

Black and red currants and gooseberries may all be propagated by cuttings.

November.—Runner beans can be cleared and the haulms used for compost; the old roots can be left in the ground and later dug-in. If the sticks are pulled up early and stored they will last for some years.

Broad beans may be sown outdoors in districts where they are known to succeed; an allowance for losses should be made by sowing 3 in. apart.

Asparagus responds well to a top dressing of animal manure or compost; if supplies are short, aim to apply once in three years.

Lettuce sown last month under cloches can be transplanted and, under wide barn cloches, three rows can be grown easily for cutting in the spring. Slugs may cause serious losses, so water with "Slugit" at planting time and keep a few spare seedlings to fill any gaps.

Tulips may be planted throughout November.

Heaths and heathers of all sorts can be planted in peaty soils. Large clumps may be split up and replanted.

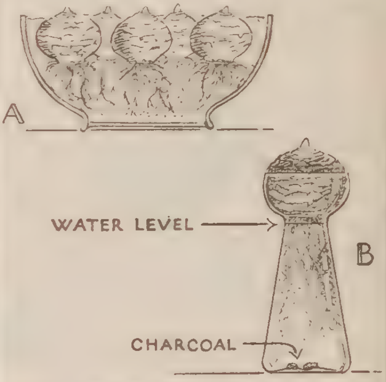
Roses and all deciduous shrubs and trees, including fruit trees of all sorts, should be planted as soon as possible. Always firm the soil well, but do not plant too deeply.

Where necessary, herbaceous borders can be replanted. Large clumps of perennials can be split up and the strong pieces from outside of the clump replanted; the centre of the clump should be discarded.

Continue to keep indoor bulbs as cold as possible. By the second week in November, growth should be about an inch high. Towards the end of the month, transfer to a cool, light position.

Throughout the winter continue digging and incorporating organic matter like compost, spent hops, and coffee grounds.

Vines grown in a cold greenhouse should be given full ventilation night and day. After leaf fall cut back annual growth to one bud.



Bulbs Indoors—Note strong root development before leaves appear. This factor can only be brought about by early planting (*see* September notes). In both bowl (A) and glass (B) a little bonfire charcoal is necessary for healthy growth.

December.—Decaying leaves on winter greens should be removed to give free circulation of air around the plants.

Bird damage may be prevalent on spring cabbages because of pigeons. In serious cases it is worthwhile to erect fish netting.

When frost makes cultivations impossible, pruning of fruit trees should be done. The only exception may be red currants and gooseberries, because in districts where bird damage is serious any pruning is best left until the spring.

Deciduous hedges of beech, hawthorn, and the like can all be cut back hard where the plants have got out of hand, with a view to reducing work of trimming during the growing season.

Well-berried holly is always in demand, and a variety of regular fruiting habit to fulfil the requirement is *Ilex aquifolium* 'Pyramidalis.'

For those wanting mistletoe, the seed should be planted on apple trees in the spring—not in December.

Early in the month, hyacinths can be brought into full light and warmth for Christmas flowering. If growth is a little stunted cover plants with a sheet of newspaper and give more warmth; if growth is poor look to the cultivator not the supplier.

Christmas trees to be brought indoors in pots should be thoroughly watered first, to check the needles falling through lack of moisture in hot stuffy rooms.

Care of Indoor Plants

By definition a house plant is one which can be permanently grown for decoration indoors. Such plants should not be confused with orchids, crotons, hibiscus, and the like, for these are really greenhouse plants or denizens of Scandinavian or American houses, where heat and air conditions may be automatically controlled. Conversely, the average British home is often cold and draughty, and has a high temperature in the evening and a very low one at night. This is far from satisfactory, but, in view of the fact, the cultivator of house plants must choose subjects tolerant of existing conditions.

Cultural Conditions.—Ideally, the temperature should be kept as constant as possible, and in cold weather plants grown in window-boxes are best moved nightly into the centre of the room to avoid damage by frost. Linked with temperature is the question of humidity, for plants respond well to a moist atmosphere. Here again the majority of rooms are ill-suited for growing plants. The condition can be improved, however, by sinking the pots in peat or wrapping them around with sphagnum moss. Alternatively, pots may be stood on a layer of gravel which can be kept damp without allowing water to seep through the bottom of the pot and thereby saturating the soil.

Other factors influence the health of plants indoors—gas fumes, for example, and draughts—so both must be avoided if possible. It will also be found that dust collects on the foliage, therefore plants with large leaves should be sponged regularly with soapy water. Others, with hairy leaves, like saintpaulia, may be gently sprayed, but the water must not be allowed to remain on the foliage, as it may lead to scorching or rotting.

Of all cultural practices, the most important is watering. Unfortunately, the right way and time to do this cannot be laid down emphatically, because the practice is essentially an art and not a science. As a general guide, plants may become *nearly* dry before watering and then be given a *thorough* soak by standing the pots up to their rims in a bucket of water. For all plants, rain-water is best; if tap water has to be used, it should reach the same temperature as that of the room before being applied.

Soils and Potting.—However well a plant has been grown, the turning point culturally is in its repotting, as from this juncture it either grows vigorously or soon declines. The important factor is to get the correct compost. This may vary slightly, but an all-round mixture can be made up of:

- 7 parts by loose bulk medium loam
- 3 parts by loose bulk granulated peat (or leaf soil)
- 2 parts by loose bulk coarse, gritty sand

This mixture is the basis of John Innes Potting Compost and, with fertilisers added, can be purchased in small quantities from horticultural sundriesmen. If fertilisers are not added, plants should be fed during the growing season at about fortnightly intervals (depending on the particular plant) with a dilute solution of liquid animal manure; alternatively, 2 oz. of the following mixture dissolved in a gallon of rain-water can be used:

- 5 parts by weight of sulphate of ammonia
- 7 parts by weight of superphosphate
- 2 parts by weight of sulphate of potash

Normally a plant will grow satisfactorily in the same soil for three or four years. After this annual growth may be poor, together with yellowing or dropping of the foliage. The plant is then in immediate need of repotting. To do this a large crock should be put into the bottom of the new pot—which should be generally a shade larger—followed by a little compost. Then the matted roots of the plant can be teased out with a pointed stick, put in the pot and more compost worked firmly around the roots. Some plants, of which palms are an example, prove intolerant of root damage, and repotting must be done with particular care, but, nevertheless, the compost must be made firm. When repotting is not absolutely necessary, the top inch of soil can be taken off annually and the pot top-dressed with fresh compost. Both repotting and top-dressing are best done before growth starts in the spring.

Propagation.—Many house plants are easy to propagate from cuttings or layered shoots. The former are taken off the parent plant at a joint in the stem by severing cleanly with a razor blade. After the lower leaves have been removed, the stems are inserted into a mixture of equal parts of sand and peat in a pot. A glass tumbler or specially-made, small, plastic tent is then placed over the top to avoid loss of moisture, and in a week or two rooting will have taken place. As for layering, this can be done by bending a shoot into a pot of sandy soil and pegging it down at a joint. When the layer has rooted it can be severed from the parent.

Health of Plants.—Fortunately the number of pests and diseases affecting indoor plants is small, and the large majority of troubles are due to faulty cultivation. Occasionally aphids (green or black flies) may be found on young growth, and can be destroyed by carefully wiping affected leaves and shoots with water containing a little detergent, repeating the practice if necessary. On ivies, in particular, sometimes a brown, waxy scale can be found. Underneath the protective scale is a small insect which sucks the sap, and without difficulty these can be removed by hand. Another insect occasionally seen is the mealy bug, an aphid which is surrounded by a prominent coating of a white, woolly substance; control in this case is to paint individuals with a dab of methylated spirits and to deal regularly with any reinfestation.

Basal rotting of flower stems and leaves, to be seen often on cyclamen and peperomias, is due to fungal infection, but this can be avoided by attention to correct watering and temperature. Similarly, premature yellowing of the foliage and leaf dropping is primarily a cultural trouble brought about by excessive cold, draughts, gas fumes, dryness, over-watering, perhaps over-feeding, or a combination of some of these factors.

SELECTION OF PLANTS FOR GROWING INDOORS

Florists' Plants

These are plants, like cyclamen and cinerarias, which are purchased in flower and usually discarded when flowering has finished, as their value lies only in providing temporary colour. Most of them are forced for seasonal trade in the moist atmosphere of a heated greenhouse, so do not respond kindly to treatment indoors.

One of the loveliest of these plants is *Azalea indica*, the Indian or evergreen azalea. After flowering it can be kept in a cool greenhouse. It needs plenty of moisture, and as it is a calcifuge, only rain-water can be used. To encourage growth after flowering, spray the foliage regularly and apply dilute, liquid animal manure or dilute soot water.

The most popular florists' flower is the cyclamen. It is difficult to grow really well, and cultural notes should be followed. With expert attention old plants can be flowered for ten years or more, although the best results are obtained from one-year seedlings. On the other hand, varieties of cineraria are grown as biennials. These need cool, airy conditions, and should be watered freely but, at the same time, with care not to over-water.

At Christmas-time numerous varieties of primula will be offered for sale. All of them are of comparatively easy culture, and if top-dressed and fed can be grown-on for a year or two. Some varieties, particularly those of *Primula obconica*, can cause a rash on those susceptible to it. Other plants which can be kept after flowering are the varieties of *Solanum capsicastrum*, the winter

cherry. It is a pleasing little subject and quite easy to grow. In season, the small, bushy plants are covered with large, red fruits and can be kept healthy by regular spraying of the foliage and attention to watering. When the fruit falls the young shoots can be trimmed back, the plant repotted and then grown-on in a cool greenhouse.

Indoor Plants

Unlike the florists' plants, those in this section are grown as permanent features of a house. The ones listed can be grown in most homes if given reasonable care, and all of them are available through normal trade channels.

Araucaria excelsa (Norfolk Island Pine).—Because of its likeness to a small fir tree, it is a plant to stand on its own. It is not difficult to grow if kept out of the full sun and the soil moist. One of the earliest plants adopted for growing indoors, but not often seen at present.

Begonia.—An enormous genus of plants of world-wide distribution, many being suitable for indoor cultivation. Of particular interest are *B. heracleifolia* and *B. manicata*, both being easy to propagate from cuttings under a tumbler.

Billbergia nutans.—This is a member of the pineapple family, the Bromeliads, having typically narrow, spiny-edged leaves. Nearly hardy, and will flower in a warm room. Do not repot unless absolutely necessary, as the roots are best confined.

Campanula isophylla (Harebell).—A charming blue-flowered plant with a long flowering period. Easily grown in cool conditions, and its pendulous habit makes it useful for a basket. After flowering, remove dead flower-heads and trim straggly shoots. There is a good white form, *alba*.

Cacti.—Innumerable sorts are used as house plants. In the main, all should be grown in a sandy, gritty soil with sharp drainage; water may be given freely in the summer, but withheld in winter, except to prevent the soil drying out. Two cacti which will flower freely and are particularly worthy of cultivation are *Aporocactus flagelliformis*, the rat's tail cactus, and *Epiphyllum ackermanii*. Both are tolerant of poor conditions and neglect. Mention should also be made of the old-fashioned Christmas cactus, *Schlumbergera bridgesii*, as a great favourite, but an infinitely more exciting one of a similar type is the rare *Rhipsalidopsis gaertneri* with bright-red flowers. These two are both easy to grow, and the latter was shown well at Chelsea in 1956.

Chlorophytum elatum.—Will tolerate a range of temperature and responds to occasional feeding in the summer. It is most attractive, with its green leaves striped with cream-coloured bands. A good plant for beginners.

Crassula.—Shrubby members of this genus make fine house plants, growing well in light soil in full sun. Particularly valuable are *C. lactea*—which has white flowers annually and large, succulent, spoon-shaped foliage—and *C. falcata*, a choice plant with red and yellow flowers.

Ferns.—Some will grow in rooms, but well-grown specimens of maidenhairs and the like are hallmarks of first-rate cultivation. Species of *Asplenium*, *Blechnum*, and *Nephrolepis* are worth trying. Compost is made up with equal parts of fibrous loam, peat, leafsoil, and coarse sand.

Ficus.—Species like *F. elastica decora* with broad, leathery, shiny leaves are often seen as window decoration in large stores. Not easy to grow in some circumstances; leaf-drop and yellowing may be caused by fluctuations in temperatures or draughts, and rain-water should be used when watering.

Helxine soleirolii (Mind-your-own-business).—Appropriately named from its habit of thriving where it is not wanted. Makes a pleasant mass of thin, green, trailing stems. Should be kept always on the wet side.

Ivy.—Common in many continental houses, for ivies show an interesting range of colour, shape, and size in their foliage. Invaluable as climbing plants and in warm rooms, the Canary Island ivy is worth trying. A related plant raised in France is *Fatshedera lizei*. All of these prefer a damp, leafy soil, and the foliage should be sprayed occasionally.

Monstera deliciosa.—A striking plant with large, deeply-cut leaves and long, thick, aerial roots, many of which do not reach the ground. Often seen as a prominent decorative feature of continental homes. Requires a leafy soil and generous watering. Spray or sponge foliage regularly and avoid fluctuation of temperature in its cultivation.

Nepeta hederacea variegata (Ground Ivy).—Creeping, hardy perennial native of Britain; variegated form makes an attractive addition to a hanging basket, having long stems and small kidney-shaped leaves. Correctly known botanically as *Glechoma* not *Nepeta*. Good plant for beginners.

Palms.—Like the aspidistra, the palm is considered a relic of Victorianism, and on such slender evidence is condemned on many counts. Notwithstanding, palms of various sizes make good decorative plants. Care must be taken when repotting, and for a number of years it is only necessary to top-dress provided that feeding is done in the summer. To keep the foliage green, the leaves should be sponged regularly or, better still, the plant taken out of doors and vigorously sprayed with water from a hose.

Pelargonium (Geranium).—Ease of cultivation and beauty are found in this plant and its infinite varieties. Some of these, like 'Mrs. Cox,' have multi-coloured leaves and are well worth hunting for in trade lists. During the summer feed generously and keep the stock vigorous by rooting cuttings annually in the late summer.

Philodendron.—Most climbing plants with aerial roots and represented by a number of species from tropical America. Fairly tolerant of adverse conditions, but dislike draughts and require light shade, free watering, and a rich, open soil. *P. scandens*, with heart-shaped leaves, is typical of the climbing group; *P. bipinnatifidum*, with broad, incised leaves, of the non-climbers.

Saintpaulia (African violet).—A charming, dwarf plant with hairy leaves and pretty single and double flowers in many colours. It is a *difficult* plant to grow well, as it thrives in a steady temperature of 65–70° F. and a wet atmosphere. Water from below. Rotting of leaves is due to excess of moisture, draughts, cold, or gas fumes.

Sansevieria trifasciata.—Perhaps unkindly but appropriately known as mother-in-law's tongue. It has a distinctive appearance, with stiff, erect leaves striped with gold. Keep warm and fairly dry; do not over-pot; tough.

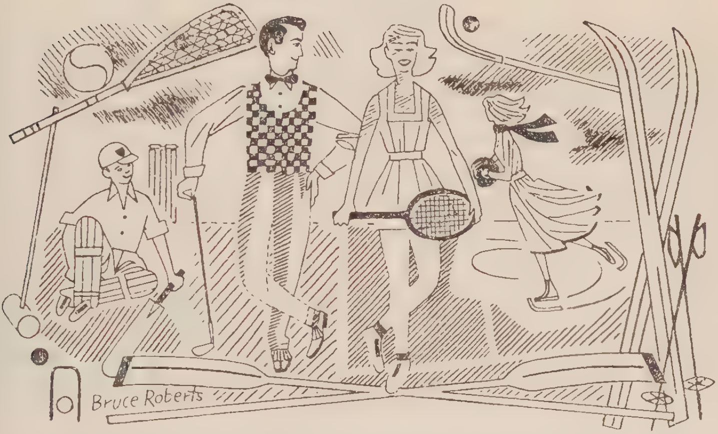
Saxifraga sarmentosa.—Of easy culture and hardy out of doors; should be afforded a cool position and kept moist. Reddish leaves and pink flowers make it most attractive.

Tradescantia (Wandering Jew).—Tolerant of neglect and makes a fine trailing plant. For best results keep moist and feed during the summer. When green shoots appear on variagated forms these should be cut out at once.

Vines.—Two of these are particularly valuable as climbing plants; *Cissus antarctica*, kangaroo vine, is a native of Australia, and *Rhoicissus rhomboidea*, a Natalese plant which does not appear to have been grown to any extent in Britain until after the Second World War.

Zebrina pendula.—Related closely to *Tradescantia*, and often their nomenclature is confused. Like its relative, *Zebrina* is a difficult plant to kill. Its leaves have a pleasing metallic lustre, and beneath are a shade of blood-purple. Introduced from Mexico sometime before 1850.

Games and Recreations



Some seventy entries alphabetically arranged

RECORDS

Games and Recreations

INTRODUCTION.

The people of Britain have always been fond of spending their leisure hours in pursuits requiring physical effort or mental effort or both, and of thinking out special ways of celebrating special occasions. The result of this is a long history of games, recreations, and customs, some based vaguely on the pastimes of very ancient races, others appearing from time to time as the years and centuries passed; and, in a country with a strong sense of tradition, many activities of long ago still remain virtually unaltered, while many others retain much more than a trace of distant origins. For many years, most of the more highly organised pastimes were restricted to the nobility, but the ordinary people often contrived simplified or less formal versions of them, and always had plenty of recreations of their own. While the nobility took part in the joust that was the forerunner of fencing, the people took part in wrestling that remains wrestling; while the nobility enjoyed casting the bar that became throwing the hammer, the people enjoyed throwing the javelin that remains throwing the javelin; while the nobility performed masques and court dances, the people performed country dances, both sections of the populace thus playing their parts in paving the way for the theatre and the ballet.

About a century ago, games began to show more signs of organisation, with governing bodies coming into being to control them, and rules becoming fixed and codified. The object of these measures was to make the games available to more people, but the effects were, firstly, to make them more formal and less spontaneous, and secondly, to make the eventual classification of players of them according to ability at them inevitable. The next stage was probably equally inevitable. If you have classes you have a top class, and the top class is presumably worth watching. People began to spend the leisure time that had been used for playing games in watching others play them. This development began about seventy years ago, and reached its climax between the first and second world wars when not only games but also entertainments had multiplied and reached such high standards that they attracted as spectators those who, feeling that they were not good enough to participate, began to lose the desire to do so.

The second world war changed that, and started to swing the pendulum back again. It was a testing time that might have driven all thoughts of games and recreations out of people's minds, but it actually had the reverse effect. People needed recreational activities and entertainments as a relaxation, and a great many people were stationed in remote areas where, if they wanted these things, they had to provide them for themselves. Many, forced into a more active life than they had led for years, returned to games they had not played for years; and many, starved of entertainment, took to providing entertainments for their fellows. In many cases, the taste for these activities acquired during the war was retained after it, and it was helped and strengthened by various developments. On the one hand, there was a definite effort by certain associations and bodies to bring recreational activities, including some that had previously been the prerogative of the wealthy, within the reach of all, and to provide facilities and instruction in them; on the other hand, there was television. Television has been accused of restricting social activities by an ability to hypnotise people and keep them tied to their sets. It may well deserve some of these strictures, but there is also something to be said on the other side. It brings demonstrations of various activities to people who have never seen them before, and who, having seen them, often feel that they would like to try them; and, by bringing top-class sport to people's homes, often at times other than those normally used for outdoor recreation, it frees people who want to see the events from the necessity of giving up their own outdoor activities to watch them. This showing of major events at times more compatible with viewers' own recreational activities is achieved in two ways: one being the use of telefilms, and the other because of yet another post-war development, that of the playing of first-class fixtures in the evening by floodlight. Still another factor in the move back to practical, physical recreation is, of course, the increased leisure provided by shorter working hours. To-day, there are more people about than there ever were before; there is more spare time than there ever was before; and there are more recreational activities than there ever were before.

Any attempt at a thorough coverage of the present vast field of games and recreations in one section of this volume would be doomed to failure unless some limitations were applied. There is, therefore, no mention of sports in which the participant is largely dependent on mechanical aids, and none of racing, in which only a comparatively few people can actually take part as riders. There is, however, some mention of most sports and games popular in Britain, including fairly recent importations from abroad, and including also some overseas games that have not yet reached Britain. Indoor games are also included, though one section of them, card games, has had to be restricted to what might be called the major and most popular games of skill. Mention is also made of various non-competitive recreations, indoor and out; of children's games, again indoor and out; and of old games and customs in Britain and elsewhere, some of which survive to-day in whole or in part.

One problem that confronts those keen to try some game or recreation is how to set about it. In many cases, the simplest way of finding out what facilities exist in a particular area is to enquire at a local newspaper office, which will have particulars of all sports clubs, dramatic societies, and other recreational bodies in the area. A few addresses that might be useful to those with certain specialised interests appear at the appropriate places in the text, and a valuable source of helpful information on many games and recreations is the Central Council of Physical Recreation, which has English, Scottish, Welsh, and Northern Irish addresses as follows: England, 6 Bedford Square, London, W.C.1; Scotland, 4 Queensferry Street, Edinburgh, 2; Wales, 18 Windsor Place, Cardiff; and Northern Ireland, 45 Arthur Street, Belfast. Those keen on touring the country at moderate cost might appreciate the services provided by the Youth Hostels Association, which has addresses as follows: England and Wales, Trevelyan House, St. Albans, Herts, with a London office at 22 Gordon Square, London, W.C.1; Scotland, 7 Bruntsfield Crescent, Edinburgh, 10; Northern Ireland, 28 Bedford Street, Belfast; and the Irish Republic, 39 Mountjoy Square, Dublin.

American Football.

American Football is played eleven-aside on a pitch marked by a line across it every 5 yards, and with goals and a ball resembling those used in Rugby Football (*q.v.*), though the ball is smaller. Scoring is by "touchdowns," which are like Rugby tries, but count six; goals after touch-downs, which count one; field goals during play, which count three; and "safeties," which give the attacking side two points if the defenders carry the ball over their own goal-line and touch it down. The ball is advanced by carrying it, forward passing, and kicking. The game consists of a series of "plays" or "downs," the ball becoming dead when the ball-carrier is tackled. A team must advance 10 yards in four downs or give up the ball to their opponents. Players can run ahead of the ball-carrier to protect him by "blocking" opponents. Penalties take the form of distance, usually 5 or 15 yards, lost. A game lasts 60 minutes, divided into four 15-minute quarters.

Angling.

Angling, which is catching fish with rod, line, and hook, goes back to beyond the beginning of history, for it was known to the Greeks and Romans. It is now a recreation, for, though the catch may subsequently be cooked, it is not primarily fishing for the pot. It has its competitive side, with competitions offering prizes for the biggest catch, and there are angling clubs, but many people prefer to use it as a recreation to be enjoyed alone in quiet surroundings. It is actually not so much a recreation as many recreations, for fishing can take place in the sea, rivers, lakes, ponds, and even canals, and there are several entirely different kinds of angling. The most obvious divisions are fresh-water fishing, including coarse and fly-fishing, and sea angling, including fishing from piers and the shore and big-game fishing.

The biggest branch of angling is fresh-water fishing for general or "coarse" fish, which are so called to distinguish them from "game" fish like salmon. Coarse fishing is bait fishing, or, in the case of pike, spinning, groundbait also being thrown in before and during fishing. It covers many varieties of fish, and the bag may be a very mixed one. Certain fish, of course, are known to frequent certain localities or types of locality, but, though the angler may know exactly the kind of fish he is after, he rarely knows if his catch will consist entirely of that kind of fish, or even if it will include any of that kind. Coarse fish do not generally make good eating.

Fly-fishing for salmon and trout differ widely from coarse fishing, and from each other. As the name implies, artificial flies are used, but those used for trout are quite different from those that attract salmon. In the case of trout, a fly is made to resemble a real insect as closely as possible, but, with salmon, this is not necessary. Salmon rarely, if ever, feed in fresh water, and, when in that type of water, they are usually irritable. They will dart wildly at any objects that attract their attention, so salmon flies are simply bright objects designed to draw them on. Fly-fishing is rather an expensive sport, for it means hiring beats on private water. In both coarse and fly-fishing the angler would be well advised to keep out of sight of the quarry as much as possible.

Old though angling itself is, sea angling is a comparatively recent development of it, really dating back only to the nineties of the nineteenth century. It is now the most competitive form of angling, with sea-angling festivals and competitions plentiful during the holiday season. As with coarse fresh-water fishing, the catch can be a very mixed one. Sea angling has what might be called its equivalent of fly-fishing in fishing with feathers, which attract several kinds of fish.

The sea is also the scene of the greatest of all forms of fishing, big-game fishing, when a single bite can mean a catch of 1000 lb., if the angler can win the terrific battle to land it. Big-game fishing takes place from a motor-launch, which is not towed by the hooked fish, but follows it, so that the ensuing fight is between man and fish, and not between the fish and the dead weight of the boat. Such a fight could last for 12 hours, and it is never certain that the angler will win it. With fish of this size, some of them with a terrifying armoury of razor-sharp teeth, liable to turn back on the boat or leap clear of the water, big-game fishing can sometimes be as dangerous as the most adventurous sportsman could wish.

Archery. *See* **Old English Games and Customs.**

Association Football.

Games that may have resembled football were played by very ancient races, and games that certainly were football of a kind were played in the England of several centuries ago, but the Association Football that is the most popular game in Britain, and perhaps the world, to-day had its origins in the games played at English Public Schools in the days before sport became organised.

It was not surprising that some of those who had played football of one kind or another at school should want to go on playing after they left, but, before they could do so, it was necessary to work out a set of rules that would be universally understood and accepted. Meetings were organised by those interested, and, as the universities were natural meeting-places for boys from many schools, it was there, particularly Cambridge, that these took place.

It was soon evident that there was a major difference of opinion between those who wanted handling permitted and those who opposed this. The rival factions proved irreconcilable, so they went their separate ways. The handling enthusiasts based their rules on those in force at Rugby School, and thus pioneered Rugby Football (*q.v.*). Those who felt that football should be played primarily with the foot brought into being the game that was to take its name from the Association that was formed, in 1863, to govern it, and became Association Football, often called by the abbreviation, "Soccer."

Soccer is played with a round, leather-covered ball weighing from 14 to 16 ounces, and with a circumference of from 27 to 28 inches, on a pitch marked out as in the accompanying diagram. It is played eleven-aside, the positions being goal-keeper; right and left full-backs; right, centre, and left half-backs; and five forwards, playing at outside-right, inside-right, centre-forward, inside-left, and outside-left. The object is to score goals by putting the ball between uprights 8 yards apart and under a crossbar 8 feet high. The ball is advanced by kicking or heading, but only the goalkeeper when in his own penalty area may handle it, and he may not carry it. A game lasts for 90 minutes, divided into two halves.

The game is started by a kick-off from the centre, with all the opposing players outside the centre circle and in their own half. The ball must travel at least its own circumference into the opponents' half, and the kicker may not play it again until someone else has done so. The right to kick-off is decided by a toss that gives the winner the option of kicking or choosing which goal he will defend. Ends are changed at half-time, after which the ball is kicked-off by the side that did not do so at the start. The game is restarted in this way after each goal, the non-scorers kicking-off.

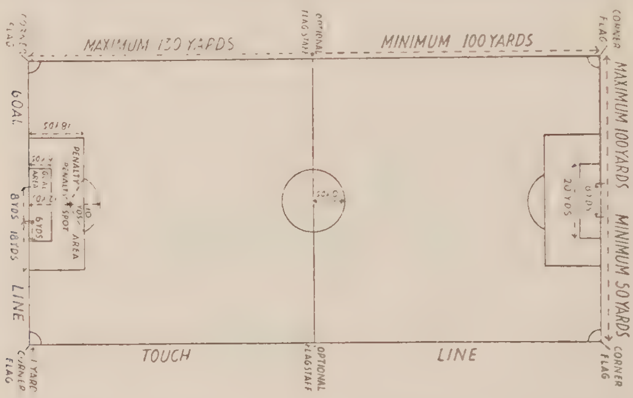
If the ball crosses the touch-line it is thrown in by a player of the side that did not put it out, the throw being two-handed. If it crosses the goal-line wide of the goal it is kicked-off by a defender from the 6-yards line if the attackers were responsible, and by an attacker from the intersection of the goal-line and the touch-line if the defenders were responsible.

Infringements are penalised by free kicks, which may be "direct" or "indirect." Direct free kicks, from which a goal may be scored, follow deliberate infringements, indirect free kicks, from which a goal cannot be scored, being for more technical offences. Offences by defenders in the penalty area are generally penalised by a penalty

kick, which is a shot from a spot 12 yards out from the centre of the goal, with only the kicker and the goalkeeper in the penalty area, and the goalkeeper barred from moving until the ball has been kicked. However, certain offences in the penalty area, such as carrying by the goalkeeper and obstruction, are penalised only by an indirect free kick.

A player is "offside"—called "sneaking" in the school games from which the rule came—if he is nearer the opponents' goal-line than is the ball unless there are two opponents between him and the goal-line, or unless the ball was last played by an opponent. He cannot, however, be offside in his own half, from a corner kick, or from a throw-in. If a player in an offside position interferes with the game, a free kick is awarded.

A game is controlled by a referee, who has the assistance of two linesmen. These may signal infringements, but the referee is not bound to act on such signals.



In Britain, soccer is a winter game, the season lasting from August until May, though, in Scotland, it continues even during the short summer season in the form of five-aside football, known as the "short" game. British soccer is highly organised, ranging from the fully professional Football League of four divisions and the equivalent, though slightly smaller, Scottish League through minor professional leagues to amateur leagues. There are also many cup competitions, from the Football Association Challenge Cup and the Scottish Cup downwards.

The game has also spread almost all over the world, being extraordinarily popular all over Europe and in South America, and played to some extent in the United States, Canada, South Africa, Australia, and other areas. There is a World Cup competition that is played for every four years, and an annual European Cup competition played for by the top club of almost every European country Soccer is also included in the Olympic Games.

Athletics.

The sport of Athletics, which includes running, walking, jumping, and throwing, is probably the most natural of all sports, and certainly one of the oldest, for it began in the days of pre-history or of mythology. Details of the Olympic Games of 776 B.C. are known, and it is certain that the Games were being held long before that. The story of Athletics is not, however, a continuous one, for the Romans discontinued the Games.

A later starting-point might be found in the country sports of various periods of English history, but, though these included some events that might be regarded as the ancestors of certain modern athletic events, they were mainly concerned with activities far removed from Athletics.

Modern Athletics probably really began in 1849, when the Royal Military Academy instituted a meeting that was followed by a similar meeting at Exeter College, Oxford, and, subsequently, at other Oxford and Cambridge Colleges. The Civil Service were also early in the field; and the first athletic club was the Mincing Lane Athletic Club, now the London Athletic Club. There was also the Amateur Athletic Club, which organised an annual championship meeting, and acted as a governing body for both athletics and amateur boxing.

In 1880 the Amateur Athletic Association was formed as a governing body. Other countries, particularly the United States, took to the sport, and in 1896 the first modern Olympic Games were held at Athens. Other international meetings and matches followed, and championships and competitions of all standards were started in many countries. Women came into the sport in the early 1920s, and were included in the Olympic Games in 1928. There is now a long list of internationally agreed standard events, including distances measured in yards and miles, and also their metric equivalents; and including also a major all-round test, the ten-event Decathlon.

The longest strictly standard distances are the Marathon of 26 miles 385 yards for runners, and 50,000 metres for walkers, but there are regularly held longer events. For runners, the longest annual race is between Durban and Maritzburg, about 55 miles, the longest in Britain being from London to Brighton, about 53 miles; but there are occasional 100-mile and 24-hour events. For walkers, there are annual 100-mile races and fairly regular 24-hour ones.

The Marathon is not, as might be expected, a revival of an ancient Greek race, for the Greeks had no races longer than 3 miles. It does, however, commemorate an ancient Greek event that is quite possibly no more than a legend: the supposed run by Pheidippides to take the news of the Battle of Marathon to Athens in 490 B.C. The first Marathon race, in 1896, was from Marathon to Athens, but the standard distance of the race is that of the 1908 Olympic Marathon from Windsor to the White City, London, which had just been held when it was thought advisable to have an exact standard distance. All Marathons commemorate the Battle of Marathon, but the oldest annual Marathon, the Boston Marathon, also commemorates the Battle of Lexington (the first battle of the American Revolution), and, more particularly, the ride by Paul Revere that preceded it.

Athletics is entirely an amateur sport. There are some professional races, but this side of the sport is called, not athletics, but pedestrianism.

There is a famous annual professional meeting at the Powderhall Grounds, Edinburgh, and there are other events in Scotland and the North of England. There are also professional meetings in Australia, chiefly in Victoria.

Cross-Country. Athletics is mainly a summer sport, but in cross-country running it has an extremely popular winter branch.

Cross-country originated in the traditional runs at various English Public Schools, particularly Rugby and Shrewsbury; and came into wider prominence when it was adopted by the Thames Rowing Club as winter training. It is still used as training by many sportsmen of all kinds, but it is now also a thriving competitive sport in its own right. There is an International Championship, but this is not yet fully representative, being virtually confined to Western European nations. Major cross-country championships are over courses of 9 or 10 miles.

Australian Football.

Australian Football is played eighteen-aside on large, oval grounds. There is no offside, and scoring in goals and behinds (near misses) is high. It is played to the practical exclusion of all other forms of football in the southern half of Australia.

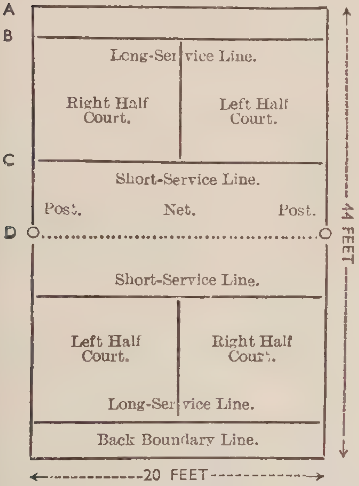
Badminton.

Badminton is said to have been invented by two guests at the Duke of Beaufort's house at Badminton in Gloucestershire, who spent a wet afternoon playing with the children's battledores and shuttlecocks. It seems certain that the game we know to-day did take shape at Badminton, from which it takes its name, but it is likely that its basis was a game originally played in the Orient.

Badminton might be described as an indoor version of Lawn Tennis (*q v*) in that it is played over a net, and can consist of either singles or doubles. There, however, the resemblance ceases. Scoring is by single points, and only the servers score, winning shorts by the receivers ending service sequences. The equipment used is lighter than that of Lawn Tennis, particularly the "shuttles" or "birds" that replace the ball. These are half-circles of cork in which feathers are fixed, and, as they do not bounce, all shots are volleys. Unlike Lawn Tennis, shots are made with the wrist, rather than the whole arm.

It is often said that it is impossible to play both Lawn Tennis and Badminton well, but this is not really true. Though the techniques differ, the eye for the moving object is the main requisite of both games. Badminton is a winter game, and many Lawn Tennis players turn to it during that season.

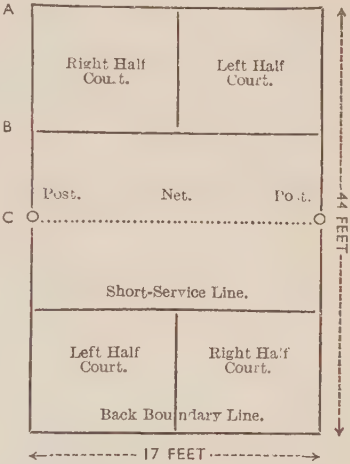
DOUBLES COURT.



NOTE.—If it is practicable place the posts on the side boundary lines; failing this, place them at any distance not more than 2 ft. outside these lines.

A to B 2 ft. 6 in. A to C 15 ft. 6 in.
A to D 22 ft.

SINGLES COURT.



NOTES.—Place the posts on the boundary lines or not more than 2 ft. outside these lines.

The back boundary lines become the long-service lines.

A to B 15 ft. 6 in. B to C 6 ft. 6 in.

Diagram of Ground as marked out for Badminton.

Ballroom Dancing.

Though the actual dances have changed from time to time, Ballroom Dancing has been one of the most popular of all recreations for a very long time; and while, in recent years, some other evening activities and entertainments have declined in popularity owing to the growing interest in television, the popularity of dancing has actually increased to a remarkable extent.

For many years, the "standard" ballroom dances have been the foxtrot, the quickstep, the waltz, and the tango; but these have frequently been augmented by various other dances, often novelty dances, that have been the subjects of sudden, and generally short-lived, crazes. A stronger challenge, however, has come from Latin America, which has exported quite a number of dances, most of them arousing some interest, and some of them winning and holding firm places. Many of them are ballroom versions of old native

and folk dances, which were often solo dances in their original form.

Dancing is highly organised, with its "governing body" composed of qualified teachers, and each dance has its recognised and approved fundamental steps and variations on those steps. If the popularity of a new dance justifies it, the authorities recognise it and approve step sequences. Many people dance regularly without ever having a dancing lesson, but, for the many others who really want to know all about the different dances and steps, there are countless dancing schools all over the country, where dancing is taught both in classes and in private lessons, and where special classes are arranged to teach any new dances that appear. These schools cater for absolute beginners absolutely regardless of age, and also for experienced dancers who want to rise to still higher standards.

A great many people dance purely for pleasure, and never think of dancing as a competitive activity. It is one, though; and there is a link between purely recreational dancing and competitive dancing in the system of medal tests. In these, dancers do not compete with other dancers, but simply try to achieve a certain standard. Beyond these tests, there are numerous competitions, ranging from local ones to world professional and amateur championships and international matches.

A fairly recent and very popular ballroom dancing innovation is formation dancing, in which teams consisting of a number of couples perform dances either as exhibitions or in competitions.

Old-Time Dancing. The most striking and, in some ways, surprising dancing development of recent years has been a tremendous increase in the popularity of Old-Time (often described as Old-Tyme) Dancing. A few old dances, such as the veleta, which, despite its name, is of English origin, had always retained at least a small place in dancing, but the organisation of dances in which every dance was of what might be called approximately veleta vintage was a new idea that seemed destined to enjoy at most the short-lived success that is the reward of novelties. That, however, was not the case. Interest in this type of dancing increased, and it has long since become firmly established, even to the extent of offering competitions. It is, in fact, no longer really true to describe it as old-time, for it is definitely part of the dancing of to-day.

This popularity is not, after all, so very surprising, for an old-time programme offers a wide variety of dances, most of them accompanied by exceptionally tuneful music. The dances are really similar to what, in some other countries, such as, for instance, Scotland, would be called country dancing, and include ordinary "pair" dances, sequence dances, progressive dances, and set or square dances. The veleta holds its place, as do several kinds of tango and many kinds of waltz, as well as the Canadian barn dance, the Boston two-step, the maxina, the lancers, and cotillions and quadrilles. Strangely enough, the cheerful Bohemian dance, the polka, is rarely seen. Old-time dancing provides no scope for just "walking round." The steps are in regular sequences, and all the dancers are making the same movements at the same time.

Bandy. *See* Skating.

Baseball.

The invention of Baseball, a summer game played from April until October, and the national game of the United States, is generally credited to an Army officer, its origins being old country games called "One Old Cat" and "Two Old Cat."

Teams are nine-aside, and bat and field in turn. The main part of the ground, the "diamond," has a "base," marked by a sack, at each corner, the lines from sack to sack being the "base paths." One base is "home," and there the batter stands, by a square of rubber on the ground, called the "plate." The base forward and to the right of a right-handed batter is "first," the one straight ahead of him is "second," and the one forward and to his left is "third," the distance from one base to the next being 30 yards. 20 yards out straight in front of the plate is the pitcher's "mound." The lines from home to first and from home to third are continued beyond these bases, and are the "foul lines."

It is the object of the batting side, using a bat which resembles a long, heavy Indian club with which to hit a hard, white ball weighing 5 ounces, to score runs, one being scored each time a player completes a circuit of the bases, not necessarily from one hit. When a batter leaves the plate, either "out" or to proceed along the base paths, the next man comes in, the team's innings lasting until three men are out. Nine such innings complete the game, and, in each innings, the batting side carries on at the point in the batting order reached in the previous innings. There is no toss for first innings, the visiting side always batting first.

The pitched ball reaches the batter without touching the ground, and, if not hit, it should pass over the plate between the batter's shoulders and knees. If it does so, it is a "strike," and three such strikes dismiss the batter. If it does not, it is a strike only if the batter swings at it; otherwise it is a "ball," and four balls give the batter a free passage to first base, called a "walk." A batter also walks if he is hit by a pitched ball. Other ways in which the batter can be dismissed are by being caught, and by being "put out" while on the base paths by failing to reach the base to which he is running before the ball. When an out is made, the ball does not become "dead." If there is more than one runner on the base paths, then, if the ball can be relayed quickly enough, two, or even three, men can be put out on the same "play."

If the batter hits fairly, he must run, but, to be fair, the hit must be in front of him and between the foul lines. A "foul hit" counts as a strike against him, except that the third strike, which actually dismisses him, must be a clean one across the plate. If a foul is caught, he is out.

The fielding side is divided into three sections, the "battery," the "infield," and the "outfield." The battery consists of the pitcher and the catcher, who stands behind the plate and gives signals indicating the kind of ball he thinks the pitcher should deliver: for, though the pitched ball does not touch the ground, pitchers can produce a wide variety of deliveries, including various kinds of curve. The infield consists of the first baseman, at or near first; the second baseman, between first and second; the shortstop, between second and third; and the third baseman, at or near third. The outfield covers the ground beyond the infield, the three remaining fielders taking the right, centre, and left sections of it. Catchers wear a large glove on the non-throwing hand, a mask, a chest protector, and leg-guards. All the other fielders wear a glove on the non-throwing hand, the first baseman's being larger than the others. The batter wears no protective gear.

Substitutes are permitted, pitchers frequently being changed if they are being hit, and "pinch hitters" being sent in instead of weak batters if a hit is desperately needed. If this happens, the man replaced, often the pitcher, cannot return when his side fields again, though his field replacement need not be the man who batted for him.

As with Cricket (*q.v.*) batting averages are recorded, these being calculated by dividing the number of times at bat into the number of hits. An average of 0·400, referred to as "four hundred," would be exceptionally good. "Hits" mean safe hits on which the batter achieved one or more bases without giving a chance. If he reaches base because a catch was dropped or a ball misfielded, he plays on from there in the usual way, but is not credited with a hit. Pitchers are graded according to the number of games won and lost. Recorded fielding statistics include each man's "put outs," "assists," which are throws from which a team-mate made a put out, and "errors."

In the United States there are clubs and leagues of all standards, from professionals of various classes through semi-professionals to amateurs, called "sandlotters," and boys. The top class of all consists of two major leagues, the National and the American, each with eight clubs. The champions of these two leagues meet in a best-of-seven-games series for the "Championship of the World," always known as the World Series.

Baseball is also the chief summer game of Canada, and it is quite widely played in some other countries, including Australia, Britain, and Japan.

Softball. Similar to Baseball is Softball, which is popular in the United States with girls as well as men, and which was demonstrated in Britain during the War by American and Canadian servicemen. The ball is not particularly soft, but it is larger than a baseball, and pitching is under-arm. Distances between bases, and between the plate and the mound, are shorter than in the parent game.

Basketball.

Basketball was invented by an American Y.M.C.A. official at Springfield, Massachusetts, as a winter team game that could be played indoors. It can be played in almost any gymnasium or hall, and it can also be played outdoors on an asphalt court. In America it is played by teams of all standards from schoolboys to professionals, and it is watched by more spectators than any other game. It has also spread to almost as many other countries as has Association Football (*q.v*), and it is included in the Olympic Games. It has been established for some years in Britain, where it has been encouraged by the Services and the Y.M.C.A.

Basketball is played five-aside, substitutes being permitted, with a ball resembling that used in Association Football, and goals consisting of posts that have iron rings with short nets attached to them and backboards. It is purely a handling game, and the ball is advanced by dribbling, which means bouncing, and by passing. Deliberate bodily contact is not allowed. Goals thrown during play count two points, and goals thrown from free throws after infringements one point. Height is an asset in the game, which demands stamina and agility, and which has been highly recommended as an ideal training activity by coaches of other sports, particularly Athletics (*q.v.*).

Girls also play Basketball in many countries, but not in Britain, where the nearest approach to it for women is Netball (*q.v.*).

Billiards.

Billiards, which originated in France, is a game of angles, and of very great skill. It is played on a table measuring 12 feet by 6 feet 1½ inches, having six pockets, one at each corner, and one in the middle of each side. The table is covered with green baize, the edges being of cloth-covered rubber, called "cushions." Across the table, 2 feet 5 inches from the bottom edge, is a line, called the "baulk" line, the space between the line and the bottom of the table being "baulk." On the baulk side of the line there is a semi-circle with a radius of 11½ inches from the centre of the line. Down the centre of the table are four "spots," one 12¾ inches from the top, one midway between the top and the centre, one in the centre, and one in the middle of the baulk line. Two white balls, one with a spot for identification purposes, and one red one, are used, the balls being played with "cues" that taper down to a striking tip. The remaining equipment includes a long, cue-like stick with a metal cross fixed diagonally on the end, called a "rest" or "jigger," and a special long cue, these being used when the player cannot reach his ball in the ordinary way. Most games are "singles," though "doubles" can be played, the object of the game being to score points according to fixed rules, an agreed number of points making the game.

To decide who is to start, players "string" by playing their balls simultaneously from baulk up to the top cushion, the ball which returns nearer to the bottom cushion winning. At the start, the red ball is "spotted" on the top spot, and players start from the baulk circle. Scoring is three for pocketing, or "potting," the red or going in off the red; two for potting the white, which is, of course, the opponent's ball, or going in off the white; and two for a cannon, which is hitting both the other balls. A player whose shot hits no other balls at all gives one point to his opponent, unless his ball goes into a pocket, when he forfeits three. A player's turn, called a "break," continues as long as he is actually scoring. When the red is potted, it is immediately respotted.

Snooker. Also played on a billiard table, and perhaps even more popular, is Snooker, which uses 22 balls, positioned as follows: 15 reds in the form of a triangle with its apex on the second spot from the top, and its base at the top end; a black on the top spot; a pink touching the apex ball of the triangle; a blue on the centre spot; a brown in the middle of the baulk line, with a green beside it on the left end of the baulk circle, and a yellow on the right end; and a white, which is the cue-ball to be played. The points values of the balls are from one for red, through yellow, green, brown, blue, and pink, to seven for black. A player's turn continues as long as he scores, his first shot being at a red, when, if he pots one, he plays at one of the other colours, play being at reds and colours alternately as long as balls are being potted, and as long as there are reds on the table, after which the remaining colours are played in ascending order of value.

Pool, Russian Pool, and Pyramids. Other games played on a billiard table include Pool, Russian Pool, and Pyramids. In Pool each player has a ball of a different colour, the order of play being white, red, yellow, green, brown, blue, pink, black. Each player plays at the ball of his predecessor, and tries to pot it, the game starting with white spotting his ball on the top spot, so that red is actually the first to play. A player whose ball is potted loses a life, players losing three lives dropping out of the game. A turn continues as long as a player is potting balls, and if he clears all the balls on the table he then spots his own ball for the next player.

Russian Pool uses the yellow, green, blue, and black balls, with the white as cue-ball, the black being placed on the top spot, the blue on the centre spot, the green on the left side of the baulk circle, and the yellow on the right side. A player's first shot must hit the black, after which he can play at will. Scoring is by potting balls, by going in off balls, and by cannons, but the black can be used only for the top pockets, the blue for the middle pockets, and the green and the yellow for the bottom pockets. Cannons count two, potting or going in off counting nine for the black, seven for the blue, five for the green, and three for the yellow. A player's turn continues as long as he is scoring, but consecutive cannons on the same balls are limited to 25, and the same ball must not be potted from the same spot more than three times in succession. A complete miss forfeits three points. A variation of Russian Pool adds the pink ball, which is spotted on the second spot from the top, counts six, and can be used with any pocket.

Pyramids uses the 15 reds, starting in their triangle, and a white cue-ball, the object being to pot the reds. A turn continues while a player is scoring, 8 balls potted ending the game.

Bird-watching.

Mention of Bird-watching might well bring thoughts of uncomfortable, and even hazardous, journeys to remote islands off the coast of Scotland, or at least to desolate parts of the Scottish

mainland; but, while it is true that expert bird-watchers of long experience do frequent these localities, as well, of course, as less-remote places like the Norfolk Broads, bird-watching can be practised, and should certainly be started, much nearer home, and with birds seen by almost everybody, though properly observed by very few, every day.

Bird-watching means exactly what it says: watching birds flying; watching two birds to see if they are, in fact, a pair, or if they are two males competing for the attentions of a hen-bird, which may be near by; watching where and how and with what materials they build nests; watching what they eat and how they get it; watching a pair in a nest to see if the male plays a full part in their domestic life, or if he just sits on a branch singing while the female does it all. If the bird-watcher really wants to increase his knowledge, and perhaps that of other people, careful observation accompanied by careful note-taking is essential, and will reveal some surprising facts. It has, for instance, been discovered that a pair of quite ordinary "garden" birds may fly sixty miles a day for every hundred yards their source of food is from the nest, and that the collecting of materials for building a nest may mean a total of six hundred miles flying. In time, the bird-watcher may wish to go in search of more unusual birds in remote places, but if he is anxious to increase the general knowledge of birds he might do better to remain close to his home; for, so keen have the experts been to track down the rarer birds, that far more is now known about them than is known about "ordinary" birds like the blackbird and the thrush.

Bird-watchers who would like to contact and compare notes with those with similar interests can do so by joining a Natural History Society, of which there is at least one in almost every county, full particulars generally being available at public libraries.

Boat Races.

Race rowing is a strenuous sport that makes no pretence of attracting as many active participants as some other sports and games; yet its long history includes races with unusual stories about them; races that are amongst the greatest annual international sporting events; and one race that provides what is probably the most enthusiastically supported free sporting spectacle in the world.

That, of course, is the Oxford and Cambridge University boat race, rowed on the Thames from Putney to Mortlake. First rowed in 1829, it has offered its excited public, which includes thousands of people with no connection of any kind with either university, everything, including runaway victories, dead heats, and even sinking boats. To all intents and purposes, this is a regular annual event, and has been so since 1856; but, in actual fact, every race is the result of a separate special challenge from the losers of the previous race to the winners of it. The race has an interesting parallel in the United States, where Yale University, whose colours are dark blue, annually meet Harvard University, which is at Cambridge, on a river called the Thames.

The Oxford and Cambridge race is the best-known annual race on the Putney-Mortlake stretch of the Thames, but it is by no means the only one. There are other races that attract entries sometimes numbered in hundreds: entries that are far too big to race abreast on the Thames, and so race in single file, with crews following each other at fixed intervals in what are known as the Head of the River races. The biggest of these is for crews of eight, but there are other Head of the River races for women's crews, who cover only part of this famous stretch of water, and for single scullers. Single scullers also cover this course in a straightforward race in the Wingfield Sculls event, which ranks as the English Amateur Championship, and which was first held one year after the first Oxford and Cambridge race, in 1830.

Head of the River races, but with a difference, are also held between the colleges of Oxford and Cambridge, where the Isis and the Cam, respectively, are much too narrow to permit straightforward racing. These are the Bump Races, in which each crew endeavours to catch and bump the crew ahead of it, except for the leading crew, which can concentrate on staying in front. When a bump is achieved, the two crews pull into the bank, and change places for the next day's racing. The racing goes on for four days, and it is, of course, the ambition of each crew, apart from the leaders, to register a bump on each day.

Back on the Thames, but farther down it towards the port and docks of London, is the scene of a race that makes the Oxford and Cambridge race and the Wingfield Sculls look like recent innovations. This is the annual race from London Bridge to Chelsea for the Doggett's Coat and Badge, a single sculling event open only to young watermen who are within twelve months of completing their apprenticeship. It was founded in 1715 in honour of the House of Hanover, and to commemorate the anniversary of "King George I's happy accession to the throne of Great Britain," by Thomas Doggett, a Dublin-born actor connected with the Drury Lane and Haymarket theatres, who regularly travelled on the Thames in preference to using the roads, and who left a sum of money to perpetuate the race, which is now controlled by the Fishmongers' Company.

This race is more truly an annual one than almost any other event; for, while most so-called annual races have been subjected to two long interruptions because of the First and Second World Wars, those qualified for the Doggett races during those years were subsequently traced, and the races duly decided after the wars. The event is a colourful one, for each race is followed by a barge carrying a batch of past winners wearing the Coat and Badge, and also the cap, breeches, silk stockings, and buckled shoes that go with them. The scarlet, pleated, quilted Coat, with its silver buttons, is worth £160, and the large silver arm Badge bearing the White Horse of Hanover and the word "Liberty" is worth another £20. They are presented at the Fishmongers' Hall, where the winner is greeted with a salute of trumpets and the tune, "See the Conquering Hero Comes."

For a rowing event of a very different kind, dating back "only" to 1839, one must go up the Thames, far beyond the end of the Tideway, to Henley, for the annual Royal Regatta. This consists of events open to the world and others closed to English colleges and schools for eights, fours without cox, pairs, double scullers, and single scullers, the most famous of its races being the Grand Challenge Cup for eights and the Diamond Sculls.

Finally, a journey far from the Thames and almost round the world will bring to light the story of a rowing trophy that first appeared sixteen years before Oxford first met Cambridge. The Carrow Cup was awarded for a four-oared race on the River Yare, in Norfolk, from Carrow Bridge to Whitlingham and back in 1813. Sometime during the 1840s that cup disappeared: to reappear in 1890—in Australia. In 1947 it came into the possession of the Victoria Rowing Association, which made it the trophy for a pair-oared race, but sent it to England in the Olympic year of 1948 for exhibition in the Olympic rowing museum. There it was recognised as a Norfolk trophy, and, though it returned to Victoria, it came home again in 1950, when the Melbourne club gave it to the Norwich Rowing Committee, which now annually awards it to "the Norwich club whose general performance, judged by a points system in Regattas, shall be best."

Bobsleigh Riding. *See* Winter Sports.

Bowls.

Bowls, one of the oldest of all games, was once regarded as "an old man's game," but it actually has many devotees of all ages and both sexes, and is played indoors as well as outdoors. It certainly goes back to the thirteenth century, when it

popularity made it one of the games legislated against as likely to draw people away from archery. Henry VIII played; and the famous game on Plymouth Hoe, in which Sir John Hawkins stayed to beat Sir Francis Drake even after the Armada had been sighted, if not definitely authenticated, is accepted as fact by several historians. It is interesting to note that, if this game was played, it would have been almost identical with a game of to-day, for it was in that century that the "bias" that is a leading feature of the bowls or "woods" was introduced. A century later, however, Bowls, which was largely played on greens attached to taverns, acquired a reputation as being merely an adjunct to pot-house revelry, but it was revived on a higher level in Scotland, and never again came so near to oblivion.

There are actually two games of Bowls, the Rink or Level Green game and the Crown Green game, and it is the rinks rather than the objectives that differ. The Level Green game is the more widely played, and it takes place on a perfectly flat piece of well-cared-for turf. The Crown Green game, which is popular in the North and Midlands, is played on a green of which the centre is 6 inches or more higher than the corners. The games differ—for instance, in the putting into play of the object ball—but only slightly, so it will be appreciated that the Crown Green game demands a good deal of experience and skill. It is mainly a singles game, whereas the Level Green game is played between sides consisting of one, two, three, or four players.

Bowls looks a simple game, the object being simply to place the bowls as near as possible to the object ball, or "jack." The bowls, however, are "biased," and the game is actually one of considerable skill. When bias was introduced, it took the form of weighting with lead, but it is now achieved by turning one side of the bowl less round than the other. Level Green bowls weigh up to 3½ lb., but Crown Green bowls are smaller and less biased. On the Crown Green, however, the jack, which is played into position by the first player, is also biased.

Players normally use two bowls in a game, or four in singles, and the side with the best record of bowls near the jack wins the "end," and the best record of shots in an agreed number of ends the game.

A Bowls green is such a perfect piece of grass that it might be thought that the expression "rub of the green," used to describe an unavoidable piece of bad luck, comes from this game. In actual fact, though, it would probably be more correct to attribute this phrase to Golf (*q.v.*).

Boxing.

Boxing, sometimes called "The Noble Art of Self Defence," though actually aggression is its keynote and defence an incidental, is a modern continuation of the old sport of prize-fighting, which, though always illegal, was popular from the time of the Regency until it was succeeded by the present-day glove-fighting at the end of the nineteenth century.

In prize-fighting bare fists were used, and wrestling holds were allowed. Rounds ended when a fighter went down, and fights continued until, following a knockdown, a man failed to come up to the scratch line in 30 seconds.

In modern boxing, gloves are worn, and no wrestling is allowed. Rounds last for a fixed time, generally 3 minutes with 1 minute between rounds, and fights last only for a fixed number of rounds, never more than fifteen. A knockdown does not end a round, the man who is down having 10 seconds in which to rise. If he fails to do so, his opponent wins by a knock-out. If a man fails to come up at the beginning of a round or if the fight is stopped to save a man from further injury, the victory is by a technical knock-out. If, however, both men are still on their feet at the end of the stipulated number of rounds, a decision is given on points. Boxing is therefore technically a contest of skill for points, and, as such, far removed from prize-fights to a finish.

Fights are controlled by a referee, and, in British professional boxing, he is solely responsible for any points decision. In amateur boxing the decision is given by several judges, who sit apart from each other. The difference between a good professional and a good amateur is probably more marked in boxing than in any other sport.

Boxing contests are arranged in classes according to weight, the divisions being: fly-weight, up to 8 stone; bantam-weight, up to 8 stone 6 lb.; feather-weight, up to 9 stone; light-weight, up to 9 stone 9 lb.; welter-weight, up to 10 stone 7 lb.; middle-weight, up to 11 stone 6 lb.; light-heavy or cruiser-weight, up to 12 stone 7 lb.; and heavy-weight, any weight. Amateurs have two additional classes, light-welter-weight, up to 10 stone, and light-middle-weight, up to 11 stone.

Prize-fighting was governed successively by "Broughton's Code," the "New Rules of the Ring," and the "London Rules." Then, in 1866, the eighth Marquess of Queensberry drew up the rules that have been the basis of boxing ever since. British professional boxing has been controlled since 1929 by the British Boxing Board of Control. The Amateur Boxing Association has governed amateur boxing since 1884, when it took over from the Amateur Athletic Club, which had looked after both boxing and athletics.

Prize-fighting is finished, but it has left a legacy, not only in modern boxing, but through an expression that has become part of the language, for the phrase "come up to scratch" originally referred to a prize-fighter stepping up for a new round.

Bridge.

Auction. Auction Bridge is a card game in which two partnerships of two oppose each other, each player facing his partner. A complete pack is used, the suits having special values, ranging from 6 points per trick for Clubs, through Diamonds, Hearts, and Spades, to 10 points per trick for No-trumps. When bidding, it is the points value of the bid, and not the number of tricks bid, that decides seniority, though the highest number of tricks prevails when the points values are equal. If a bid, or contract, is doubled or redoubled, the trick score is doubled or redoubled.

A player may pass, but, should he bid under the previous bid, he can be penalised, the player on his left having the option of closing the bidding at the previous bid or demanding that the offender make a proper bid. In this case, his partner is barred from bidding again unless the opponents do so. Should a player bid out of turn, the player on his left can demand a new deal.

Points are counted in two ways, below the line and above it. Points below count towards game (30 points), and are awarded for all tricks over six made by the contracting side. Points above the line are gained in various ways, and count in the final score, but not towards game. The first side to win two games wins the rubber, and 250 extra points above the line. The holding of honours also wins points above the line, as follows: three honours, twice the suit value; four, four times the suit value; five, five times the suit value; four in one hand, eight times the suit value, four in one hand and one in partner's, nine times the suit value; five in one hand, ten times the suit value. At No-trumps the honours count for Aces is 30 points for three, 40 for four, and 100 for four in one hand. The points for defeating a contract are 50 for each trick by which the contract fails. Extra points for making a doubled or redoubled contract are 50 for the contract plus 50 for each trick over when doubled, and 100 for the contract plus 100 for each trick over when redoubled. 50 points are awarded for a little slam, which is 12 tricks, and 100 for a grand slam, all 13 tricks.

The player who first named the contract suit is the declarer, and his partner is dummy. After the lead, which comes from the player on declarer's

left, dummy lays his hand face upwards on the table, and it is played by declarer, dummy having only limited rights of intervention. If his partner fails to follow suit, he can ask him if he has no cards in the appropriate suit; he can draw attention if too few or too many cards are played in a trick, or if the wrong side gathers up the trick; he can discuss questions of fact, and correct any claims made by the opponents to which they are not entitled. He cannot draw attention to any revoke; he cannot claim any penalty; and he cannot warn his partner against leading from the wrong hand.

Revoking is failing to follow suit when this is possible, the revoke becoming established when the player or his partner plays to the next trick. Up to then, the offender may correct it. The penalty is 2 tricks for the first revoke, and one for subsequent revokes, the penalty tricks to be taken only from the trick in which the revoke occured or later ones.

A lead from the wrong hand may not be withdrawn unless the opponents request this. If they do, the card is replaced, and play continues. If declarer's opponents lead from the wrong hand, declarer may either demand a lead in a particular suit from the right hand or reserve the right to have the exposed card played whenever he chooses to call for it. In this case, though, the offender may play the card before it is called, if he has an opportunity.

Contract. At Contract Bridge only the tricks contracted for are scored below the line, overtricks being recorded above it. The score for tricks is 30 in a major suit (Spades or Hearts) and 20 in a minor suit (Diamonds or Clubs). In No-trumps the first trick counts 40 and subsequent tricks 30. In bidding, the highest number of tricks prevails, regardless of suit values.

A game is 100 points, two games won constituting a rubber, which carries a bonus of 700 points, if the opponents have not won a game. In an unfinished rubber, a game gains 300 points and a part score 50, provided the opponents have no part score at all. A side winning a game becomes vulnerable, and this affects subsequent scoring.

Penalties for failing to make a contract are 50 points per undertrick if the declarer is not vulnerable and 100 points per undertrick if he is. If an opponent has doubled, the penalties are 100 for the first undertrick and 200 for subsequent ones if not vulnerable, and 200 for the first undertrick and 300 for subsequent ones if vulnerable. If the declarer has redoubled, these penalties are doubled. In successful contracts doubled, overtricks score 100 if declarer is not vulnerable and 200 if he is. A successful doubled or redoubled contract wins a bonus of 50 points. Bonuses are awarded for making slams, if they have been bid. If declarer is not vulnerable, the bonuses are 500 for a small slam (12 tricks) and 1000 for a grand slam (13 tricks). If vulnerable, the bonuses are 750 and 1500. Honours points are 100 for four honours in the contract suit in one hand; 150 for five honours in one hand; and, in No-trumps, 150 for four Aces in one hand.

A player making an insufficient bid may be required either to pass or to make a sufficient bid. If he passes or makes a sufficient bid in a different suit, his partner is barred from further bidding. A call out of turn is void, but, if it was a pass, the offender must pass in his turn, and, if it was not a pass, his partner is barred from further bidding. A player has no redress if he misunderstands a bid, though he can ask for a bid or a sequence of bids to be repeated. When three successive players have passed, the contract is fixed, declarer being the first player on the contracting side to nominate the suit, and dummy being his partner.

Dummy is entitled to ask for or give information on the laws, to point out revokes and try to prevent those about to occur, and to remind his partner from which hand he should lead. If, however, he looks at any hand other than his own, he forfeits these rights.

If declarer leads from the wrong hand the opponents can demand a lead from the correct hand; and, if it is possible, this must be in the same suit. If a defender leads when it is the declarer's turn, the card becomes a penalty card. If a defender leads when it is his partner's turn, declarer may either bar a lead in that suit or make the exposed card a penalty card. A penalty card must be played at the first legal opportunity.

Contract Bridge is a game of systems. There are systems for assessing the value of a hand, and there are more important and more involved systems governing bidding, the object of these being the interchange of information between partners.

Bumping Races. *See* **Boat Races.**

Camping.

For those whose holiday requirements are a maximum of fresh air and a minimum of formality, Camping is the ideal solution. Choice of equipment, such as tents, tent furniture, and cooking accessories, is entirely a matter for the camper, the only difficulty in this department being making a selection from the very wide variety available. The choice will, of course, depend to some extent on the type of camping holiday planned, for Camping can take several forms. It can, for instance, be static, or it can be combined with motoring, canoeing, cycling, or walking. The more static the camp or the heavier the transport, the more elaborate the equipment that can be taken, cyclists and walkers being restricted to the lightest, though not necessarily the least comfortable, gear.

Practically all suitable camp sites are privately owned, so permission to use them must, of course, be obtained. The choice of site is of major importance, and should combine proximity to water with shelter from winds. The pitching of the tent or tents is also important, as, if the campers intend to keep the tent " door " open at night, they will not want to face east, and be wakened unduly early by the rising sun. If the camp is static, tents should not be allowed to remain too long in one position, as this is not good for the ground on which they are pitched; and the hallmark of the experienced camper is that he leaves the site exactly as he found it. Rain is always a possibility, and demands certain precautions, particularly the slackening of the guy ropes, which might otherwise become taut enough to pull out the pegs, in which case the tent would probably be blown away. In wet weather the tent walls and roof should not be touched from the inside, as this tends to cause, or to reveal, leaks.

Several organisations exist to assist campers, including the Camping Club of Great Britain and Ireland, of 35 Old Kent Road, London, S.E.1, which specialises in lightweight camping, and has done much to develop suitable equipment and to obtain and list sites. There is also the Youth Camping Association, of 106 Ashurst Road, Cockfosters, Herts; and canoe-campers have an organisation of their own in the Canoe Camping Club, of 4 Felstead Road, Wanstead, London, E.11.

Canadian Football.

Canadian Football resembles American (*q.v.*) but is twelve-aside, uses only three downs, and limits blocking. Touchdowns count five.

Canoeing.

Canoeing is both a recreation and an organised competitive sport.

As a recreation, it can take the form either of simply taking a canoe out and " paddling about " for a short period or, by combining it with Camping (*q.v.*), of a lengthy and interesting river trip, the canoe-camper proceeding, of course, at his own pace, and giving as much time as he wishes to sightseeing.

As a sport, Canoeing has Olympic Games status. In Britain it has its headquarters on the Thames

at Teddington in Middlesex, the governing body being the Royal Canoe Club. There are races for singles and pairs, including events for women. There is also one long annual race for pairs that really combines Canoeing with Camping. The course is from Devizes in Wiltshire to London, and the competitors have to negotiate a long series of locks.

There are two types of canoe: Canadian canoes, like those used for many years by Red Indians, and kayaks, the very light Eskimo-type canoes, in which an expert, but not a beginner, can turn a complete circle into the water and out again without losing his seat in his craft. Both types are catered for in the Olympic Games, but all racing, and, indeed, virtually all Canoeing, in Britain is in kayaks.

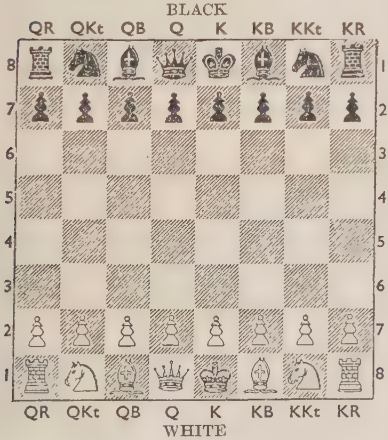
Card Games. *See* **Bridge; Patience; Solo Whist; Whist.**

Chess.

Chess, greatest of all board games and a game of pure skill, has a known history of some 1500 years. Eastern players, who originated it, reached a high standard, but the game's greatest advances were made in Italy in the fifteenth and sixteenth centuries. In the early days the value of the pieces and their moves underwent periodical changes, but the game we know to-day dates from the sixteenth century.

The board has 64 squares in eight rows of eight, and each player has 16 pieces, one set being white and the other black or red, but always referred to as black. A toss decides possession of white, which always starts. The object is the capture of the opponent's King, no matter how many pieces are lost in doing so, nor how many opposing pieces remain untaken. If the King could be captured on the next move, it is in "check." It must move out of check, and, if it cannot, it is "checkmate." and the game is over. If the King is not in check, but cannot move except into check, and the player has no other pieces he can move, it is "stalemate," and a draw. Games may also be drawn if neither player has sufficient pieces to force a win.

In addition to the King, each player has a Queen, two Bishops, two Rooks—sometimes wrongly called Castles—two Knights, and eight Pawns, and all these move in accordance with rigid rules. The following diagram shows the pieces at the start of a game:



(The initial position as seen by White)

Each line of squares across the board is a "rank," and each line up and down the board is a "file."

The permitted moves are as follows:—

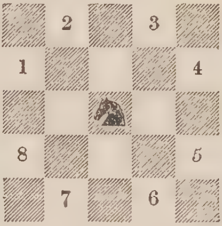
The King can move one square at a time in any direction.

The Queen can move in accordance with the powers described below for both Bishops and Rooks.

The Bishops move diagonally as many squares as desired.

The Rooks move straight along the ranks or files as far as desired.

The Knights move as shown in the following diagram:—



(The Knight's Move)

Stationed away from the side of the board, and on a black square, the Knight illustrated can move to any of the numbered white squares. The move is one square along rank or file in the desired direction, and one square diagonally. The Pawns move straight forward, one square at a time, but may move two squares when moved for the first time. They capture by moving one square diagonally forwards. A Pawn reaching the eighth rank may be replaced by any other piece.

Once during a game, a player may "Castle," by moving the King two squares towards the Rook, which is placed on the last square passed over by the King. This move cannot be made if either the King or any of the squares he would pass over are in check. Neither King nor Rook must have moved previously.

Games of Chess can be recorded, so players can play over great "Masters" games, and record their own games.

Draughts. Draughts—called Checkers in America—is also played on a chess board. Possibly older even than Chess, it is much simpler, but not devoid of skill.

Each player has twelve pieces or "men," all alike. Squares of one colour only are used, the men starting on the first three rows on the board. The move is one square diagonally forward, but a man reaching the eighth row becomes a "King," and may then move forward or backward. The object is the capture of all the opposing men by jumping over them. If the arrangement of the men permits it, more than one man may be captured in a single move. A man which can effect a capture but does not do so is removed from the board, or "huffed."

Children's Games.

Amongst the many sports and games that have come into being through the years and the centuries is a lengthy list of what, for lack of a more precise name, might be called Children's

Games, suitable for playgrounds or, indeed, practically any open space. Almost without exception, they are simple; they require little or no equipment; they can be adapted to almost any number of players; and they are good fun and good exercise. Most of them are also very old; few of them have any "official" name; and many of them have had many names

The "basic" playground game is Tag, in which one player, called "it," chases the others, any player he touches becoming "it." A variation of this allows players to rest without being tagged if they can find a piece of wood to touch; but there are many more variations that make more interesting games. In Imitation Tag "it" can follow any mode of progression he chooses, such as running, walking, running or walking backwards, hopping, or crawling on all fours; and whatever he does the other players must do, too. In Partner Tag all the players except "it" and one other stand about in pairs with their arms linked. "It" chases the other free player, who may link up with any pair, when the player at the other end of the link becomes "it's" quarry. For Chase Tag, all the players except "it" and one other form a circle, each player just touching his neighbour's shoulder with one outstretched arm. "It" and his quarry start at opposite sides of the circle, and the quarry may dive in and out under the outstretched arms, "it" being compelled to follow exactly the same route. A variation of this has three players running, with the second chasing the first, and the third chasing the second. Pursuit Race is a form of tag in which every player is both chaser and chased. Players station themselves in a very large circle, all facing either clockwise or anti-clockwise, and with approximately the same distance between each. At the word "Go," each player sets off after the one in front of him, tagged players dropping out.

Marching Tag also starts with the players in a circle facing clockwise or anti-clockwise, but they are close behind each other, and there is an "it" inside the circle. "It" announces a number, and then starts counting steadily up to it. As he does so, the others march round in their circle, but when he reaches the chosen number, they all dash away to a "home" line 25 or 30 yards away, with "it" in pursuit. Listen Tag starts with the players in a circle, facing inwards, and with "it" and one other player inside the circle. This other player announces a word, and then goes on talking or telling a story, in the middle of which he casually introduces the word. When he does so, the players dash for the home line, with "it" either in pursuit or calmly tagging some player who has missed the word and is still listening to the story. Numbers Tag has the players in two teams, who form rows, one behind the other, and both with their backs to the home line. The front team agree on a number that their rivals do not know, and a member of the rear team then calls out numbers in any order. If he hits on the agreed number, the front team swing round, each man trying to tag the man behind him before that player realises what is happening and dashes for the home line. Hidden Numbers Tag starts similarly, except that the teams face the home line, each player in the front team having a number that is unknown to the rear team. A player in the rear team calls out a number, and the player with that number dashes for the home line with the caller in pursuit. This goes on until everyone has gone, the last front-team player being allowed to run immediately his predecessor is either safe or tagged.

Bucket Tag has all the players in a line with their backs to the home line, "it," who is in the middle of the line, having a bucket several yards in front of him. He tries to toss a tennis ball or a rubber ball into the bucket, and the moment he succeeds, everyone dashes for the home line with "it" in pursuit. Ball Tag and Football Tag are like ordinary tag, except that, in ball tag, "it" must hit his quarry with a tennis ball or a rubber ball, which he throws, and in football tag he must hit him with a football, which he kicks. Another form of Ball Tag is between teams, and uses a football, which is thrown. The area is divided into two halves, one team being in each, and each half having an additional, narrow zone behind it. A non-player should act as referee, and start the game by throwing the ball up over the centre line, which no player must cross. The game consists of trying to hit opponents on the legs with the ball, any player who is hit retiring to the zone behind the other team, from where he can still take part in the game by throwing the ball at his opponents from behind if it should come through to him. The game continues until one half has been cleared. This "pitch" also serves for End to End Ball, in which half of each team starts off in the zone behind their opponents, and the ball is not thrown at opposing players, but through to team-mates behind the other team, each successful effort counting as a goal.

There are several popular "combat" games, in which players take part two at a time. Two are described, not very accurately, as Indian Wrestling. In one, the two opponents face each other, clasp their right hands, and press their right feet against each other, the "fight" consisting of an attempt to make the opponent move his foot by pushing with the clasped hand. In the other method opponents face each other, each with his hands pressed against his rival's shoulders, and with some object, such as an Indian club, a skittle, or even a stone bottle, on the ground between them, the object being to push the opponent in such a way that he will knock the object over. In Cock-Fighting two players with arms folded hop, each trying to make the other put his raised foot to the ground by pushing into him with his shoulder. Hat Snatch is more tag than combat, unless it is a combat of wits. Two teams face each other, some way apart, and having a hat or cap or some other suitable object on the ground between them. Each player has a number, the same numbers being used for both teams. A non-player acting as referee calls a number, and the players concerned, one from each team, try to snatch the object and carry it back to their own team, the one who does not get it trying to tag his opponent before he reaches safety.

Finally, three Tug-of-War variations. In Elbow Tug two players stand back to back with their elbows linked, each having in front of him a line, across which he tries to pull his opponent. In Rope Tug three players grasp a rope that has been tied so that it is actually a circle. The players are outside the circle of the rope, holding it with one hand, and having their backs to it. In front of each player is a small stick, which he tries to pick up, without letting go of the rope, before his rivals can pick up their sticks. Sprint Tug may end up as an ordinary tug-of-war, but it starts with the rope being placed at right angles across a line in the middle of the ground, and the two teams lined up at opposite ends of the ground. At the word "Go" they rush forward, the object being to pull the whole of the rope across to their side of the line. If this is not achieved before the other team arrives, it becomes a real tug-of-war.

Cricket.

Cricket, traditionally England's national game, has a longer history than most team games. There have been attempts to trace its origin in various games played by ancient races; and, even if some of these derivations are a little far-fetched, it certainly developed from very old country games, and has been played in a form not so very dissimilar from that of to-day for over 250 years. The men of Hampshire, particularly the village of Hambledon, Surrey and Kent were the real pioneers of the cricket of to-day.

Cricket is played by two teams of eleven players, which bat and field in turn. In the centre of the ground are two "wickets," 22 yards apart, and each consisting of three "stumps," joined at the top by two "bails." The bats used have a flat striking surface, and the ball is a hard red one weighing 5 ounces.

There is a batsman at each wicket, and their object is the scoring of runs by hitting the ball away, and running before it can be returned, each time the two batsmen cover the length of the

pitch counting as one run. Should the ball be hit beyond the boundary line round the ground, it counts four or, if it crosses the line without touching the ground, six.

The ball is "bowled" from one wicket to the batsman at the other, six balls, or, in some cases, eight, which comprise an "over," being bowled from each end in turn. The object of the fielding side is to get the batsmen "out," ten dismissals completing the "innings," as the eleventh man is left without a partner.

A batsman can be dismissed in several ways. If he misses the ball and it hits the wicket, or if he plays it on to the wicket, he is out "bowled." If he leaves his ground, indicated by a line in front of the wicket, misses the ball, and has the wicket "broken" by the wicket-keeper he is out "stumped." If he hits the wicket with his bat he is out "hit wicket." If his hit is caught he is out "caught." If, when running, he fails to reach his ground before the wicket is "broken" he is out "run out." If a ball, when bowled, would have hit his wicket, but hits his leg instead, then, subject to certain provisions regarding where the ball actually pitched, he is out "leg-before-wicket." A batsman may also be given out if he handles the ball or obstructs the fielding side, but these are rare occurrences.

In addition to runs hit by the batsmen, there are certain "extras." If the ball passes the bat, misses the wicket, and goes far enough for the batsmen to run, it is a "bye." If, however, it goes off the batsman's leg it is a "leg-bye," but leg-byes cannot be run unless the batsman was definitely attempting a stroke. If it is bowled so wide that the batsman cannot reach it, it is a "wide." If the bowler comes in front of his wicket before releasing the ball, or if he throws it, it is a "no-ball," in which case the umpire calls it as quickly as he can, for the batsman can hit such a ball, but he cannot be out to it, unless he is run out. If he does not score, one extra is added.

Of the fielding side, one, of course, is the bowler, and another, placed behind the batsman's wicket, is the wicket-keeper. The others will be placed as the bowler and his captain decide, for there are far more recognised positions than can be occupied at one time. To gain some idea of these positions, imagine a right-handed batsman at the wicket, his left side towards the bowler. The side of the wicket in front of him, nearer to his bat than to his body, is the "off" side; the side behind him, nearer to his body than to his bat, the "leg" side. On the off, behind the wicket and close to it, are the "slips," and, behind them, "third man." Farther round, but still behind the bat and close to it, is "gully." Level with the bat is "point" or, if he is some way from the bat, "deep point." In front of the bat, but in front also of the bowler's wicket, is "cover" and "extra cover." Roughly level with the bowler's wicket is "mid-off," with, behind him, "long off." Similarly on the leg side, where "long on" is the equivalent of "long off," "mid-on" of "mid-off," "mid-wicket" and "deep mid-wicket" of "cover" and "extra cover," "square leg" and "deep square leg" of "point" and "deep point," "short leg" of "gully," "long leg" of "third man," and "leg slip" of "slip."

First-class cricket matches last for three six-hour days or longer, but there are also two-day, one-day, and half-day matches. Matches of two days or more are two-innings games; of one day or half a day, one innings. If the side batting first, which is decided by a toss that gives the winner the choice of batting or fielding first, dismisses the opposing side for a smaller score, the victory is by the number of runs by which the smaller score was exceeded. If the side batting second pass the other total, the game ends, and the victory is by the number of wickets the second side still have standing. In a two-innings match, should the side batting first gain a first-innings lead of a certain size, normally 150 runs in a three-day match, it can require the other side to follow straight on with its second innings, the leading team keeping its second innings in reserve, to be played if needed. If a batting side has sufficient runs, and is anxious to see the other side batting while there is still plenty of time to dismiss it, it can declare its innings closed. In this case, should the second team score enough runs to win, it does, in fact, win, even though it may have lost more wickets than had the declaring side.

Cricket is not a fast-moving game, and for years views have been expressed to the effect that it must be "brightened up" if it is not to die out. Periodically, small changes in the rules are made; but, for the most part, the game just goes steadily on, easily retaining a large following that is satisfied with it as it is, and still able, when big international matches take place, to command a place, not only on the sports pages, but on the front pages of the Press.

The game is unusual in that it has no really official governing body. It is ruled by the M.C.C., which stands simply for Marylebone Cricket Club, from its headquarters at Lord's ground in London; and the M.C.C.'s pronouncements are accepted almost without question.

Outside England, the development of cricket has been peculiar. Even as near at hand as Scotland and Ireland, the game has never aroused much enthusiasm; and in Continental Europe, where many British games have won great acclaim, cricket has gained a real foothold only in the Netherlands. In the United States and Canada it is played, but only to a small extent. However, in the other Commonwealth countries of Australia, South Africa, New Zealand, the West Indies, India, and Pakistan, it is extremely popular; and the national teams of these countries, together with England, provide the top-class international sides of the game. They meet regularly in "Test Matches," a "rubber" normally being decided in a series of five Tests.

Cricket is rich in technical terms and expressions, which are seen and heard frequently through newspapers, television, and radio when a Test series is in progress. Many of these are almost self-explanatory, but a few never fail to puzzle less-experienced readers, viewers, and listeners. Prominent amongst these are three types of ball used by bowlers, the "yorker," the "googly," and the "chinaman."

A yorker is a fast ball that pitches just in the batsman's block-hole, and often passes under his defensive stroke. The term is believed to have originated in Yorkshire, but the only known explanation of it is that attributed to a Yorkshire cricketer, who, asked why a yorker was so called, replied simply, "Well, what else would you call it?" There is an answer to that, for the yorker was originally known as a "tice." A googly is an off-break or a leg-break which is disguised, because the bowler has delivered the one with the action of the other. A chinaman is an off-break bowled by a left-handed bowler to a right-handed batsman. These words also lack an authentic derivation.

Cricket has provided one expression that is now heard in many connections. That is "hat-trick," which dates back to the days when cricketers wore top-hats, and any player who took three wickets with three successive balls was presented with a white top-hat. Now, he is usually given the ball.

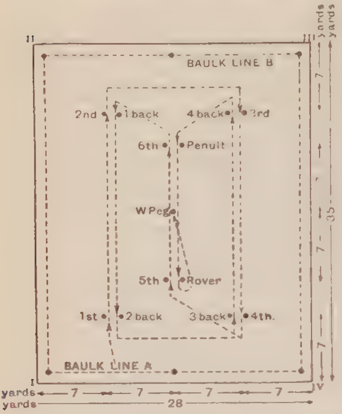
Croquet.

Croquet originated in France, and has been played in Britain for about a century. The governing body, the All-England Croquet Club was founded in 1868, with headquarters at Wimbledon. Soon afterwards, this also became the headquarters of Lawn-Tennis (*q.v.*), and it is probable that the rapid growth of that game was a factor that restricted the development of Croquet. Croquet, however, still retains a following, and, in addition to Championships and tournaments, it is widely played on private lawns.

The equipment consists of four balls, coloured blue, black, yellow, and red; four mallets, usually marked with the same colours; six hoops; and a peg. The playing area is 35 yards by 28 yards, but this can be reduced, provided that the proportion remains 5 to 4. The hoops, which stand 1

foot out of the ground, and the peg are placed as shown in the diagram. Generally two players, taking the blue and black balls, oppose two using

STANDARD SETTING.



Only those portions indicated by a continuous line need be marked on the court.

The order of making the points is indicated by the arrows.

the yellow and red, but singles can be played, each player using two balls, blue being paired with black, and yellow with red. Each player completes the circuit of hoops twice, finishing by hitting the peg.

Croquet is a game of skill, and players can earn extra turns in various ways, such as hitting another ball with their own or passing through hoops. While making their own circuits, players also concentrate on leaving their opponents at a disadvantage. Handicap matches are possible through the giving of extra turns, or " bisques." A " half-bisque " is an extra turn in which no hoop may be scored.

Croquet can, perhaps, claim some credit for a phrase used in everyday life. " Pegging out " has the rather sinister meaning of " dying " or " finishing," but it is actually the term used for finishing a Croquet round by hitting the peg.

Cross-country. *See* **Athletics.**

Cycling.

That few inventions have been so widely adopted so rapidly as the bicycle is not surprising, for this comparatively simple machine is at once a useful method of transport, a means of healthy and enjoyable recreation, and, for those who desire it, the " key " to participation in a thrilling and well-organised competitive sport.

The earliest cyclists aroused considerable hostility on the roads; but as cycling progressed through a series of unwieldy and dangerous machines to the present " safety " models, more and more people realised its many advantages, with few counterbalancing disadvantages, and it soon became established and accepted. A bicycle is not expensive, it should have a long life, and the riding of it is not difficult to learn.

From a utilitarian point of view alone, a bicycle can be extremely useful. A small amount of " luggage " can be carried, so it can be used for shopping, as well as for travelling to and from work, and for any necessary journey of reasonable length. Like walking, it provides exercise, but the cyclist can travel three or four times as fast as when walking. The rider is also independent of local transport services, while probably travelling, at least in towns, as fast as the public transport.

As a pleasant recreation, cycling offers a wide range of possibilities. Outings can be for a day or part of a day, or they can be tours of any length the rider wishes, with the overnight halts spent in hotels or hostels or Camping (*q.v.*), which can easily be combined with cycling. The cycle tourist has distinct advantages over both the walker and the motorist. The walker gets exercise and a good view of the country, but covers only a limited distance. The motorist covers plenty of ground, but sees little and gets no exercise. The cyclist, however, gets exercise while covering a distance which, if much less than the motorist's, is four times the walker's at a pace that still enables him to see the country, and spot places worth a stop for a closer investigation. Progress can be fast or slow, and exercise strenuous or leisurely, as the rider wishes.

As a competitive sport, cycling offers a remarkable variety, for no other form of racing provides events of so many different types. On the Continent, cycle racing is by far the most popular sport, and the leading riders are national heroes. The sport, which caters for both amateurs and professionals, also has a large following in Britain, where it would soon progress still farther if there were more tracks suitable for big events available.

Cycle races are held on banked tracks rather like motor-racing tracks, on flat grass tracks, on cinder tracks, on indoor banked board tracks, on roads, and even across country. There are races at all distances, from short sprints to road tours divided into daily stages lasting for several weeks. There are massed-start races, in which all the competitors start together; races in which competitors are drawn in twos or threes through several rounds up to a final; and time trials, in which each rider starts alone. Track races may be straightforward races or time trials; or motor-paced, with the riders behind motor-cycles; or tandem-paced; or pursuit races, with riders or teams of riders starting on opposite sides of or spaced round the track; or point-to-point, with points awarded to the leaders at the end of each lap; or courses des primes, with a prize for the leader at the end of each lap; or Madison races, for teams of two, and occasionally three, riding one at a time, and relieving each other at will. There are also races for tandems and tricycles; and the sport includes races on both track and road for women as well as men.

In the cross-country side of cycle racing, called Cyclo-Cross, riders cover a cross-country course of perhaps 10 miles, riding when they can and carrying their machines where riding is impossible. Still another form of cycle racing is roller racing. In this, the cycles are fixed on rollers, and do not move at all, the distance the riders pedal being registered on large dials. There is also cycle speedway, a sport devised by youths, and practised only by youths. Events take the form of team matches, generally on rough cinder tracks constructed on waste ground by the youths themselves, with pairs of riders opposing rival pairs in a series of races, and points awarded to the leaders in each race. Corners have to be " skidded " round, as they sometimes are in ordinary grass-track cycle racing. Very different, but still competitive in a way, is a form of event that provides a link between the sporting side of cycling and the more purely recreational side, the reliability trial or attempt to achieve a fixed standard.

Cycling also has its team game in Bicycle Polo, a hard game requiring a high level of cycling skill and considerable nerve.

Taking up cycling is simply a matter of purchasing a bicycle and devoting a short time to learning to ride it. After that, it is for the individual cyclist to decide for what purposes he wishes to use his machine, and whether he prefers to ride alone or in company. If he likes company there are many clubs which provide facilities for touring cyclists of all degrees of energy and ambition, as well as for racing cyclists.

There is also an organisation that caters especially for the distance tourist in the Cyclists

Touring Club, which keeps a check on premises offering accommodation to cycle tourists, and provides a sign for use on approved accommodation. It is interesting to note that the Automobile Association, which offers similar services to motorists, but which is not as long-established as the C.T.C., originally based its methods on those of the C.T.C. The C.T.C. address, for those who might be interested in joining, is 3 Craven Hill, London, W.2.

Dancing. *See* **Ballroom Dancing; Folk Dancing.**

Darts.

Originally just a casual amusement confined almost entirely to public-houses, the game of Darts is now one of Britain's most popular pastimes. Public-houses still provide facilities for it, but to-day clubs, canteens, factories, offices, and private houses also have their boards, and there are numerous team and individual competitions, including a National Championship. The prizes rival those of any other game for value, matches are widely reported, and the attendance for the bigger contests is limited only by the size of the hall. This enthusiasm is not misplaced, for the game is a test of skill, and luck plays little part in it.

The circular board has a diameter of 18 inches, and is divided into segments numbered from 1 to 20, but not consecutively. In addition, there are two rings, each ⅜ inch wide, that go right round the board and through each segment. These are the "double" ring, at the extremity of the board, and the "treble" ring, near the centre of the board, darts in these rings counting double or treble the value of the segment. In the centre of the board there are two small rings, the "bull" or "dosser," counting 50, and the "outer," counting 25. The bull is 5 feet 8 inches from the ground, and the wooden or metal feathered darts are thrown from a line, called the "hockey," 9 feet away.

Matches may be singles, doubles, or between teams of four or eight players. Games are for a certain number of points, usually 101, 201, 301, 501, 801 or 1001, the lower totals being used for individual, and the higher for team contests, and matches are generally the best two out of three games or "legs." Conditions for matches vary, but normally stipulate either "straight start and finish on a double" or "start and finish on a double." In the first case players score from the start, but in the second they do not score until one double has been registered. In both cases they must finish on a double, and they must finish with the exact number they require. Scores are counted downwards, players being told how many they need, rather than how many they have scored.

In addition to the straightforward game, there are many Darts variations. In one, "Round the Clock," a player has to throw one dart into each segment from 1 to either 20 or the bull, his turn continuing until he throws three darts unsuccessfully. In "Shanghai," players start with a complete throw of three darts at number 1, and continue with a throw at every number up to 9, but players who fail to score at number 5 drop out. In "Cricket," one player "bats," throwing normally, and counting everything over 40, while the other "bowls," throwing only at the bull, and counting one wicket for every "outer" and two for every "bull," five wickets ending his opponent's "innings." In a Darts version of Shove-Ha'penny players have to get three darts in each segment from 1 to 9, and three in the centre. In "Fives," players score only if their total is divisible by five.

Diving. *See* **Swimming.**

Dramatics.

For many years, "amateur theatricals" were a popular indoor pastime; but they were a recreation for the performers, offering little in the way of real entertainment to the spectators, and relying for their audiences on relatives and friends who had little option but to attend. In no sense were they either connected with or comparable to the professional stage.

There may still be a few "entertainments" of this kind, but the vast bulk of amateur drama to-day is something very different. It is something that is taken really seriously, that is worked at, and that can entertain a paying audience on its merits. Relatives and friends still attend, of course, but so do strangers in search of entertainment, many productions, particularly big musical ones, depending on public audiences to cover their heavy expenses. The change from light-heartedness to seriousness, and from play to work, far from driving performers to seek recreation elsewhere, has increased the popularity of this particular recreation to a phenomenal extent. Nobody can say with certainty how many amateur groups there are in Britain at any one time, for new ones are springing up all the time, but there are certainly thousands.

Surprising though it may seem, the amateur theatre movement made tremendous advances through the Services in the Second World War. There was a certain amount of professional entertainment available to servicemen, but, for much of the time, service units had to provide their own entertainment. In many cases a few enthusiasts who knew something about entertaining were found to start things moving, and these soon built up casts by "conscripting" those in whom they thought they saw talent, and, often with considerable ingenuity, staged some excellent shows under very difficult conditions. Many of those who were "forced" into amateur entertaining during those days remained in it after the War, and many of the things that producers of those shows had to teach themselves by experiment and trial and error have contributed to better productions since then.

People often query whether or not it is fair to judge amateur actors by a severe standard, or to compare them with professionals. Generally speaking, it is perfectly fair to do both. Though amateurs are acting voluntarily, and because they like it, they are, nevertheless, setting out to entertain audiences whom they charge for admission. This renders them liable to criticism, and most serious amateur performers would not want it otherwise. With regard to comparisons with professionals, amateurs cannot, of course, fairly be compared with the best professionals, but they can be compared with, say, professional repertory companies, and they should emerge from such comparisons with distinction. Professional repertory actors generally perform a different play every week, rehearsing each play while they are acting another, and rehearsing only for a short time. Amateurs usually rehearse for a long time, and with only one play to think about. They should, therefore, if they are of any standard at all, give a better performance than the harassed repertory players.

The connection between the professional and amateur stage to-day goes beyond the mere making of comparisons. Professional theatre people sometimes assist at summer and week-end schools for amateur actors, and many amateurs have helped out both repertory and touring companies by playing small parts and appearing as "supers." Many young amateurs, particularly in musical shows, hope that the amateur stage might prove the first step towards a professional career, and some amateur groups include former professionals who, for one reason or another, have left the theatre.

There are several ways in which the amateur theatre can be of real assistance to the theatre as a whole, particularly in that amateurs can try out new or experimental plays that the professional, commercial theatre dare not risk. Many amateur groups conduct vigorous and useful theatrical experiments, and this also applies to some musical groups. Other companies, both straight and musical, prefer to concentrate on proved successes.

The days when the first consideration in choosing a play was that it should have parts for every member of the group are gone. Groups now normally select plays on their merits, and often cast them, as in the professional theatre, by competitive audition. This, however, need not discourage those who might feel that, if parts have to be "won," they would never get any. Even these more ambitious groups often, in addition to their main plays, stage supplementary programmes consisting, perhaps, of three or four one-act plays, which are cast from those omitted from the bigger productions; while some groups definitely pick an occasional play, possibly a costume drama, that has a long cast. There are also plenty of small groups that often find themselves with too few people for the play they want to do. A newcomer can always find a welcome somewhere. Many amateurs start with small groups, and either remain with them or move farther up the tree, as their particular ambitions or talents may suggest.

There is also a vast field for enjoyable and useful activity behind the scenes. Many of those in the amateur theatre movement never appear on the stage at all, preferring to concentrate on producing, stage-managing, set designing, lighting, or one or other of many essential jobs; and anyone whose ambitions follow these lines is always welcome. Producing plays is, of course, an extremely important and satisfying activity. Small groups will often let a new producer try his hand, while the more ambitious groups will offer opportunities to new producers in the supplementary programmes which they also use to give newcomers acting opportunities.

Straight plays and musical comedies, comic operas or operettas are the best-known branches of the amateur theatre, but amateur revues are also frequently seen. Many of the improvised Services shows were of this type, and the taste for them has increased. They provide opportunities of many kinds, not only in singing, dancing, and acting, but also in composing, song-writing, and writing sketches. Still another type of amateur entertainment born during the War is the radio-style play, which was first tried in prisoner-of-war camps, when no other type of play was possible. In this, performers read their parts behind a curtain, submitting themselves to the severe test of holding their audiences by the voice alone.

One other branch of "home-made" entertainment that is not generally considered a part of the amateur theatre, but that is definitely worth a word, is skiffle. In its commercialised form skiffle became associated with, and almost indistinguishable from, the "rock 'n roll" craze, but it would be more correctly regarded as something that should be quite remote from "rock 'n roll," and remote also from periodical crazes. It might be described as the making of music by ordinary people, often with improvised instruments, and it probably had its origins in various times and places, where, had it not been for this type of music, there would have been no music at all. The music normally takes the form of songs, and these should really be descriptions of actual local, national, or world events, rather as the calypsos are. The songs may be old folk-songs, or up-to-date songs of the same type, set, perhaps, to old or existing tunes; and if skiffle groups would include in their repertoires modern descriptive songs of their own making they would add considerably to their own and their audience's entertainment.

Film-making. While it is not too difficult for amateurs to present their own plays, it might seem that amateur film-making, apart from purely private records of things like family holidays, is too ambitious a project to be seriously considered. This, however, is not the case; and if those whose ambitions are to act, direct, and write for films have fewer opportunities than their stage counterparts, they nevertheless have opportunities, and a growing number of them, in the various film societies, now more often called ciné clubs.

These clubs make their own films, including fiction films, documentaries, and cartoons, and many of them attract attention far beyond the club that made them. The clubs also show members films other than those made by themselves, including some made by other clubs; and they periodically entertain and visit other clubs.

Draughts. *See* Chess.

Eton Fives. *See* Fives.

Fencing.

Fencing can claim a longer history than most sports, for it is the modern equivalent of duelling. In mediæval tournaments mounted knights fought with lances, and, in addition to actual fights to the death, they also met with special, less lethal lances purely for sport. Later, duels were fought dismounted, and with different weapons. In Elizabethan days duellists used a sword, for attacking, in the right hand, and a dagger, for defence, in the left. Later still, the dagger was discarded, and duels were fought, as are fencing bouts to-day, with a sword only.

Duelling declined in Britain during the Regency period, when it became fashionable for gentlemen to learn to fight with their fists, but they continued to learn swordsmanship, and to fence with the practice weapon, the foil. Eventually, duelling became illegal almost throughout the world, but swordsmen of other countries similarly continued to fence with the foil. Even before Britain took to fist-fighting, most of the advances in fencing technique had been made in France and Italy, and the fencers of these and other Continental countries are still the best in the world, countries like Britain and the United States relying largely on fencers of Continental European descent.

Duelling was restricted to "gentlemen," and something of this restricted atmosphere pervaded the early days of fencing as a sport, clubs being few, expensive, and rather exclusive. Now, however, that has changed, and widespread class tuition in fencing has opened the sport to anyone.

Modern fencing includes contests with three weapons: the foil, which is the only one used by women; the epée, the real duelling sword; and the sabre, which cuts as well as thrusts. These weapons have "buttons" on the points, but fencers wear a special glove, a padded jacket, and a mask. Fencing requires grace of movement, lightness of foot, agility, strength of wrist and forearm, quick mental reactions, and good eyesight; and it will do much to develop these qualities, including the eyesight. As masks are worn, it is perfectly practicable to fence wearing glasses.

The language of fencing is French, all the terms used, many of them traditional, being French.

Figure Skating. *See* Skating.

Film-making. *See* Dramatics.

Fives.

There are two games of Fives, Eton Fives and Rugby Fives. They are court games using walls, but an Eton Fives court has the addition of a buttress or "pepper" jutting out from one side wall. The striking implement is the gloved hand. Eton Fives is a doubles game, but both singles and doubles are played in Rugby Fives.

Folk Dancing.

From the ballet, by way of the less-serious stage and the ballroom, to country and folk dancing, there are many forms of dancing, and it is easy to trace links from one kind to another, but much harder to say definitely exactly where one kind stops and another starts. Of all types

of dancing, perhaps Folk Dancing is the most difficult to pinpoint. Its name implies that it would be found chiefly in remote areas, where it would be performed, almost instinctively, by simple country people. Originally, it was, and, to some extent, it still is; but it is now also to be seen in ballet and in the ballroom in adaptations that may or may not have retained the main features of the original, but that have almost certainly lost the spirit of it. To many people, thoughts of folk dancing mean thoughts of Central Europe; of places like Bohemia with its polkas. Central Europe, however, by no means covers the subject. Italy, for example, is rich in gay dances, and in dances with folk-lore-type stories behind them, like the famous tarantella, which is reputed to induce enough perspiration to cure the bite of the tarantula. Latin America, too, has its rumbas and other native dances that were originally solos, but are now known mainly in their ballroom versions.

There are good grounds for regarding the term "folk dancing" as nearly synonymous with country dancing; for if country dances differ, as they do, in different countries, they are not only countryside dances, but dances of a particular country, and therefore of its people. Almost every country has its country or folk dances, though it has been said that England is an exception. It is, however, nothing of the kind, for English Morris dancing has been a part of England, and of England's holiday festivals and customs, for centuries, and remains so to-day, about fifty different teams or groups now being affiliated to the Morris Ring of England.

The origins of Morris dancing, and even of its name, are shrouded in mysteries that will probably never now be solved. The name probably comes from the word "Moorish," and it was certainly used to mean Moorish by Shakespeare. Morris dancing, though, dates from long before Shakespeare's time, so, while the word may be the same as Moorish, it is probably used in the mediæval meaning of Moorish, which was simply "pagan." It may be, therefore, that Morris dancing was based on rituals of the old religion, and that the facial disguises that figure in it were originally necessary if the dancer was to avoid persecution and prosecution. A theory that Moorish was used in its more normal sense because the dancers blacked their faces falls down on the fact that only a minority of Morris dancers ever did this. To-day, only the Lancashire Coconut Dancers do so. For centuries, Morris dancing was mainly associated with England's May-day revels, but it was, and is, also seen at other times, such as for instance, Boxing Day.

There are many different Morris dances, including handkerchief dances; stick dances, using either 3-foot quarter-staves or seed-planting sticks of half that length; and jigs. Most of the dances are for teams of six, but some of the jigs are danced as solos. The accompaniment was originally on pipe and tabor, both being played by one man, but is now mostly on accordions and violins. The dancers are generally preceded by their Fool, armed with a stick and bladder, with which he clears a space for the dancing.

Scottish dancing is famous; but what is less generally realised is that there are two distinct kinds of it, Highland dancing and Scottish country dancing. Highland dancing consists of dances like the sword dance, or Gillie Callum; the fling; and the seann triubhas (which means "old trousers"). It is solo dancing, and though many girls now take part, it should really be danced only by men. Highland dances are danced mainly, though not quite entirely, on the ball of the foot.

Scottish country dancing includes set dances, such as reels and the similar, but generally slower, strathspeys, and also jigs and progressive dances, during which each dancer meets practically every other dancer. Highland dancing is normally accompanied by a single piper, but the accompaniment for Scottish country dancing should be built round Scotland's national musical instrument, the violin. Scotland is also the home of the unusual "mouth music." This is, of course, vocal, but it is not song, being, in fact, an entirely practicable substitute that can be used when no musical instruments are available to accompany dancing.

Ireland also has its reels and its jigs, also normally performed to an accompaniment led by a violin. With lesser-known tunes, people who are not Celtic sometimes find it almost impossible to tell the difference between Scottish and Irish country dance music.

A country that does not spring very readily to mind when one thinks of folk dancing is the United States, but it has its country square-dancing, and, here again, the violin is the prominent accompanying instrument. Many of the tunes used are clearly based on old Scottish and Irish airs that were taken across the Atlantic by emigrants many years ago.

Football. *See* **American Football; Association Football; Australian Football; Canadian Football; Gaelic Football; Public-School Football; Rugby Football.**

Gaelic Football.

Gaelic Football is seldom played by anyone who is not Irish, but it is frequently played outside Ireland, for Irishmen have taken it with them to Britain, the United States, Australia, and South Africa.

Played fifteen-aside, it is a blend of Association and Rugby Football (*q.v.*), the goals having the uprights, cross-bar, and net, exactly as in Association, but having the uprights extended above the cross-bar, as in Rugby. If the ball goes under the cross-bar it is a goal, and if it goes over it is a point, a goal equalling three points. The ball is round, and it may be kicked or caught, but not thrown forward, nor carried, though it may be dribbled by bouncing it. In its essentials, it is probably simpler than most other forms of football, but it is fast and involves frequent hard bodily contact. Substitutes are permitted in case of injury.

Gaelic Football joins with Hurling (*q.v*) in coming under the old-established Gaelic Athletic Association.

Gliding.

The first serious efforts to develop Gliding, which is flying in engineless aircraft or sailplanes, took place in Germany in 1919, and were successful enough to lead to experiments in France and England, where it arrived in 1922. At that time, however, it failed to gain much support, and the real history of gliding in Britain dates from a second attempt to encourage it in 1929. Little more than ten years later, gliding had advanced sufficiently to be a real factor in the Second World War.

Normally launched from hills and by catapult, gliders at first achieved nothing more than small hops. These were followed by steady descents from high hills, and, eventually, by the achievement that ensured the success of the idea, ascents to points higher than the starting-point; for, with altitude, flights of considerable duration, and also over considerable distances, became possible. The altitude is gained by using air currents, which, when the wind strikes the hills that are the ideal starting-points, must rise, and must, if the force of the wind is strong enough to overcome the sinking speed of the glider, carry the glider upwards. Skilful use of air currents enables the glider pilot to stay up, and skilful use of the rising currents beneath clouds enables him to cover long distances by hopping from cloud to cloud.

The extent to which gliding has developed can be gathered from the fact that world championships now take place, and that, in Britain in one recent year, gliding enthusiasts made over 180,000 flights of a total duration of nearly 25,000 hours, and covering altogether over 56,000 miles. Gliders can now reach altitudes of over 40,000 feet, stay in the air for over 50 hours, and carry

out flights of hundreds of miles. Both men and women pilot gliders, and the best pilots are often people in their forties and fifties.

Golf.

Golf, a game of great antiquity, originated in Scotland, and is now widely popular in many countries. It consists of using a set of clubs with which to play a small white ball over a cross-country course of eighteen holes. Each hole will be several hundred yards long, and will have its fixed starting-point and its finish with an actual hole in the ground, the object being to complete the course, which will be several miles long, in as few strokes as possible.

The playing of each hole falls into three sections, driving, approaching, and putting. The starting-point will be a flat piece of ground on which the player will "tee up" his ball on a small rubber peg, or "tee," which he will carry round with him. He will then hit the ball towards the hole, concentrating on achieving distance. From the tee to near the hole is the "fairway," which will consist of fairly smooth ground, not entirely devoid of natural obstacles, and probably containing some sand traps, or "bunkers." On each side of the fairway is the "rough," which may consist of long grass, shrubs, woods, or even roads. The player will continue to play his ball towards the hole, concentrating now chiefly on direction. On the fairway or off it, he should always play his ball where it lies, but, should it be quite unplayable, or even lost, he may drop it or a new one, and pay a stroke penalty for the privilege. The actual hole will be on the "green," a rough circle of exceptionally well tended grass, and, once on it, the player will cover the last few yards by the more delicate art of "putting."

There are many different types of club, players being limited to fourteen. The shafts are generally steel, the striking surfaces being iron or, in the case of drivers, wood. The different "irons" have numbers, but golf clubs used to have special names, often descriptive of their functions, for instance, lofter, cleek, mashie, niblick, and even blaster. Originally, most golf courses were by the sea, and these were called "links," a term now loosely applied to any course.

There are two actual methods of competitive play, match play and medal play. Match play is by holes, a player completing any hole in fewer strokes than his opponent winning that hole. Once a player leads by more holes than there are still to play, the game finishes, the victory being by *X* and *Y*, where *X* is the number of holes he is "up," and *Y* the lesser number of unplayed holes. When a player leads by the same number of holes as there are still to play he is said to be "dormy" so many. Opponents level after eighteen holes proceed to the first hole, and play on until one is one hole up, when he is said to have won at the 19th, 20th, or whatever it may be. Some important match-play events are over 36 holes, or two complete rounds. Medal play is simply stroke play, the result depending on the number of strokes needed to complete the course. This demands a higher level of consistency, for one bad spell can ruin the total, whereas, in match play, it may cost only one hole. In play after the initial drive, the player farthest from the hole normally plays before his opponent.

In match-play championships and tournaments players are drawn against each other, the winners going on to the next round, and so on up to the final. In medal-play events players go round in pairs, but each is, of course, playing against the whole field. Team matches consist of singles and foursomes, in which the partners play shots in turn. Other, less-formal forms of golf are four-ball foursomes, in which each player plays his own ball; best-ball foursomes, in which both partners drive, but, thereafter, play in turn only at the most successfully driven ball; and threesomes, in which each player plays for himself against the others. During a match, a player must not receive advice from anyone except his "caddie," if he has one, the caddie being an attendant who makes a profession of carrying golfers' clubs round.

Every course has its "bogey" and "par" figures, these being scores, with par representing the higher standard that a first-class player might achieve for the course. By assessing a member's own scores against these figures, clubs can allocate a handicap which indicates the player's standard. There are many minor competitions in which golfers play, not on level terms, but from their handicaps, which also serve as a perpetual incentive to players to improve their game, and therefore their handicaps. The possession of a handicap also makes it easier for players to arrange even matches with strangers. Handicaps are subject to alteration as a player's standard changes, and such alterations may be in either direction. The operation of the handicap in play takes the form of strokes deducted from the actual score at certain holes, in accordance with the arrangements in force at any particular club.

Golf offers a tremendous number of competitions of all standards, as well as championships and team matches. Probably the four most important individual championships are the British Open, the British Amateur, the American Open, and the American Amateur. These are long-established, but the two major international team events are quite new. They are the Canada Cup, open to teams of two professionals from any country, and the Eisenhower Cup, for teams of four amateurs, the three best scores counting, from any country. Other, much older international team events include the Ryder, Walker, and Curtis Cups, which are contests between Britain and the United States for professionals, amateurs, and women, respectively; though it is interesting to note that the actual inscription on the Curtis Cup indicates that this trophy is open to women golfers of any country.

Golf is ruled by the Royal and Ancient Club of St. Andrews, Scotland, which is recognised all over the world as the game's headquarters. There was an unusual illustration of this widespread recognition when the Eisenhower Cup competition was instituted by the United States in 1958, for, at the special request of the American organisers, the first meeting took place, not in the United States, but at St. Andrews. The Royal and Ancient Club makes the rules of golf, but these are generally supplemented by local rules in force at particular clubs.

The popular expression "rub of the green," used to describe an unexpected and unavoidable mischance, comes from golf, where it is used when a putt fails to take the expected line because of a slight flaw in the normally perfect turf of the green.

Gymnastics.

Gymnastics is a system of exercising with apparatus, and also a competitive sport, the chief items of apparatus used being the horizontal bar, the parallel bars, rings, ropes, ladders, and the vaulting horse. The horizontal bar, the parallel bars, and the rings can all be used for similar exercises, some being fast swings and others slow movements requiring considerable strength. Strength and swinging also come into ladder exercises; and the rope, which can be climbed in several different ways, is a simple form of apparatus that demands, and will develop, strength. The horse can be used for a variety of vaults, in either the lengthways or sideways position, and still others are possible when pommels are fitted to it. In addition to those who specialise in gymnastics, many sportsmen of various kinds regularly attend gymnastic classes as part of their training for their own particular activities.

Head of the River Races. *See* **Boat Races.**

Henley Royal Regatta. *See* **Boat Races.**

Highland Dancing. *See* **Folk Dancing.**

Highland Games. *See* **Traditional Games and Customs.**

Hockey.

Hockey originated about three-quarters of a century ago as a game confined to Britain, but with rules that varied in each of the home countries. However, in 1900, England, Ireland, and Wales combined to form the International Hockey Board, with a view to formulating rules that would apply wherever the game was played, and, two years later, Scotland joined the alliance. The game was also taken up with terrific enthusiasm in India, and Indian players became, and remain, the best players in the world. Their enthusiasm extended to what is now Pakistan, so the division that brought that country into existence also added one more to the list of hockey-playing countries, and without noticeably weakening India's own national team.

Hockey is now played in many other countries, but, for some time, it made little progress on the Continent. Eventually, though, it was tried, liked, and adopted in a number of European countries, and one of these, the Netherlands, has now established a right to a place alongside India, Pakistan, and Britain as the game's top layer. Hockey has, and has long had, Olympic Games status.

Hockey is played eleven-aside on a pitch marked out as in the accompanying diagram, the normal positions of the players being a goalkeeper, two full-backs, three half-backs, and five forwards, exactly as in Association Football (*q.v.*). The white ball can be either sewn, as is a cricket ball, or seamless, and it must weigh from $5\frac{1}{2}$ to $5\frac{3}{4}$ ounces. Sticks must weigh from 12 to 28 ounces, and have a handle that can be passed through a ring with an inside diameter of 2 inches. They have a striking surface on the left side only, left-handed sticks not being permitted. A game consists of two 35-minute halves, unless the captains have agreed on a shorter period.

The game is started, and restarted after half-time and after a goal, by a bully at the centre of the ground. The players bullying stand facing the side-line, each with his own goal on his right. Each taps the ground between the ball and his own goal and his opponent's stick over the ball three times alternately, after which one of them must play the ball. At any bully, all the other players must be 5 yards from the ball, and between it and their own goal.

In play, the ball must be propelled only by the stick, and it must not be stopped with any part of the body except the hand, in which case it must only be stopped, and not caught or knocked forward. These prohibitions, however, do not apply to goalkeepers, who may stop the ball with any part of their body, and also kick it, when in their circle. No part of a player's stick must be raised above the shoulder either at the beginning or end of a stroke, or to stop the ball. Hitting the ball in the air and scooping it are allowed, but deliberate undercutting is not, and umpires can penalise any hit which they judge to be dangerous. Interfering with an opponent's stick, running between an opponent and the ball; and charging or other bodily contact are not allowed. Players must not tackle from the left unless they can play the ball without touching the opponent or his stick.

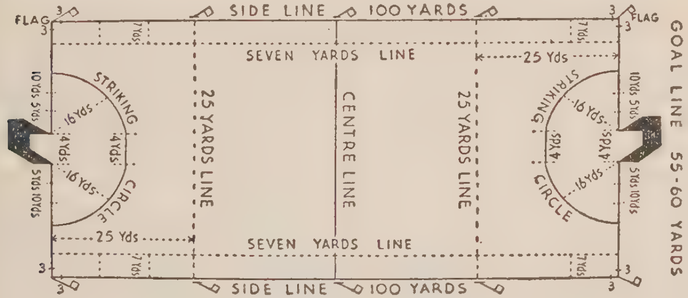
A player is "offside" if there are fewer than three opponents between him and the goal-line, unless he is in his own half, or unless a team-mate playing the ball is nearer to the goal-line than he is. A player who is offside is put onside if an opponent plays the ball, but not if the ball merely touches or glances off the opponent. Players who are offside are not penalised if they do not interfere with the play.

If the ball crosses the side-line it is rolled in by a player of the side that did not put it out. This player must have his hands, feet, and stick outside the field of play, and he must not play the ball again until someone else has done so. All the other players must have their feet and sticks inside the 7-yard line until the ball leaves the roller's hand.

If the ball is sent across the goal-line wide of the goal by an attacker, or, unintentionally, by a defender who is more than 25 yards from the goal-line, the restart is by a bully on the 25-yard line. If it is hit behind unintentionally by a defender who is within 25 yards of the goal-line, a corner is awarded to the attacking side. If it is hit behind intentionally by a defender from any part of the ground, a short, or penalty, corner is awarded to the attacking side. A corner is a hit from a point on either the goal-line or the side-line within 3 yards of the corner flag, while a short corner is a hit from a point on the goal-line 10 yards from the nearer goal-post. At a corner, all the defenders must be behind the goal-line, and all the attackers outside the circle. When the corner hit comes into the circle, attackers are not allowed to take a first-time shot, but must first stop the ball or slow it down. At no time during the game can a goal be scored unless it was hit from inside the circle.

Penalties for infringements outside the circles are generally free hits. Penalties for infringements inside the circle by defenders are short corners, unless they have been deliberately committed to prevent a goal, or have, in fact, prevented a goal, in which cases a penalty bully is awarded. In extreme cases, both short corners and penalty bullies can be awarded for offences anywhere behind the 25-yard line.

A penalty bully is a duel between the offender and one opponent, taking place in the circle, and with all the other players, including the goalkeeper, if he is not the offender, beyond the 25-yard line. The players bully 5 yards from the centre of the goal, and play between them continues until either the attacker scores or hits the



GROUND.—100 yards by 55 to 60 yards. OPENING OF GOAL.—7 feet by 12 feet.
Diagram of Ground as marked out for Hockey.

ball behind or hits the ball out of the circle, or the defender hits it out of the circle. If the defender hits it behind, the bully is restarted. If no goal results, the game is restarted by a bully on the 25-yard line.

A game is controlled by two umpires, each of whom takes one half of the field and one complete side-line. Substitutes are not permitted in hockey.

Hockey is entirely an amateur game. Almost every match is a friendly, for, in Britain, there are no leagues and only a very few rather specialised cup competitions. There are, however, a great many representative games, from county matches up to internationals.

A major feature of the hockey season, which normally lasts from October until March, is the end-of-season Easter Hockey Festival. There are actually several festivals, most of them taking place at seaside resorts. Teams go to them from many different areas, including the Continent, and play three or four matches in four days against opponents whom they would not normally meet. Six-aside tournaments also take place occasionally during the season.

Hockey is played by women, as well as men, and there is a certain amount of mixed hockey between teams composed of both men and women.

Hurling.

Hurling, which might loosely be called the Irish brand of Hockey (*q.v.*), is played fifteen-aside, and has been described as the fastest game using a ball in the world. The ball, called the "slitter," and the sticks, called "hurleys," bear some resemblance to Hockey's ball and sticks, but nothing like Hockey's "sticks" rule applies. The slitter may be hit at any height, and with either side of the hurley, and it may be kicked or caught, though it must not be carried more than three steps, nor picked up off the ground. There is no offside, apart from the fact that attackers must not enter the parallelogram marked out near the goal ahead of the slitter. The goals have uprights that are extended above the cross-bar, and scoring is by goals, under the bar, and points, over the bar, a goal equalling three points. There is a good deal of bodily contact and substitutes are permitted for injured players.

Hurling, rarely played by anyone who is not Irish, but often played by Irishmen outside Ireland, is of great antiquity, and the English authorities in Ireland first tried to suppress it six hundred years ago. It was kept alive, however, and it is very much alive to-day. To Irishmen, Hurling and Gaelic Football (*q.v.*) are symbols of nationalism and patriotism. They are governed by the Gaelic Athletic Association, which has a rule that states: "Any member who plays or encourages Rugby, Association Football, Hockey or Cricket by that very fact incurs immediate suspension from membership of the Association."

A form of Hurling with slightly different rules, called Shinty, is still preserved in another Celtic country, Scotland.

Ice-Hockey. *See* **Skating.**

Ice Skating. *See* **Skating.**

Judo. *See* **Wrestling.**

Knur and Spell. *See* **Old English Games and Customs.**

Korfball.

Korfball is a team game with several unique features, the most striking being that it is a mixed game, a team consisting of twelve players, six being men and six women. The game resembles Basketball (*q.v.*) in some ways, the goals, which are 11½ feet high, and the scoring of goals being similar. It can be played on any firm surface, the pitch measuring 300 feet by 133 feet, though a smaller pitch can be used, provided that length and width are reduced in proportion. The pitch is divided into three sections, and players do not move from one sector to another during actual play. They must, however, change to another zone after every two goals. This encourages all-round attacking and defensive ability, and ensures that, even in a one-sided match, every player gets a fair share of the game. Four players from each team play in each section, and players always mark opponents of their own sex. Players must not run with the ball which is advanced purely by passing. There is no tackling, and the ball can only pass from one team to the other by interception. Players may not score if there is an opponent within arm's length. A game lasts for 90 minutes, divided into two halves.

Korfball originated in the Netherlands, where it was first played in 1902. It spread to Belgium in 1927, and reached England in 1947. There is a British Korfball Association, and also an International Board, on which the Netherlands, Belgium, and England are represented. International inter-club matches are a regular feature of the game. Though really a winter game, Korfball is actually played all the year round, the international games between clubs from the three Korfball countries taking place during the summer.

Lacrosse.

Lacrosse, which originated from a game played by the Red Indians, was introduced into England from Canada in 1867, and has been played here ever since.

Basically, it is, perhaps, the simplest of all field team games. The object is the propelling of a rubber ball through goals 6 feet wide and 6 feet high with a wooden "crosse" not more than a foot wide at its widest point, where there is a "mesh" of strings. The goals are from 90 to 110 yards apart, but play can take place behind them, for there are no boundaries to the pitch except the natural borders of the field, unless the captains have agreed otherwise. The only lines required are the centre circle, the goal-lines, and the goal-creases.

In England teams consist of twelve players, but in Canada and the United States the number was reduced to ten some years ago. Players line up right down the field, instead of only in their own half, and there is no offside, except that no attacker may enter the goal-crease before the ball. Should a player leave the field through injury, his opponents must also withdraw a man.

A game consists of four 20-minute periods, but the captains can agree to vary this, either to two 45-minute halves or otherwise. The game is started or re-started after a stoppage by one player from each side "facing" by placing the ball on the ground between the backs of the two crosses, and then drawing them apart, after which the ball is in play. It can then be advanced by running with it on the crosse, throwing it from the crosse, or kicking it, though no goal, except an "own goal," can be scored by a kick. Only the goalkeeper, who can deflect the ball with his hand, but not catch or throw it, may handle the ball. Players can shoulder opponents when trying to get the ball off the ground, and "body check" them by simply standing in front of them to impede them. A player can also check an opponent's crosse with his own crosse if the opponent has the ball. A foul is penalised by giving the non-offending player a "free position," which means that he is given the ball, and the game is then re-started.

Lacrosse demands speed and stamina, and a high level of skill demands practice, but it is not hard for a beginner to grasp the main objects or master the comparatively simple rules.

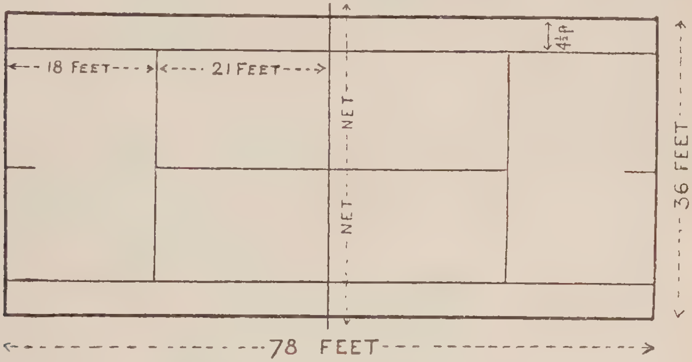
It is interesting to note that Lacrosse, which can be one of the roughest of all games, has been made a suitable game for women by very simple measures, such as the elimination of the body

check; and that there are now more women playing than there are men.

Lawn Tennis.

Originally called Sphairistike—or "Sticky" by those who disliked it—Lawn Tennis was invented in the seventies of the last century as a simplified, outdoor version of Real Tennis (q.v.), using a net, but no walls. It is now far more widely played than the parent game, being popular almost all over the world. As its name implies, it was originally intended to be played on grass, but it is now also played on hard courts of various surfaces, and indoors on wood.

The court is as shown in the accompanying diagram, the outer long boundary lines being the limitations for doubles, and those parallel to them being the boundaries for singles. Both server and receiver score, four points making a game, six games won a set, and two out of three or three out of five sets won a match. Game points are scored "15," "30," "40," and "Game." The system of "vantage" games and sets is used. This means that, if 40-all—called "deuce"—is reached, a player must gain a clear lead of two points to win the game, the winner of the first point after deuce being said to have the "advantage." If the games reach 5-all, the set continues until one player has a clear lead of two games.



NET:—Height 3 ft. 6 in. at posts, 3 ft. at centre.
Diagram of Ground as marked out for Lawn Tennis.

When the game began, there was considerable discussion before this scoring, which is taken from Tennis, was given preference over the straightforward one-two-three system of Rackets (*q.v.*). Much more recently, experiments have been made with the equally straightforward system of Table Tennis (*q.v.*), but the Tennis system survived these, and remains in force.

Service is almost invariably overhand, and the receiver plays the service after one bounce. Thereafter, strokes may be "ground" strokes, played after one bounce, or volleys, played before any bounce. In doubles, either partner may play the ball, but each must serve in turn.

In addition to being played by thousands of people, Lawn Tennis attracts large crowds of spectators. The big annual tournaments, such as Wimbledon, Forest Hills, and Paris, are amongst the major sporting events of the year; as are the Davis Cup competition, open to teams of men from every country in the world, and the Wightman Cup, a women's contest between Britain and the United States. All these events are amateur; but the game also has a top layer of professionals, whose annual world tours are a great attraction.

Marbles.

See Old English Games and Customs.

Modern Pentathlon.

Imagine a king's messenger riding with an important dispatch, and being hotly pursued. His horse is shot, and he has to engage his pursuers, first with his revolver, and then with the sword. Eventually, he breaks away, swims a river, and finishes his journey on foot and running.

That is the "plot" on which is based one of the most interesting, exciting, and testing of all sporting events, the Modern Pentathlon. Often wrongly thought to be a part of Athletics, the Pentathlon is a separate sport, but one that actually consists of five different sports: the five activities, in fact, of the king's messenger in the story, riding, revolver shooting, fencing, swimming, and running. True, the Pentathlon competitor does not have to carry them out one after the other, but he does have to take part in them in that order, one on each of five successive days, both riding and running being across country, the riding on a horse strange to him.

The Pentathlon first appeared in the Olympic Games of 1912, but, in recent years, it has become so popular that, in addition to the Olympic event every four years, there are now annual world championships, as well as national championships in many countries, including Britain. The event was originally designed as one suitable for Army officers, and, though present-day Army training is rather different, most Pentathlon competitors are still servicemen, though they are not all officers. However, a civilian has won the Olympic event, and, in Britain, the Army authorities are willing to provide training facilities for civilian competitors who show signs of reaching a high standard. Many people believe that the "keys" to success in the Modern Pentathlon are swimming and running, and that competitors who are good at them can be taught the riding, shooting, and fencing without too much difficulty.

Morris Dancing.

See Folk Dancing.

Mountaineering.

It is difficult to say when Mountaineering, which is the climbing of mountains, not for any scientific reason, but purely for the sense of achievement and for sport, began, but, by the middle of the sixteenth century, Zürich student had formed an Alpine club, and the value and uses of ropes and even dark glasses were known. Amongst famous peaks, Mont Blanc was first conquered in 1786, the Jungfrau in 1811, and the Wetterhorn in 1854. By then, Mountaineering

was becoming organised, and there were systematic assaults on the Alps; in Norway, the Caucasus, and Corsica; in the Rockies and the Andes; in Japan, New Zealand, and Kenya; and, of course, in the Himalayas, where over thirty years passed between the first assault on Everest and its conquest. There are still unconquered peaks in the Himalayas, but it is not only first ascents that interest mountaineers, who can find exciting sport in many parts of the world.

The way to master Mountaineering is to accompany and watch experts. The essential qualities include perfect physical fitness and perfect nervous fitness, and to them must eventually be added a detailed knowledge of snow, ice, avalanches, glaciers, crevasses, and cornices, as well as of the different techniques of ascending, descending, and traversing. Also to be learned is step-cutting, which is hard manual labour carried out under difficult conditions that are also conditions that make perfect workmanship literally a matter of life and death. Clothing, including properly nailed boots, and equipment, including ropes, ice axes, knives, maps, compasses, medical supplies, and a number of other things, must be of the best, and yet, at the same time, it must be light.

Apart from the more obvious dangers, one of the ills to which the mountaineer is heir is mountain sickness, which may take one or more of several forms, including actual sickness, headaches, drowsiness, shortness of breath and palpitations, and general bodily weakness, particularly in the legs. These are about the last sensations that a man engaged in an ascent would choose to experience, but, at high altitudes, the only way to avoid them is by using oxygen.

Rock-climbing. Mountaineering is generally taken to mean snow and ice climbing, but allied to it is Rock-climbing, which demands the same perfect physical and nervous condition, and, in place of knowledge of snow and ice, knowledge of several very different kinds of rock. Ascending, descending, and traversing all apply, and so do ropes, and the rock-climber should, in fact, be something of a knot expert. Light, rope-soled shoes replace the mountaineer's nailed boots. Skye is a favourite haunt of rock-climbers, and, in view of what might justifiably be called the antiquity of climbing, it is surprising to note that the highest peak in Skye, Sgurr Alasdair, was not conquered until 1873.

Netball.

Netball, which is played exclusively by women, is similar to Basketball (*q.v.*), but it is played seven-aside, does not allow substitutes, and the goals have no backboards. It is almost always played outdoors on asphalt or grass.

Nine Men's Morris. *See* **Old English Games and Customs.**

Old English Games and Customs.

The story of England had its beginnings a very long time ago, and many of England's present-day customs, recreations, sports, and games can be traced far back in that story. Some, of course, have undergone very considerable changes, but the links with the past are still clear.

On 1 May, for instance, girls still awake in some villages to the realisation that they are to be May Queens, and to reign for a day, though they may not realise that they are preserving a custom that can point to origins in the days of the Druids, and that, in Tudor times, would have sent them and their fellow villagers out to spend the preceding night in the woods, gathering branches of trees and flowers with which to decorate their houses. Maypoles and morris dancers also belonged to May Day, and they can still be seen in England, and not only on that day.

More local, even quainter, but equally traditional is the trial for the Dunmow Flitch of Bacon in the village of Dunmow in Essex. The original conditions offer this award to any married couple who will go to the twelfth-century Augustinian priory, and there kneel on two sharp-pointed stones and swear that they have neither quarrelled nor repented of their marriage within a year and a day of its celebration. This award has lasted into modern times, not annually, it is true; but then it never was given annually, for it was instituted in 1244, and first claimed in 1445.

One annual event that is as traditional as it is strenuous in the Whit Monday cheese-chase at the village of Brockworth, near Gloucester. Records of this go back to the days of the Stuarts, for that was when they started to keep records of a custom that was already old then: so old that its origins are unknown, though they had to do with the villagers' cattle-grazing rights. A massive round cheese is rolled down nearby Coopers Hill, which has a gradient of one in four throughout its 150 yards; and, with a certain amount of risk to life and limb, the chasers tear down after it, the cheese being the prize for whoever catches it. Sometimes, the cheese hits a bump, and literally leaps out of reach over the hedge at the bottom of the hill, but the chase continues, the prize going to the first pursuer to reach the hedge, where "catchers" wait to halt the headlong rush of the runners. Despite the obvious dangers, the records to date mention nothing worse than a sprained ankle.

This brings us into the realm of sports and games; and, though the most popular game of to-day, Football, is, in anything like the form in which we now know it, a comparatively recent growth, it can claim some relationship with the customs of an earlier day. For its remote ancestry, it might point to Harpastum and Campball, which existed before the Norman Conquest; and it can certainly claim to have been one of a batch of popular recreations banned in the interests of Archery. The football of those and later days, however, took the form of struggles between whole villages, the players battling *en masse* over a cross-country course of several miles. People past whose houses the battle was likely to rage prudently barred and shuttered all windows and doors, awaited the cessation of hostilities with anxiety, and probably helped to push this particular custom into oblivion.

The oldest English games are old indeed, and not only Football, but Cricket, too, had its remote ancestors, from which the descent to to-day can be traced rather more directly. They included Creag, Cat and Dog, and Rounders. Creag, which was played at the time of Edward II, used a curved stick, called a "cryc," as a bat, and a tree-stump as a wicket. Cat and Dog, which came later, was a game for three, two batsmen defending holes 13 yards apart, and trying to hit away the piece of wood that the third player aimed at the holes, the bats being the "dogs" and the piece of wood the "cat." It is interesting to note that Baseball's accepted ancestors are games called One Old Cat and Two Old Cat, which is a clear indication of a common origin for cricket and baseball. Though these and other games have places in Cricket's ancestry, some of them remained popular after Cricket had arrived, and rounders is still a popular children's game.

The beginning of Athletics can also be found in old England. Putting the weight and casting the bar, which was a forerunner of throwing the hammer, were popular with the courtiers in Tudor days, while other events, including javelin throwing, were practised by ordinary people of the same period. Later on, the early hammer throwing also spread beyond the Court, and was even attempted by women, which modern hammer throwing is not.

Tournaments and jousts were popular from the Middle Ages until Tudor times. These were combats between mounted men, a joust being single combat, while a tournament involved many contestants. They were succeeded by dismounted combats, which still take place to-day in the sport of Fencing. Those taking part in tournaments and jousts were required to swear an oath to the effect that they were com-

peting purely for sport; and those taking part in the Olympic Games and certain other big sports meetings to-day swear an almost identical oath. Somewhat similar to jousting, but not restricted, as jousting was, to the nobility, was Tilting at the Quintain, which was practised both mounted and on foot, and in which a lance was thrust at a wooden target, which, if not struck accurately, swung round and struck the tilter.

Other old games, clearly the ancestors of modern ones, included Handball, which became Fives, but which is still handball in the United States; Battledore and Shuttlecock, still a children's game, but now developed by adults into Badminton; and Shovelboard, an elaborate game, for the nobility, which consisted of sliding weights down a long table marked with lines, and which is certainly a forerunner of Shove-Ha'-penny. Another probable ancestor of Shove-Ha'penny was Squails, in which a coin was placed in the centre of a round table, and players tried to push their "squails," or discs, as close to the coin as possible, distances being measured by an instrument called a "swoggle." Also known as Skayles and Keels, this game appeared in the sixteenth century, lasted into the nineteenth century, and, under the name of Keels, achieved a poetic mention in Sidney's "Arcadia."

Archery. Archery goes back hundreds of years, to the days when the bow was the chief weapon of war, and, because of that, practice shooting and contests were officially encouraged: encouraged, in fact, to the extent that other popular recreations, like Football, Quoits, and Bowls, that might have interfered with it were banned, though the bans were always largely ignored. Eventually, the bow disappeared from the battlefields, but, to this day, it has remained popular as a means of recreation and sport. Through the centuries, archery contests were generally of three kinds: shooting at a mark, or target; shooting purely for distance, though this was more popular abroad, in countries like Turkey, than in Britain; and shooting at "rovers," in which two or three archers would cover a cross-country course, taking it in turns to select a mark at which to shoot. To-day, archery, which retains enough of tradition in its terminology to remind the archer that he is following in a very long line, consists of shooting at a target containing rings coloured, going from the centre outwards, gold, red, blue, black, and white, the values being respectively, nine, seven, five, three, and one.

Knur and Spell. Knur and Spell belongs to Lancashire and Yorkshire, and originated in a children's game called Trap and Ball. The player uses a wooden club, the striking end of which, called the "pommel," is shaped something like a bottle, though it has a flat hitting surface, with which to hit a small ball, which he himself releases from a trap by means of a trigger. The ball, which is the "knur," weighs ½ ounce, measures 1 inch in diameter, and was originally wooden, though, later, porcelain was used. The trap is the "spell," and consists of a small brass cup with a strong spring, which is kept down by the trigger. The fixing of the spell is an elaborate process requiring the use of a spirit level, and, when it is in position, a player is allowed 10 minutes to adjust the tension of the spring. Players generally have their own spells. Each player has five consecutive hits, or "rises," and scores one point for every 20 yards covered.

Marbles. Marbles is supposed to have been played in ancient Egypt, but its popularity, with adults as well as children, in the England of the Middle Ages entitles it to count as an old English game. Marbles are often made of clay, but better ones are glass, and the best are pure marble. These are called "alleys," or "alley taws." There are several games of marbles, but they all involve the aiming of a marble at a target, which may be another marble or an opening, by bowling or "shooting" it along the ground. In shooting, the marble is held between the thumb and forefinger, with the knuckle of the forefinger on the ground, and is then flicked away.

Perhaps the best-known game is Ring Taw, in which players shoot from one circle at marbles placed in another about 6 feet away. Fortifications and Increase Pound use concentric circles, players shooting at marbles in each circle in turn. Three Holes and Handers involve shooting at holes in the ground; Arch Board or Bridge, at arches in an upright board; and Die Shot, at another marble on which a numbered die is balanced.

Nine Men's Morris. Nine Men's Morris is a fourteenth-century game for two, usually played outdoors on a diagram marked on the ground, but sometimes played indoors on a board. The diagram consists of three squares drawn inside each other. In addition to the outlines of each square, there are lines from the centre of each side of the inmost square, through the centre of the sides of the middle square, to the centre of the sides of the outermost square. The corner of each square and the centre of each side are the 24 points of importance in the game. Each player has nine men, often counters, and they play in turn, placing a man at an unoccupied point, and endeavouring to place three men in one row, continuing, when all the men are placed, to try to form rows by moving men along the lines. The completion of a row entitles a player to remove, or "pound," one of his opponent's men, the object of the game being either the capture of all the opposing men or blocking them so that they cannot move. The game has many variations, and many names, including ninepenny morris; fivepenny morris, for a version played with five men; and merils, marls, marrels, morals, morris and miracles, all for a version played with three men.

Pall-Mall. Two London thoroughfares, Pall Mall and the Mall, are reminders that Pall-Mall was once popular. Often described as a forerunner of Croquet, it was really more like a form of Golf, a game that arrived at about the same time, both having a common, if remote, ancestor in the Roman game, Paganica. In Paganica players walked across fields hitting a small, leather ball at trees with a curved stick, the object being to reach the target in the fewest possible strokes. It was played by country people, whereas pall-mall, which achieved rapid popularity in the seventeenth century, was a game for the nobility, though other people played simplified versions of it. Pall-Mall was played in special alleys, sometimes ½ mile long, and often surrounded by walls. A boxwood ball a foot in circumference had to be played down the alley, in which were a number of iron arches, in the fewest possible strokes. The player drove off as in golf, but, on reaching the arches, not only changed his club, but also substituted a small steel ball for the boxwood one.

Quoits. Dating back to the fifteenth century, Quoits is one of those ancient games that had the distinction of being banned because its popularity was such that it was believed to be keeping people from archery practice. The ban was not effective, and it continues to this day, though it is now less played than it used to be, Scotland, the North of England, and Suffolk being, perhaps, the last main strongholds. The pitch consists of two circles or squares of clay, 18 yards apart, and each having in its centre an iron pin, called the "hub," 1 inch of which remains above the surface. The quoits are iron rings with a diameter that must not exceed 8⅝ inches. The weight is not fixed, but is often 3 lb. or more. The object of the game, which can be either "singles" or "doubles," is to throw the quoit over or near the hub from the opposite point, 18 yards away, one point being scored for each quoit nearer the hub than the opponent's quoits, and two being awarded for a quoit that drops over the hub, called a "ringer." No points are awarded if opposing quoits are the same distance from the hub, and none are awarded if each side has a ringer. A game is 11 points in "singles," and 15

points in "doubles." Quoits developed from pitching actual horseshoes, and, to this day, some players make their first practice attempts at it with horseshoes. It is, in fact, to the large-scale disappearance of horses, and, therefore, of horseshoes, from country life that some people attribute the drop in the popularity of quoits. It is interesting to note that, in the United States, horseshoe pitching itself is a game, and one that is still popular.

Shove-Ha'penny. Shove-Ha'penny is an old English game that still retains an enthusiastic following. It uses a board, made of wood or slate, and divided by parallel lines across it into nine spaces, or "beds," the edges of the board being cushioned. The "halfpennies" may be actual halfpennies, but they are more often round metal discs. The object of the game is to shove the halfpennies into one of the nine beds, the shoving usually being done with the ball of the thumb, though any part of the hand may be used. First turn is decided by shoving halfpennies at the number nine bed, the best attempt winning. A turn consists of five halfpennies, and the winner is the first player to shove three halfpennies into each bed, halfpennies that touch the cushion not counting. Should a player place more than three halfpennies in any bed, his opponent can claim the excess ones, if he needs them, but the final point of a game cannot be won in this way.

Skittles. An ancient game, played in a special alley, level, about 12 yards long, and 3 or 4 yards wide, Skittles consists of throwing a flat-sided, wooden ball, weighing about 10 lb. and called a "cheese," at nine pins, each weighing 7–9 lb. arranged in a diamond formation 6–8 yards away, the thrower being allowed one forward step while throwing. Scoring is either by knocking down as many pins as possible in a fixed number of throws, or by knocking down 31 in the fewest possible throws. Still another method is to try to knock down the full set of nine in three or fewer throws. Alternative games include one using four pins, and Dutch Skittles, in which a round ball is bowled, and the centre, or "king," pin must be hit first. This resembles the American game, Bowling, which uses ten pins, the tenth having been added when "Ninepins" was made illegal because of the gambling on it.

Stoolball. Yet another ancestor of Cricket, Stoolball is still a popular girls' game. The wicket is a board a foot square on a pole 4 feet 8 inches high, the bat has a round striking surface, and the ball is rubber. Wickets are 16 yards apart, and ten balls constitute an over.

Old-time Dancing. *See* **Ballroom Dancing.**

Oxford and Cambridge Boat Race. *See* **Boat Races.**

Pall-Mall. *See* **Old English Games and Customs.**

Parachute Jumping

Parachute jumping is generally regarded as a last-resort safety measure, to be undertaken only in a supreme emergency, and with considerable anxiety; but it is now also a recreation and a competitive sport, practised entirely voluntarily, and for enjoyment. This form of jumping may be said to have grown out of the Second World War, in which jumping was used to a far greater extent than ever before, and not only for escape in an emergency. Now, international competitions take place, and the sport has an enthusiastic following in Britain.

Parachute jumping as a sport involves jumps of particular kinds, including landings in a certain area, marked by a circle, and demonstrating turns and body control in the air, the parachutist regulating his direction by pulling down the lines of the parachute. Jumps of this kind may be made from about 6000 feet.

The first point that occurs to many people when they think about Parachute Jumping is that it is extremely dangerous. However, those who jump as a recreation maintain that this is not so, and that it is about as dangerous as skiing. Injuries are few and slight, and, in three years, none of the hundred-odd members of the British Parachute Club, of Fairoaks, Surrey, suffered anything worse than a sprained ankle. The parachutes used are so reliable that they still work even if they have been badly packed. A parachute consists of twenty-eight sections, called "gores," each divided into four panels, so that, even if a hole should stretch right across one gore, which is rare, the remainder of the parachute remains intact, and will bring the jumper down safely. As an additional precaution, jumpers wear a small reserve parachute on the chest, but this is hardly ever needed.

Training, which generally takes place at weekends, starts with a period of learning how to fall, how to judge wind direction and speed, and how to pack a parachute. The first actual jumps are from 1500 feet. Both men and women take part in Parachute Jumping.

Party Games

Parties can be for any of quite a number of age groups; and, when it comes to Party Games, it is not easy to say at what age a particular game ceases or starts to be fun. However, given a number of games from which to choose, the organiser of a party should be able to select those suitable for the occasion and the guests.

Many years of popularity perhaps confer the right to first mention on a batch of "classic" games suitable for young children, starting with Musical Chairs and a less-well-known variation of it. Musical chairs requires a line of chairs, one facing one way, and the next one the opposite way, and so on. Someone starts playing the piano, and the players, who should number one more than the chairs, move round and round them. When the music stops, they sit down quickly, the odd one out dropping out. The game continues with one chair removed, and carries on until the last two players are contending for the last chair. The variation is Going to Jerusalem, which needs a line of chairs similarly placed, and numbering one less than the players, and also a piano accompaniment. The players start seated, the remaining one walking round and round them, chanting "I'm going to Jerusalem." Every now and again, he knocks on the floor behind a chair, and the player seated there must rise and follow him. He carries on, reversing his direction at will, until all the players are following, after which the game is exactly the same as musical chairs.

Hunt the Slipper has all the players except one seated in a circle, with their knees raised so that the slipper can be passed underneath them. The extra player stands either outside or inside the circle, and tries to spot the slipper, and tap a player when he is in possession of it. For Hunt the Thimble, all the players except one go out of the room while the selected player hides the thimble in such a way that it is visible without anything having to be moved. He then summons the others with the formula, "Hot beans and melted butter, ladies and gentlemen, come to supper." The others then search for the thimble, being told if they are "hot," "warm," or "cold." As each player spots it, he sits down quietly, and lets the others continue their search. Up Jenkins has two teams seated on opposite sides of a table, one team having a small coin, which one player holds. The leader of the other side then says, "Up Jenkins," at which the first team hold their hands, with fists clenched, above the table. Next comes a command, which is either "Smash," at which the hands come down flat on the table, or "Crawl," at which they come down clenched and then slowly spread the fingers, the coin holder always complying, but trying to conceal that he has it. The other side then order various hands to be removed, the object being to remove all but the one with the coin.

In Charades a group of players go out of the room and select a word for the others to guess. This should have two syllables, each itself a word. The group then act three short scenes, the first representing the first half of the word, the second the other half, and the third the whole word. There are several ways of acting Charades. In one, each scene actually represents the word or syllable in some way; in another, it has nothing to do with it, but the word or syllable is mentioned; and in still another, it is both represented and mentioned. In historical Charades a well-known figure of fact or fiction with a name containing about five letters is selected, and short scenes are acted about different characters whose names begin with the various letters in the chosen name. Similar to Charades is Dumb Crambo, in which those in the room select two rhyming words, decide on one to be acted, then call in the "actors" and tell them the other. If they start to act a wrong word, the spectators hiss, but, when the right word is reached, they clap. Both actors and audience remain silent. The similarly named Crambo requires each player to write a noun and a question on separate pieces of paper, put them into two hats, draw another paper out of each, and write an answer to the question on one bringing in the noun on the other. Capping Verses is a rhyming game in which one player invents a line, and the others have to supply a rhyming line in the same metre.

Perhaps the most famous of all paper games is Consequences. Each player has a sheet of paper divided into columns, writes an adjective applicable to a man in the first column, folds it over, and passes it on. He then writes a man's name in the second column of the paper he receives, folds and passes it, and carries on with an adjective applicable to a woman, a woman's name, a place, a remark by a man, a remark by a woman, what the consequence was, and what the world said; after which, the papers are read out. Lost and Found is a variation, in which the items required are the object lost, by whom, when, where, by whom it was found, in what condition, where, and what the reward was. A simple paper game is Squares, in which several lines of dots are marked on a sheet of paper. Each player in turn joins two dots with a line, the object being to collect squares, which go to the player who makes the line that completes them. Advertisements has sections of well-known advertisements displayed with the name of the product omitted, players having to write down as many of the names as they can. This is an observation test, as is Kim's Game, in which a number of small objects on a table or a tray are displayed for one minute, after which the players write down as many of them as they can.

Verbal guessing games are numerous. In Proverbs, one player goes out of the room while the others choose a proverb, and allocate one word of it to each person. The player then returns and asks questions, the answers to which must include the speaker's particular word. In Guess Who, a character of fact or fiction is chosen, and has to be guessed by questions that must be answered "Yes" or "No." In How, When, and Where, a noun with several different meanings has to be guessed by questions that are restricted to "How do you like it?" "When do you like it?" and "Where do you like it?" Biographies is a game generally popular with children. An adult tells a brief, but accurate, life story of some famous historical character, omitting any mention of the character's surname. The winner is the first listener to interrupt the story by calling out the missing name.

Perhaps the most popular of all question-and-answer games is Murder, which starts with cards being dealt round so that only the recipients can see them. This is to allot the "parts," one particular card indicating the murderer, and another the detective. The detective announces himself at once, but the murderer keeps quiet. All the lights are then turned out, and the players disperse about the house. The murderer counts fifty, and then commits his murder by pretending to stab another player, who must stand still and count fifteen before screaming to announce the murder. The scream brings the detective, who puts the lights on, and makes what mental notes he wishes of the various players' positions, which, with the exception of the murderer's, must remain unaltered from the moment of the scream. The detective then gathers the players together, and questions them, everyone being compelled to answer truthfully, except the murderer, who can lie as much as he likes, unless he is directly accused by the detective, when he must own up. The detective is allowed three direct accusations. A variation gives an additional part to a detective's assistant, who does the gathering in of the suspects, and reports on their respective positions to the detective.

Finally two word games that generally amuse children. In What's the Word two players quietly select a word with several meanings, and start to discuss one of its meanings, without mentioning the word, soon switching to another meaning, and then another, or else back to the first. If another player thinks he has guessed the word, he joins in the conversation. He is soon proved wrong or right; and, if wrong, he drops out again, but, if right, he then takes over with a partner whom he chooses. Travels gives one player a special part, another acting as an intermediary between him and the others. The player whispers to the intermediary the name of a place, which may be anywhere in the world, to which he intends to travel. The intermediary then asks three others, who do not know the place, one question each, these being "How is he to go there?" "How is he to travel about when he gets there?" and "How is he to come home again?" The answers must be methods of transport, and the first player then tells a brief story of his journeys and adventures, during which he must abide by the means of travel suggested.

Patience.

Patience is a card game for one person, and, though there are few different games for one, there are countless different forms of Patience. There are some using one pack, and others using two, almost all of them starting with the setting out of the cards on the table according to fixed rules, and having as their object the building up of the four suits on their aces.

The game that might almost be called the basic form of single-pack patience starts with a row of seven cards, only the left-hand one being exposed. Underneath this, and overlapping it, comes a row of six cards with the left-hand one exposed, and so on down to a "row" consisting of only a single exposed card, the exposed cards being left uncovered in each decreasing row. The object is to take out first the aces, and then the cards from two up to king, building each suit on its ace. From the "lay out," exposed cards can be moved when it is possible to put one on a card one pip higher in value of the opposite colour, when any card left uncovered by an exposed card can itself be exposed. The undealt cards can be played three at a time, the top one of each three being "playable," with the one underneath becoming "playable," if the top one is, in fact, played. The undealt cards can be played through three at a time in this manner as often as desired. A slight variation of this game allows the undealt cards to be played through one at a time, but this can be done only once.

Another single-pack game starts with a row of nine exposed cards, with, below it and overlapping, a row of eight, and so on down to one, all the cards being exposed, and the right-hand one being left uncovered in each decreasing row. The remaining seven cards form a separate row at the bottom. The object and the "move" are the same as in the previous game, only one card being moved at a time, and any card being eligible to fill any vacancy that might occur in the top row. Cards in the separate row can be played as required, but, once in the "lay out," they must remain there. This game is called King of the Belgians, and the last seven cards are referred to as the Belgian Reserve.

One to Six is a two-pack game. The player deals out a row of four cards, then discards two to a rubbish heap, and carries on like this until all the

cards have been used. If, however, while doing it, he comes across any aces or kings, he takes them out, up to one of each from each suit, subsequently also taking out any that will fit on to these, building up from the aces and down from the kings. Then he goes through the rubbish heap, extracting any cards that will fit on the eight piles. The dealt-out cards, with the rubbish-heap cards, are then dealt again in the same way, the object being to complete the eight built-up suits in three rounds of dealing.

At first sight, it might appear that there is little point in Patience, which does nothing to inculcate "card sense" that might prove useful in ordinary card games. However, the fact that it has its own fascination is shown by the countless thousands who play it at one time or another, and by the virtual inability of anyone seeing a game of Patience in progress to refrain from studying the "lay out," and offering advice. There is scope for a certain amount of skill in the management of the cards, as, for instance, in the first two games described above, in which it is advisable to build up the suit-piles fairly evenly, as a long run in one suit will leave a disproportionate number of cards of one colour, thus restricting further moves.

Polo.

Polo, one of the oldest of all games, originated in Persia, then spread in one form or another to China, Japan, and India, eventually being brought from India to England by cavalry officers in the second half of the nineteenth century. Later, it was enthusiastically taken up in the United States and Argentina. Played four-aside, and mounted, on a pitch that should measure 300 yards by 160 yards, its object is to score goals by hitting a 5-ounce ball through goals 24 feet wide with a stick consisting of a long cane fixed at a slight angle into a wooden or bambo striking head. The game is divided into periods, called "chukkas," the number of periods varying slightly, as may be agreed for particular games.

Formerly, Polo was a game for the wealthy, for it entailed owning and maintaining a string of trained ponies. In recent years, however, certain stables and riding schools have provided facilities for playing and practising Polo, and these facilities include the hiring out of ponies. This apparently simple and obvious step is actually quite a revolutionary innovation that has brought Polo within the reach of almost anyone who wants to play, and thereby increased the popularity of an ancient and exciting game that might otherwise have died out because of the expense involved.

Pot-holing.

Pot-holing might almost be described as mountaineering in reverse, for it consists of the descent, perhaps to a depth of 80 or 90 feet or more, and probably by a precarious rope-ladder, of pot-holes caused by the action of carbon-charged water on rocks of the chalk or limestone type. Pot-holing is pursued as a recreation, but it can also lead to extremely useful geographical and geological discoveries, and it certainly does not lack danger.

Pot-holes are plentiful in Britain, particularly in Derbyshire and Yorkshire, for there are many instances of streams plunging into the earth, to reappear many miles away. While underground, they may alter course considerably, even to the extent of turning almost back on themselves, and they may cross other underground streams. Where many of them reappear, or where many of those that appear start from, is still unknown, for the exploration of these underground courses is of comparatively recent origin, and is still far from complete. It is, in fact, exploration of this type that pot-holers undertake, and, if, in doing it, they subject themselves to considerable discomfort and some danger, they also discover a fascinating, and even beautiful underground world. Once below the ground, even quite small pot-holes often lead to winding passages, tunnels, and underground caverns containing icicle-like formations both descending from the roof and ascending from the ground. Called stalactites and stalagmites, respectively, these sometimes meet to form weird columns and pillars, all these and other strange formations being caused by calcium deposits. Seen in the light of the pot-holers' torches, some of these caverns are wonderful sights, and new tunnels and caverns are always being discovered.

For those who have the nerve for it, Pot-holing can be an enthralling, and also useful, recreation, but it is one that the newcomer should practise only in company with experienced pot-holers, and it is one in which the loss of a torch can be a major disaster.

Public School Football.

All the forms of football popular to-day grew out of the games played at various English Public Schools a century and more ago. These games differed widely, the rules often depending on purely local considerations imposed by the available space. The Rugby game (*q.v.*) in its modern form is, of course, still played, both at that school and far beyond it; and other games that still survive at the schools that originated them are the Eton Field Game, the Eton Wall Game, the Harrow Base Game, and the Winchester Net Game.

Punting.

Punting consists of propelling a long, narrow, flat-bottomed boat with a pole, the punter standing up; and it can be either a pleasant, leisurely recreation or a fairly strenuous competitive sport. The sporting side is governed by the Thames Punting Club, which has headquarters on the Thames at Staines in Middlesex. Women, as well as men, take part in competitive events.

Punting as a sport has the unique distinction of being confined, not only to one country, Britain, but to one river, the Thames; though in some parts of the world boats poled from a standing position are used for various purposes. There have been rumours that Japan has, or had, a similar sport, but these have never been authenticated.

Quoits. *See* Old English Games and Customs.

Race Walking. *See* Athletics, Walking.

Rackets.

Rackets is a fast, racket-and-ball game, played on a court measuring 62 feet by 31 feet, and using walls. A game consists of 15 points, unless 13-all is reached, when the non-server can set the game to 3 or 5, or 14-all is reached, when the non-server can set the game to 3, the game going to the first player to score the prescribed number of points. Only the server scores, the receiver taking over service when he makes a winning shot. When served, the ball must strike the front wall above a line called the "cut" line before striking any other part of the court, but, in play, it may be played either on the volley or after one bounce. If a player impedes his opponent, it is a "let," and the point is re-started.

Real Tennis.

Tennis, sometimes called "Real," "Royal," or "Court" Tennis, is a court game played with rackets and balls that has been called the King of Games, and that was once certainly the game of kings. Henry VIII played, and it is mentioned in Shakespeare's *Henry V*; but the first kings to play were of France, where the game originated.

It is a complicated game, and no description could give anyone who had never seen it an accurate idea of what it is like. Most racket-and-ball games use either a net, over which the

ball is hit, or walls, against which it is hit, but Tennis uses both. Also, in most racket games, players change ends after so many games, but, in Tennis, they may do so during a game. Matches are in games and sets, a player winning six games completing a set towards the two out of three or three out of five that will make the match.

There are not many Tennis players in the country—there are only about a dozen courts—and very few women have ever played. People who do play, however, most of whom play other games as well, are almost unanimous in voting it the best of all games.

It is said that the term "love," used in so many games to indicate "nought," comes from Tennis, the original French term being "l'œuf," which, in that language, actually means "egg": an egg being, of course, something like the figure used for "nought." This derivation is not sufficiently well documented to be accepted as definite fact; but it is interesting to note that, in Cricket (*q.v.*), the term used for a score of "nought" is a "duck," or, in full, a "duck's egg."

Revolver Shooting. *See* **Rifle Shooting.**

Riding and Show-jumping.

The almost complete disappearance of the horse from everyday life has been followed by an increase of interest in Riding as a recreation. This is at least partly due to the great attention paid in recent years by both Press and television to one particular branch of horsemanship, Show-jumping. Before learning to jump, however, it is necessary to learn to ride, and many people never go, and have no wish to go, beyond the ordinary, unspectacular riding for pleasure that is called "hacking."

A great deal has been said and written about "correct" riding style, but, in actual fact, there are many different styles. The cavalryman, for instance, bends the leg to some extent; the Red Indian bends it to a much greater extent, more or less in the style that has been adopted by American jockeys; and the cowboy rides with an absolutely straight leg. Yet all these are expert horsemen. To assist in acquiring the normal English style, which is very close to that of the cavalryman, there is an old jingle that is now much less heard than it used to be, but is probably none the less helpful or accurate for that. It runs: "Your head and your heart keep up. Your hands and your heels keep down. Your knees keep close to your horse's sides, and your elbows close to your own." Old or not, anyone who learns it, and then builds up a certain amount of experience of putting it into actual practice is well on the way to becoming a rider.

It has been said that Riding is excellent exercise for the horse, but, whatever its merits or demerits as a medium of actual physical exercise for the rider, it certainly provides him or her with a delightful and beneficial form of recreation in the open air. For those who like the idea of Riding, no matter how inexperienced they may be, there are "pony trekking" holidays. These take place at fixed centres, where about two days are spent in simple instruction in such elementary things as saddling, mounting, starting, and stopping the horse, after which day expeditions cover the surrounding countryside. Those who feel they would like to combine their Riding with something competitive might start with gymkhanas, which are sports meetings that generally include mounted equivalents of such novelty events as obstacle races and needle-threading races. For the more ambitious, gymkhanas could even be the first step towards the top-class competitive sport of Show-jumping.

Show-jumping. A Show-jumping contest is a mounted competition over a circuit of jumps, which the entrants attempt one at a time, each having the field to himself or herself, and being free to concentrate entirely on the jumps, without having to worry about other riders. The jumps, which have to be taken in a certain order, are of many kinds, including fences, double fences, walls, and water. Scoring is by points against, called "faults," so many being debited against an entrant for falling, knocking down an obstacle or displacing part of it, refusing, and other mistakes. Though the event is in no sense a race, there is normally a time limit that must not be exceeded, and, in some events, bonus points are awarded for fast rounds. Show-jumping is not restricted to riders who own their own horses, for some owners do not want to compete themselves, and are only too pleased to let good horsemen take their jumpers round for them. Incidentally, inexperienced riders taking up jumping for the first time will probably find it advisable to make some slight changes in their method of sitting in the saddle. Jumping needs a firm seat, and the novice rider may find it necessary to shorten the stirrups a little.

Allied to Show-jumping, and coupled with it in the difficult three-day competitions, is dressage. This is simply a mounted display revealing that the horse is obedient, balanced, supple, and, in a word, trained; and is a simplified form of the better-known "haute école," or highly-schooled riding. Good riders who seek absolute perfection can, if they are willing to pay for it, take an intensive course of haute école riding and all forms of horsemanship at the most famous of all riding schools, the Spanish Riding School in Vienna. Courses, which are conducted in German, consist of eight hours training a day for six months, and informality is not encouraged, the regulation dress for students being a bowler hat, black jacket, and white breeches. Riders who fall are immediately assisted by an attendant armed, not with a stretcher, but with a clothes brush.

Rifle Shooting.

Considered as a sport, Rifle Shooting, which might almost be called the modern equivalent of archery, had its origins in virtually the same conditions and circumstances that had popularised the older weapon five hundred years previously; though, unlike archery, it did not enjoy legislation aimed at abolishing other recreations in its favour. Both were encouraged because, in their respective periods, efficiency at them meant, not only success in competitions, but also the most effective defence in time of war, the great period of the rifle's encouragement for this reason being the latter half of the nineteenth century. Archery as a sport survives to the present day, and Rifle Shooting as a sport continues, though it can no longer be regarded as the most effective weapon.

With a normal rifle, with a calibre of about ·300 inch, competitive shooting is at ranges from 200 yards to 1000 yards, and there are many competitions, the greatest of them being the annual contest at Bisley, Surrey, for the Queen's Prize. Almost equally popular, however, is small-bore shooting, with a calibre of ·22 inch, and this, too, offers many annual competitions.

Revolver Shooting. Revolver shooting, often called pistol shooting, is also a competitive sport, and a very difficult one. Impressions gained from cinema and television screens might lead anyone who has never fired one to think that the revolver is an easy weapon to fire without fuss and with devastating effect. It is the very reverse of this. It is fired, not from the hip, but with the extended arm raised, which is how, in real life, it was generally fired in the old West. It is extremely difficult to hit even a man-size target at 10 yards, and very few people can call themselves good revolver shots, just as few of the old Westerners were good revolver shots. The difficulty is caused by the tremendous "kick" of a weapon that is held, not by both hands and pressed into the shoulder, as a rifle is, but by one hand. A revolver has sights, but the normal method of aiming is by using the "instinctive pointing sense," which is based on the fact that, if you point your finger at an object in the ordinary way, without, of course, taking a careful sight along it, you will, in fact, be pointing accurately. The same applies when pointing a revolver.

Rink Hockey. *See* Skating.

Rock Climbing. *See* Mountaineering.

Roller Skating. *See* Skating.

Rowing.

Rowing, meaning simply taking a boat out on the sea or a river for a short period, is a pleasant recreation and a healthy exercise, but competitive rowing is one of the most strenuous of all sports.

A racing oarsman either rows, which means that he uses one oar, or sculls, which means two oars. Races are of various kinds, the best-known being for crews of eight oarsmen with a cox. Then there are races for crews of four with cox, and for crews of four without cox. There are also events for pairs with cox, pairs without cox, double sculls, and single sculls. Eights, fours, and pairs row, while double and single scullers, of course, scull. In fours and pairs without cox, and in all sculling, the oarsmen steer themselves.

Race Rowing is mainly a river sport, but there are races on the sea. For these, crews are usually fours with cox, and they use heavier boats than the normal racing "shell." (*See also* **Boat Races.**)

Rugby Fives. *See* Fives.

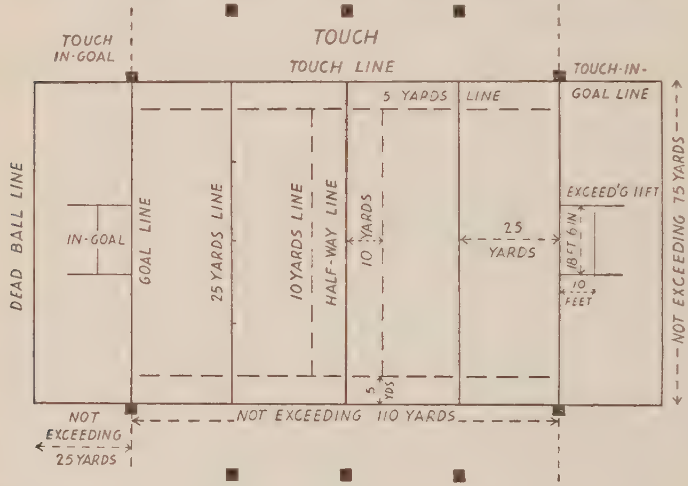
Rugby Football.

As its name implies, Rugby Football is based on the game played at Rugby School in the days when football was not organised and various schools played to their own rules. The story of how the Rugby game originated is well known and widely accepted, but it is definitely not accurate and possibly almost entirely apocryphal.

The story is that, in 1823, a boy named William Webb Ellis disregarded the rules of that time by handling the ball, and that handling was subsequently made legal. In fact, handling the ball by catching it was allowed at Rugby before 1823, so, if Ellis was responsible for an innovation, it was not by handling the ball, but by running with it after catching it. Running with the ball certainly became, and remains, the leading feature of Rugby Football; but the story that Ellis was responsible, though commemorated by a plaque at the school, was first heard years after Ellis's death, and he never knew of the fame that became his. He was definitely at Rugby at the time, though, and, a few years later, he played in the first-ever Oxford and Cambridge cricket match.

The spread of the game beyond the school that originated it has led to, not one, but two games of Rugby Football, Rugby Union and Rugby League. About twenty-five years after the game had become organised, with the Rugby Union as its governing body, there was a dispute on the question of legalising payment for time lost from work by players. The Union would not agree to this, so twenty-two clubs, mainly in Yorkshire, seceded and formed the Northern Union, now the Rugby League. Both bodies originally played the same game, but now, after over sixty years of independent existence, during which each has made various rule changes, there are some important differences.

Rugby was originally played twenty-aside, but it is now fifteen-aside in R.U. and thirteen-aside in R.L., the positions being seven backs and eight forwards in R.U. and seven backs and six forwards in R.L. Played on a pitch marked out as in the diagram, and with an oval ball, Rugby is mainly a handling game, the chief object being the grounding of the ball behind the opponents' goal-line. This is a "try," which counts three points, and entitles the scoring side to an attempt to score a goal by kicking the ball over the crossbar from a point measured in a straight line from where the ball was grounded. Other forms of goal are penalties, which may be awarded anywhere, dropped goals during play, and goals from a "mark," after a player has signalled a "fair catch" of the ball during play by shouting, "Mark." In R.U. goals following tries, called "conversions," count two, and other goals three.



NOTES:—

■ Indicates Post with Flag. Length and breadth of field to be as near to dimensions indicated as possible.

– – – These broken lines indicate 10 yards and 5 yards from half-way and touch lines respectively.

Goal dimensions.—10 feet is taken from the ground to the top edge of the crossbar and 18 feet 6 inches from inside to inside of the goal posts.

In R.L. any goal counts two, but goals from a "mark" are not allowed.

The game is started, and restarted after a score, by a kick-off from the centre; and, thereafter, the ball may be advanced by kicking or carrying. It may also be passed from hand, but not forward. Ball carriers may be tackled and thrown down, and they may "hand off" tacklers with the unclenched hand. A frequent method of restarting after a stoppage is the "scrummage," in which the forwards bend down and push against each other, three from each side constituting a front row, and the remainder two subsequent rows. The ball is then put into the tunnel between the front rows, the centre man of each, the "hooker," endeavouring to gain possession by hooking it back into, and generally right through, his "scrum." In R.L. this method of restarting is used whenever the ball goes out over the touch-line; but in R.U. the ball is thrown in straight along a "line out" of both sets of forwards, unless the side whose throw it is demand a scrummage. In R.L. kicking the ball straight out over the touch-line is allowed only from a free-kick, the penalty being a scrummage at the point from which the ball was kicked. The effect of the differences between the two games is that R.L. is faster and more open, and the ball is more continuously in play. A game lasts for eighty minutes, divided into two halves.

In addition to Britain, both forms of Rugby are played in France, New Zealand, and Australia, and R.U. is played in South Africa. Both codes also have other, smaller "outposts" in various European countries, and there are minor R.U. centres in North and South America. R.U. is entirely an amateur game, and R.L. primarily so, though there is a top layer of clubs using part-time professionals.

Sailing.

Mention of Sailing tends, perhaps, to conjure up visions of large, graceful yachts, beautiful to see, but clearly to be owned only by the wealthy. Sailing to-day, though, is very different from that. It is mainly sailing in small boats, many of them wholly or partly built by their owners. At first glance the building of a boat might seem a tremendous and highly skilled task, but, in actual fact, it can be as big and as hard or as small and as easy as the builder wishes. Some amateur builders start from the very beginning, acquiring the various materials needed bit by bit, and gradually bringing their boats into being. However, those who either lack the time for this or doubt their ability to construct a boat in which they would feel safe on the water can buy complete boat-building kits; and they can buy them at any stage of construction they choose from hardly started to complete except for a coat of paint. It is more economical to build a boat than to buy one complete and ready for launching, and the earlier the stage of construction at which the owner takes over, the greater the saving. Some owners claim that they enjoy the building as much as the sailing, and it is probably true that the owner who has done some work on his boat, however little, takes more interest and pride in the finished article.

The fact that boat-building is now within the reach of practically everyone means, of course, that the end to which it is a means, Sailing, is also within the reach of practically everyone, for few people are far from some suitable stretch of water. Where there is sailing, there are clubs, which the boat owner can join for quite reasonable fees, and which provide either sheltered moorings or "dinghy parks" where the boat can be kept.

Eventually, the small-boat owner may want to try racing his craft, and there are many events for boats of all classes and sizes. Racing is an enthralling pastime, for, though races are, of course, tests of speed, they are also very much more than that. There is tremendous scope for tactics, and the sport is in every sense a highly skilled one, as well, incidentally, as one with an interesting history behind it.

Yacht Racing. The first recorded sailing contest was a race from Greenwich to Gravesend on 1 October 1661, between Charles II, who won, and his brother, the Duke of York. In those days, such contests generally took the form of manœuvring for positions of advantage, rather than straightforward racing, for the Royal Navy also relied on sailing, and every privately owned vessel was a potentially useful naval auxiliary: a fact that emphasises the appropriateness of the right of England's most famous yacht club, the Royal Yacht Squadron, to fly the White Ensign. The club was founded as the Yacht Club in 1815, becoming the Royal Yacht Club in 1817, when the Prince Regent joined, and taking its present name in 1832. In 1851 the club put up for competition a 137-ounce, 100-guinea cup that has become the most famous trophy in yachting, and one of the most famous in sport.

In that year a schooner of the then famous New York pilot-cutter type, called the *America*, sailed across the Atlantic, and her commander challenged the Royal Yacht Squadron to find a schooner or schooners to race against her. There were no takers, so the *America*'s commander made a more tempting offer. Though the schooner rig was considered slow, and was generally given a time allowance in races, he offered to race on level terms against vessels of any rig, and to back his ship for anything up to 10,000 guineas. There were still no takers, so the commander entered for the 53-mile race round the Isle of Wight for the new cup, though he knew that some of the seventeen other yachts in the race were twice the size of the *America*. Despite that, the *America* won by eight minutes.

Subsequently, the *America* was sold to an Englishman, who cut 5 feet off the masts, and then wondered why she did not win races. She was rebuilt in a Thames boatyard, and, when the War Between the States broke out, became a Confederate blockade-runner, but was trapped in the St. John's River, Florida, and scuttled. However, she was raised and repaired, and finished the war as part of the Union Navy, after which she returned to racing, which brings us back to the story of her cup.

The cup, now called the *America*'s Cup, had been given to the New York Yacht Club for perpetual competition between different countries, and the first challenge for it came in 1870. The challenger was defeated, and by the *America*. To date, there have been seventeen challenges, fifteen by Great Britain and two by Canada, but not one of them has succeeded. The 1958 challenge, though, pointed the present trend in yachting, which is towards smaller vessels. Previously, the *America*'s Cup conditions stipulated that races must be between very large yachts, of the "J" or 21-metre type, and that, if the challenge was from across the Atlantic, the challenger must sail across. In 1958 the rule about sailing across the Atlantic was waived, and the event was between yachts of the 12-metre class. Even so, the unsuccessful challenge cost about £100,000.

Large vessels are still seen in the famous Bermuda Race, but the modern trend is very evident in the growing popularity of the annual Folkestone Dinghy Race across the Channel, which also has a class for catamarans, very fast and very popular boats that consist of two boats side by side joined by a kind of raft.

Sculling. *See* **Rowing.**

Shove-Ha'penny. *See* **Old English Games and Customs.**

Show-Jumping. *See* **Racing and Show-Jumping.**

Skating.

At first glance, ice-skating would not appear to be a normal activity for British people, for it is a part of Winter Sports (*q.v.*), which are possible in Britain only rarely and to a very small extent, and it was formerly restricted to brief periods

when rivers, lakes, and ponds were frozen. Despite this, however, the people of this country have always appeared to possess a natural talent for it, and they have practised it whenever opportunity offered. The history of British Skating goes back a very long way, and includes occasions when Skating was possible, and took place, on the Thames, as well as many, more regular instances in the Fen district and other places. In recent years this wish to skate on ice has been catered for by the opening of many indoor rinks, which make the skater independent of weather and daylight, and enable Skating to be carried on throughout the year.

Many people ice-skate just for recreation, health, and amusement, but anyone keen to carry Skating a stage farther and acquire a higher level of skill can find a wide range of opportunities from which to choose. Figure-skating is very popular, and for those anxious to test their skill at it there is a series of medal tests, in which the skater is not in competition with anybody, but is attempting only to reach a fixed standard. Beyond these, there are many competitions and championships. Dancing on skates also attracts many people; and also offers those interested standard medal tests and competitions.

Another popular skating activity is speed-skating, which takes place indoors and, whenever possible, outdoors as well, though the methods and techniques of the two forms of racing differ widely. Outdoors, the skaters normally race in pairs, though each man is timed, and is actually racing against the whole field. Much of the racing is on long, straight stretches of ice. Indoors, skaters race perhaps four at a time, and are directly opposed to those on the ice with them. These races are on small tracks, a lap sometimes being no more than 130 yards. Standard outdoor distances range from 500 to 10,000 metres, while indoor races go from 440 yards to 2 miles. There are also indoor relays, generally of 3 miles, in which teams of four race on the "Madison" method, relieving each other, not at fixed points, but at will. In addition to competitions and championships, speed-skaters also have their standard medal tests.

Ice, however, is not the only surface on which Skating takes place, for, following an unusual history, roller-skating also maintains a large following. Roller-skating was originally introduced long before the arrival of the indoor ice rinks purely to provide ice-skaters with some kind of substitute when no natural ice was available. It progressed by fits and starts, varying from extraordinary "crazes" when it seemed that everybody was roller-skating, to periods when nobody appeared to be doing so. Eventually, it settled down to a steady existence as a popular recreation in its own right that has in no sense been pushed into the background by the increased facilities for ice-skating. The opportunities it offers are almost identical with those of ice-skating, for they include figure-skating, dancing, and speed-skating, with championships, competitions, and standard medal tests in all branches.

Both forms of Skating also offer a team game, and in both it is hockey. Ice-hockey, which is called simply hockey in Canada, where it originated, and the United States, is played six-aside, with substitutes permitted, and with a rubber disc, called a "puck," instead of a ball. It first began to win popularity in Britain soon after the First World War, and since then has had rather a chequered career, helped forward by the semi-professional players from Canada, who play in the National League teams, and held back by the lack of facilities for British youngsters to practise; for practice sessions mean closing rinks to all the other forms of Skating for certain periods. The game should, however, survive, for there is a definite demand for it.

Roller-hockey, generally known as rink-hockey, bears a closer resemblance to its parent game, outdoor field hockey, than does ice-hockey. It is played with a ball, and is five-aside, with one substitute permitted. Its popularity is such that it is now played throughout the year.

There is a form of hockey on ice that closely resembles outdoor hockey. This is Bandy, which originated in England, but is no longer played here, though it is popular in Sweden and the U.S.S.R. Some other games have been tried on skates from time to time. One is Badminton, which has been played on ice, but only as a stage exhibition. Basketball on roller-skates has been tried in several countries, and might well develop and spread.

Skating is not so much a recreation, sport, or game as a whole series of different recreations, sports, and games. Each has its following, and, while there are enthusiasts who are interested in both ice- and roller-skating, or in more than one branch of one or both of them, there are many ice-skaters who have no interest in or knowledge of roller-skating, and vice versa, and many keen supporters of just one branch of Skating who hardly know that the many other branches exist. It is, of course, quite possible to take part in both ice- and roller-skating, and in more than one branch of Skating, and greatly to increase one's enjoyment by doing so.

It is not particularly hard to learn to skate. It requires strong ankles, a good sense of balance, and plenty of confidence; and it is possible to start practising, at least to a limited extent, at home, for instance, by getting used to standing on skates. Skating is probably more easily mastered when young, but many adults have successfully taken it up.

Skiing. *See* **Winter Sports.**

Ski-Joring. *See* **Winter Sports.**

Ski-Jumping. *See* **Winter Sports.**

Skittles. *See* **Old English Games and Customs.**

Snooker. *See* **Billiards.**

Snowshoe Running. *See* **Winter Sports.**

Softball. *See* **Baseball.**

Solo Whist.

Solo Whist is a card game for four players, who normally act independently. Play is as at Whist (*q.v.*), but the cards are dealt in threes, the final round being dealt singly, and the dealer exposing his last card to indicate trumps.

Players then "declare" in turn, starting with the player on the dealer's left. The lowest call is "I propose," which entails making eight tricks with a partner, any one of the other players being eligible to "accept" in his turn. The next call is "Solo," which requires five tricks to be made unassisted. Next comes "Misère," in which every trick must be lost, and then comes "Abondance," in which nine tricks must be made. Higher still is "Misère Ouverte," in which every trick must be lost with the player's hand exposed, and highest of all is "Abondance Declarée," in which every trick must be made. Any player may "Pass," and, once a call has been made, later callers must make a higher call or pass.

Though calls are made with trumps already nominated, certain calls may alter the trumps; and, with regard to these, there are several views, all quite widely held, as to the rules that should apply. A player calling Abondance can choose his own trumps, though Abondance in the nominated trumps—called Royal Abondance—takes precedence over the same call in another suit. In Abondance one school of thought holds that the first round is played on the nominated trumps, while another takes the view that the first card only is played on the nominated trumps. In either of these circumstances a player making this call should not announce his trumps until the round or card has been played, unless it is necessary to announce Royal Abondance to overcall. There is, however, a third view, and it is the view

of the majority of authorities who have actually written about the game, that the new trumps should be announced before the hand starts. Also the subject of differing views is Abondance Declarée, one view being that the caller can choose his own trumps, and another that, in this call, there are no trumps, though both views agree that this call confers the right to lead. A good player can easily adapt himself to any of these variations, the important thing being to check which versions are being used before starting to play. On the Misère calls there are no trumps, and in Misère Ouverte the player need not expose his hand until the first round has been played.

Speed-Skating. *See* **Skating.**

Squash Rackets.

Squash Rackets was designed as a preliminary preparation for the game of Rackets (*q.v.*), but it is now a popular game in its own right, played by men who have no intention of playing Rackets, and by women who never play Rackets. The game is similar to Rackets, but the court is smaller and most matches are singles. Doubles, however, can be played, and in the United States there are special doubles courts slightly larger than the normal Squash court.

Stoolball. *See* **Old English Games and Customs.**

Strand-Pulling. *See* **Weight-lifting.**

Surf Riding. *See* **Swimming.**

Swimming.

Swimming is an extremely popular pastime that also shares with walking the distinction of being a perfect exercise for health, as it exercises the whole body, and can be carried out as easily or as strenuously as the swimmer wishes. It is also a very useful accomplishment that may at any time put its possessor in a position to save a life.

There are several different swimming strokes, the basic stroke being the breast-stroke, now often seen in an alternative method, the butterfly. Faster strokes include the side-arm, the overarm, the trudgeon, and the crawl, but each of these attempts to speed up progress through the water has really superseded its predecessor, and the crawl is now almost universal. There are also two strokes used in swimming on the back, one being a back equivalent of the breast-stroke, and the other a back crawl. It is possible to swim under the water, using the breast-stroke, and to keep the eyes open while doing so. It is also possible to swim down through the water to retrieve objects that may have been dropped. Ascending through the water is automatic, though it can be hastened by a kick. Remaining stationary in deep water can be achieved either by floating on the back or by treading water, which simply means moving the legs gently up and down.

It is not difficult to teach oneself to swim, and, like cycling, it is an accomplishment which, once learned, is never forgotten. The main thing is confidence, or an absence of any fear of the water. Such fears are quite unnecessary, for water is an element that always tends to keep a human being on the surface, and not to draw him under. Going underneath the water, and staying underneath, requires a definite physical effort, and, if that effort ceases, the swimmer is automatically brought to the surface again. Many non-swimmers who get into difficulties increase these by struggling wildly, for, by doing so, they may easily take and keep themselves under. If they would make only the gentle movements of treading water, they would both stay afloat much longer and present far fewer problems to any swimmer who might be trying to save them.

Saving life in the water is the object of the Royal Life-Saving Society, which teaches the best methods of bringing people who are in difficulties ashore, and also methods of artificial respiration for use in reviving the apparently drowned. Every swimmer should acquire some knowledge of life-saving, for even a strong swimmer may experience considerable difficulty in saving anyone unless he or she has some idea of the best way of setting about it. Many swimmers, for instance, normally use only the crawl and the back crawl, whereas, to save anyone, it is almost essential to use either the breast-stroke or its back equivalent.

Swimming has a well-organised competitive side, with many competitions and championships right up to the Olympic Games. Most races take place in baths, but there are some river and sea events, and the greatest competitive challenge to any swimmer is, of course, the English Channel. Although this has been conquered many times, the swimming of it remains, and will always remain, a wonderful achievement.

Diving. Generally accepted as being akin to Swimming, though actually it is quite a different sport, is Diving. Competition Diving means using boards of various heights, performing certain set dives, and choosing additional ones from an approved list. Diving requires a certain amount of nerve, and also gymnastic ability, including the ability to control the body in the air. Whereas strong swimmers are generally fairly big, divers are often much smaller and more compactly built.

Water Polo. In view of the popularity of Swimming, it is not surprising that there is a water team game, this being Water Polo, in which the object is the scoring of goals, the ball and the goals resembling those used in Soccer, though all shots and passes are, of course, thrown. Throughout a history of nearly eighty years, Water Polo has been beset by rule trouble, and has probably been the subject of more codes of rules than almost any other game. The difficulty is the detection of fouls under the water; the ideal, a game of the basketball type, free of bodily contact.

Surf Riding. Though straightforward Swimming, Diving, and Water Polo are the chief competitive water sports, there are other water activities with large and, in some cases, growing followings, some of them also having their competitive side. Fairly old-established is the Hawaiian sport of Surf Riding, which has been seen, though generally in a rather milder form, in many parts of the world. It consists of placing a flat board on the water, and then lying, or, more rarely, kneeling or standing on it, and being carried ashore on the crest of a wave.

Water-Skiing. A growing water sport, and one in which contests are held, is Water-Skiing, which is of more recent origin than Surf Riding, from which, in fact, its development can be traced. Surf Riding led to Aquaplaning, in which the board was towed by a motor-boat, with the rider standing. A further development saw the board giving place to actual skis, and Water-Skiing was born. This sport owes some of its popularity in Britain to television, for, when still in its infancy, it was demonstrated on the screen, and this led directly to several new water-skiing centres being opened up in various parts of the country.

Underwater Swimming. Undoubtedly the fastest growing of all swimming activities is Underwater Swimming, which is a link between ordinary diving and swimming under water, with the swimmer, depending on his own lungs, able to remain below for only a few seconds, and fully-fledged deep-sea diving, with the diver weighed down with equipment and receiving assistance from the surface. The underwater swimmer receives no surface assistance, but he does use

light equipment, consisting of an artificial "lung" and breathing tubes, and also a mask and flippers. This type of swimming developed during the Second World War, in which Naval underwater swimmers, called "frogmen," rendered great services. Frogmen can also render useful services in peacetime, in, for instance, the sometimes necessary searching of rivers and canals; in underwater photography; and in exploring wrecks, and even old, lost cities, now under water. There is also a vast amount of knowledge, excitement, and pleasure to be gained from a "close-up" study of the many fascinating aspects of the underwater world.

It might be thought that the first step towards becoming an underwater expert was to become an expert swimmer, but it is not essential for an underwater swimmer to be a surface swimmer of anything like championship class. There are, of course, dangers, and the newcomer to Underwater Swimming should not go down too deep until he has had a good deal of practice and gained a certain amount of experience. Preferably, the first descents to any depth should not be undertaken alone, and if the swimmer has gone at all deep he should come up slowly, otherwise he risks getting the "bends," which is caisson disease, and means that reduced air pressure has caused nitrogen bubbles to form in the tissues. There may also be danger from large fish, and underwater swimmers should not venture into undersea caverns without a light. It is always advisable to collect as much local information as possible before diving in a strange area. Though all kinds of equipment, including cameras, harpoons, knives, and torches, can be carried, the beginner will make a better start if he dives without encumbrances. Most of the dangers can be avoided or circumvented with care, and the reward for those who master Underwater Swimming is a whole new world to explore.

Table Tennis.

Originally simply an amusing parlour game known as "Ping-Pong," Table Tennis is now a serious, world-wide, competitive sport, with many championships and tournaments, and the ability to attract crowds of 10,000 spectators.

Resembling a miniature game of Lawn Tennis (*q.v.*), the net is set on a table 9 feet long by 5 feet wide, and the ball is a very light celluloid one. Players serve series of five balls in turn, both server and receiver scoring. The service has to bounce first on the server's side of the net, and then on the other, and, thereafter, all strokes are "ground" strokes, volleying not being allowed. A game is 21 points, and matches are usually the best two out of three or three out of five games. "Vantage" games are played, as, if the score reaches 20-all, each player serves once in turn until one has a clear lead of two points. Both singles and doubles are played.

Table Tennis requires perfect fitness and split-second reactions. Many Lawn Tennis players also play Table Tennis, and several of these have found it desirable to retire from the fast table game before giving up the outdoor game.

Tennis. *See* Lawn Tennis, Real Tennis.

Tobogganing. *See* Winter Sports.

Traditional Games and Customs.

Traditional and unusual sporting events are plentiful in many parts of the world, but few have a longer tradition behind them than the Calcio in Livrea that can still be seen, over 500 years after its inception, in the Italian city of Florence. It is a version of Football, based on an ancient Greek game called Episkuros and the old Roman game of Harpastum. Played twenty-seven-aside on a pitch rather smaller than an Association football pitch, it was originally restricted to the nobility, and in 1672 a game was cancelled when it was discovered that the selected teams included players who were only "gentlemen." The ordinary people did play, but the game as played by them was called Calcio Divisi, and was not regarded as the same thing. The playing of Calcio in Livrea faded out in 1739, but was revived in 1898, to stop again in 1902, only to be revived once more in 1930. To-day, there are generally two games a year between teams no longer restricted to the nobility and representing the four quarters of Florence. They are wonderful spectacles, for the players, and also numerous officials and attendants, wear fourteenth-century costume, and the games are preceded by ceremonial processions, and by a special address to the most distinguished person present. The trophy for the games is traditionally a white calf.

Another ancient Italian sporting event that still survives is found in Siena, and consists of horse-racing in the city. It is a wild and fierce form of racing in which virtually anything that might further the cause of victory goes on between the riders. Riding events, many of them of great antiquity, figure prominently in countries in which great horsemanship is an age-old tradition. Russia offers Kop-Karri, a fifteen-aside mounted game that is a battle for possession of a sheep's pelt. Riders carry their reins in their teeth to leave their hands free for the fight, and anyone who gets the pelt is soon downed in what is one of the roughest and toughest games of all time. Played now by Kazakhs from the Steppes and Tadjiks from the Afghanistan border, this game originated in China, and was brought out of that country by the riders of the Golden Hordes of Genghis Khan. Also found in Russia is the mounted Kissing Game, in which a galloping male horseman seeks to snatch a kiss from a girl rider armed with a whip.

Horses are also prominent in American and Canadian Rodeos, which consist of competitions and displays in the various skills appropriate to cowboys. There are riding and roping events, as well as steer-wrestling and chuck-wagon races. All the skills and dangers of the rodeo can still be seen annually in famous rodeos like that at Calgary, in Alberta. Rather different are Chilean Rodeos, in which the chief events consist of displays involving horses and young bulls, and the Topeadura, in which two mounted teams push against a long log suspended horizontally between them. Perhaps the most striking feature of a Chilean rodeo is the avoidance of anything that might harm any of the animals, which all, horses and bulls alike, seem to enter into the proceedings with excitement and enjoyment. Also including animals, but not horses, are the strange bull races held at Pamekasan in the Indonesian island of Madura. Based on the local method of ploughing, these consist of races in which a driver stands barefooted on a small wooden sled harnessed to a pair of bulls, which actually do not need much driving, the man being mainly concerned with holding on. Special attendants shield the bulls from the sun before the races, which are generally started by a veterinary surgeon.

Almost a world away from these races geographically and in everything but sheer speed is Pelota, sometimes known as Jai Alai. Played in Spain, France, Portugal, North Africa, and South and Central America, pelota is a traditional Basque game that developed from a mediæval form of handball that was played against village church walls. To this day, many pelota courts, called "canchas," are next to churches, the wall, or "fronton," which is an integral part of the game being that of the church, and the priest very often being one of the best of the local players. The game, which is very fast and exhausting, can be between two players or between teams of two or three, and consists of playing a ball that is rather smaller than a tennis ball against a wall with either the hand or, in the case of the most popular form of the game, the Grand Chistera, with a long, narrow, wicker basket, called a "chistera," that is strapped to the player's hand and arm.

Personal combat sports have always been popular, and Switzerland has a national sport of this type that had its first big tournament in 1905 in Das Schwingen, which means "The Swinging." It is a form of wrestling, in which the contestants,

normally very powerful Alpine herdsmen, wear special belts and shorts by which holds are taken. The traditional prize for the winner of the annual Swiss championship is a two-year-old heifer. Iceland has a rather similar form of wrestling, called Glima. Much less similar is the Siamese form of boxing. Competitors in this wear, and use, ordinary boxing gloves, but they are also allowed to use their elbows, knees, and feet, which are bare.

Next, a group of recreations in which the feet are used less lethally, starting with the Netherlands, and the Nijmegen Marches. Over half a century old, these are international long-distance walks that are not races, but reliability trials, in which complete teams must start and finish together within a certain time. The marches take four days, the distance to be covered each day varying between 25 and 30 miles according to the class. Classes catered for include men, women, and also police teams, walking in uniform, and military teams, carrying equipment. The walks, which attract over 10,000 competitors every July, are an unusual and colourful spectacle, and the opening ceremony is as well worth watching as that of the Olympic Games. British walkers, civilian, police, and military, regularly take part. Though called marches, they are really walks; and it is unlikely that many men would consider real precision marching as a recreation. However, women do in at least one country. This is New Zealand, where marching competitions are held between teams of twelve, with a leader, each team wearing a special uniform, and carrying out a three-minute routine to the music of a pipe band. Points are awarded, not only for the marching, but also for the costumes and the leading. Though the competitions are confined to women, teams are generally trained and drilled by men. This type of marching was seen in Britain a few years ago, when the Blair Atholl team toured the country giving demonstrations.

About fifty years old in its own country, Sweden, and quite likely to spread to other countries in the future is Orienteering, which consists of finding one's way about the country from one control point to another by using maps and compasses. Generally carried out on foot, and in wild country, it can also be done on horses, bicycles, motor-cycles, skis, and skates, and in cars and canoes, and in any kind of country, including urban areas. During the Second World War, in which Sweden, though not involved, had to be ready, Orienteering was extensively used in military and civil defence training; and it was then that night Orienteering began, with competitors wearing lamps strapped to their foreheads. Probably the most strenuous annual event in Orienteering is the Swedish three-day mountain race, in which contestants, working in teams of two, have to cover 60 miles of mountains, forests, and swamps on foot, carrying equipment that must include tents and food. Though mainly confined to Sweden, Orienteering has been successfully tried in Canada and the United States, where it acquired its English-language name.

Non-English recreations that English people do not have to travel very far to see are the many and various activities that go to make up Scotland's Highland Games. Highland Games meetings, or gatherings, are sports meetings, but sports meetings with their own definite and extremely colourful and spectacular characteristics. The chief sporting events at them are the "heavy-weight" events, including tossing the caber, throwing the hammer in the Scots style, putting and throwing weights of various sizes, and wrestling. In addition, there are competitions in Highland dancing and piping, and often for pipe bands, all playing their parts in a spectacle that can hold its own with any of the many spectacular events that love of tradition and love of sport have combined to produce all over the world. (*See also* **Old English Games and Customs.**)

Tug-of-War.

A Tug-of-War is one of the least complicated and one of the most strenuous events in sport. It consists of eight men pulling on a rope against another set of eight pulling in the opposite direction, each team trying to pull the other forward across a line, and each helped by a coach, who instructs them when to "heave" and when to concentrate on resisting the opponents' heaves. A pull may be over in a few seconds, or it may take many minutes. Contests are generally the best two out of three pulls, and a competition may involve three such contests in one afternoon. Competitions may be at "catchweights," which means that there is no weight limit, or they may restrict the eight men to a total weight of, say, 104 stone or 100 stone. The Tug-of-War requires, and will help to develop, great strength.

A popular event that always arouses great enthusiasm amongst the spectators, the Tug-of-War fully merits this position, but it owes some of its success to the fact that it was introduced into the right place at the right time. In the nineteenth century, before athletic sports were really organised, most country sports meetings included events like obstacle races, sack races, and egg-and-spoon races. These, however, though they are found to this day in some children's and local sports, grew less popular, and began to give place to more "serious" ones, a favourite replacement for them being the Tug-of-War. Then athletic sports became organised, and the Amateur Athletic Association was founded, and instituted its famous annual championships, including two Tug-of-War championships that still exist, where, a few years earlier, there might have been obstacle-race and sack-race championships.

For years, service units and police forces provided the leading Tug-of-War teams, but, more recently, they have been challenged by teams from big firms. A still later development has been the formation of clubs concentrating entirely on the Tug-of-War. Organisations and clubs with Tug-of-War teams now have their own association, and their own annual championship meeting.

Underwater Swimming. *See* Swimming.

Underwater Watching.

In recent years there has been a considerable increase of interest in the undersea world; and some participation in this has been brought within the reach of those who are unwilling or unable to take part in underwater swimming and diving by the use of glass-bottomed boats, often boats in which the viewer slides back a wooden panel at his feet to reveal the glass viewing panel. Such boats, of course, can only be of use where the water is exceptionally clear and transparent, but, where conditions are suitable, a surprising amount of the life and colour of the world beneath the seas can be seen, and without any of the strain or danger of diving.

Much of the Mediterranean Sea fulfils the necessary conditions of clarity and transparency, particularly, perhaps, the coasts of Corsica, Sardinia, Sicily, and Italy itself. Greek and Egyptian waters are also clear, as are the waters of the Spanish Costa Brava and the Balearic Islands. Going farther afield, there are very transparent waters off parts of the Australian coast, and, of course, in the West Indies.

Volleyball.

Long-established in the United States, and played also in some other countries, Volleyball is a comparatively recent arrival in Britain, where it has been encouraged by leading personalities from the sport of Athletics, who saw in it an ideal game for maintaining fitness, and formed a governing body to organise and control it. A league started in London owed much of its early success to players of nationalities other than British, but the game took a big step forward when it was adopted by the London Fire Brigade as an effective method of physical training.

Volleyball might be compared with Basketball (*q.v.*) in that it is a team game that can be played

indoors, though it can also be played on outdoor courts. The actual game, however, differs widely from Basketball. Played six-aside on a rectangular court that should not exceed 60 feet by 30 feet, it consists of "volleying" an inflated ball across a net 8 feet high with the hands, the object being to make it touch the ground in the opponents' court, while preventing it doing so in your own.

Water Polo. *See* **Swimming.**

Water Skiing. *See* **Swimming.**

Walking.

Walking comes so naturally that few people ever think about it. It is, however, worth thinking about, for it is the basis, not only of everyday life, but also of every physical, as opposed to purely mental, recreation, sport, and game, all of which involve, if not actual walking, then running, which is an equally natural step beyond walking. It is also the basis of training, either for health and fitness or for a strenuous sport. It has been said that it is impossible to walk too much; and, while those who have done little walking would, of course, have to increase the distance gradually, there is no doubt that a regular, daily two- or three-mile walk would in itself prove an effective method of maintaining health and fitness.

Walking is also a pleasant recreation in its own right, in the form either of long walks or of actual walking tours, on which the walker can regulate the pace, distance, and halts to suit himself. There are different styles of walking, and some are better than others. It is, for instance, better to point the toes straight ahead, or even to turn them in slightly, as the very fit and active Red Indians did, than to turn them out. Everyone, however, has his or her own natural way of walking, and it is probably better to continue walking naturally than to set out deliberately to alter the style.

Something about the opportunities open in race walking will be found under the heading Athletics, but it might be as well to say a few words about race-walking style, and to clear up a popular fallacy. This is that race walking is unnatural, and quite remote from ordinary walking. It is not; and the fallacy has arisen largely because the walking races seen by the largest audiences are the short ones that take place in arenas during athletic meetings. An attempt to walk a short distance as fast as possible does lead to an exaggerated action, and is unnatural to the extent that anyone who really wanted to cover a limited distance as quickly as possible in ordinary life would run. The longer the distance, however, the smaller the difference between race walking and ordinary walking, competitors in, for instance, a 100-mile race being virtually indistinguishable from ordinary "hikers."

If you walk along in the ordinary way, and then try to walk faster and faster, adding to your speed by pointing the toes straight ahead, swinging the arms vigorously, and swinging the hips so that each foot falls more or less straight in front of the other, you are race walking. The official definition of race walking is so uncomplicated that it is contained in a single sentence that simply requires that contact with the ground should always be maintained, as it normally is in all walking.

Weight-lifting.

Weight-lifting is a method of exercising to maintain health and develop strength; a system of training that can usefully be at least a part of the preparation for almost any sport or game; and a highly organised and very popular competitive sport in its own right. Once, quite erroneously, thought to be an over-strenuous and "dangerous" activity, it has now, in more enlightened days, seen the pendulum swing completely in the opposite direction, with professional and amateur sportsmen of all kinds freely admitting how much they owe to it, and a large following of seekers after health and fitness, including women, many of them actresses, models, and others whose work demands a near-perfect figure.

When it is used as exercise and training, the strenuousness of it depends entirely on the wishes of the lifter or his or her adviser; for training with weights does not mean lifting as heavy a weight as possible, but carrying out a certain number of repetitions in various styles with weights well within the lifter's capacity. For those keen to develop the maximum strength of which, according to their build, they are capable, weight-lifting is certainly the quickest, and perhaps the only, way of achieving this. One of the charges levelled against it is that it makes one slow, but this is just another fallacy. It does not; and competitive weight-lifters actually make some of the fastest movements known in sport.

As a competitive sport, Weight-lifting is divided into weight classes, and there are many international and national championships and competitions. The sport is popular almost all over the world, and has been firmly established in Britain for many years.

Strand-Pulling. Akin to Weight-lifting in that it is a method of keeping fit and developing strength that is also a competitive sport is Strand-pulling, using a steel or rubber expander. Various different "pulls" are possible, and the strength and resistance of the expander can be altered at will. Many people use this old-established system of exercising for health and strength; and, for those interested, there are many strand-pulling championships and competitions.

Whist.

Whist might be called the standard card game. It has never excited quite the furore of Bridge (*q.v.*), but it is long established and popular, both at home and at Whist Drives. It is probably the first card game, apart, perhaps, from a few simple games depending on luck, that most people learn, and it provides a sound foundation for the embryo card player.

It is played by four people, two partnerships of two opposing each other, and with a normal pack of cards. The partners sit opposite each other; and the pack is shuffled, cut for trumps, and dealt out singly. The cards are then played out in thirteen tricks of four each, the player on the dealer's left having first lead, and the winner of each trick leading in the next. Ace counts as the highest card—except in cutting, when it counts as the lowest—and it is followed by king, queen, knave, and then on from ten downwards. The higher card of any suit takes the lower, unless it is trumped by a player unable to follow suit, the tricks being gathered up by the winner as made.

It is necessary to concentrate, to watch the cards played, and to endeavour to "place" the unplayed cards. This comes with experience, as does an understanding of such unwritten rules as "Second in hand plays low" and "Third in hand plays high," and a knowledge of when to disregard these.

Three-handed Whist is possible, one suit being discarded.

Winter Sports.

There are few fields of recreational or sporting activity to which, given the opportunity, British people take more eagerly than Winter Sports. Enthusiasts from Britain were going abroad to find, and in some cases start, them before the turn of the century; and to-day there are probably a hundred travellers for every one who went sixty years ago. Most of this tremendous increase has been added since the Second World War, and the numbers grow every year. Switzerland is, of course, the traditional objective, but there is

actually a wide choice, for facilities exist in Norway, Austria, Italy, France, Germany, and Czechoslovakia. There are opportunities to suit most purses, and to suit both those who want only sport and those who want sport combined with entertainment.

The most popular winter sport is Skiing; and, for those whose time and experience are both limited, it is normally skiing of the downhill variety, rather than the lengthy journeys on the level as well as on hills, and up as well as down, at which many Continental, and particularly Scandinavian, skiers are adept. Greatly increased facilities in the way of ski-lifts enable the holiday skier to work in three times as many descents as the skier of only a few years ago. Almost every resort has a ski-school with an English-speaking instructor, and it is always advisable for a novice to join this. It is also advisable for novices to start training for a ski holiday some time in advance, both by ordinary physical training and by attending a dry ski-school. The air in winter sports resorts encourages more activity than is good for a completely untrained person, and the fitter the skier, the less his chance of being injured. Skiing accidents are plentiful, but many of them could be avoided by the exercise of a few simple precautions. Having lessons is one; being fit is another; short skis with safety bindings are still another; and refusing to ski late, which may be any time after four o'clock, is yet another, for, as the light fades, it is replaced by a bluish light that makes uneven patches difficult to see, and the snow tends to ice over. Most winter sports equipment can be hired, but hired or bought, and regardless of the extent to which fashionable skiing clothing may be advertised, the most important items are the boots. The winter sports season lasts from December until March, but the snow is sometimes late, and, while Christmas and New Year should be safe enough, February offers the certainty of snow, combined with longer days.

Ski-jumping is a separate sport, and one for experts. The jumper takes-off down a steep slope and over a platform, which he leaves at a speed of about 50 m.p.h., to land something like 150 feet below his take-off, and more than that distance out in front of it. Ski-Joring is really ski-racing behind unridden horses, but the term is also applied to quite gentle ski-trips behind ridden horses, horse-drawn vehicles, and mechanical vehicles.

Bobsleigh Riding and Tobogganing consist of riding and racing down ice runs at terrific speeds on sleighs, the bobsleigh being for two, four, or five riders, and the toboggan, which takes its name, not from anywhere in Europe, but from a Red Indian language, being for one rider. Bobsleigh crews sit, the first man steering by a wheel or ropes, and the last man operating the brake with which the sleigh is fitted. Toboggan riders lie face downwards, and brake through special spikes on their boots. Both sports are exceptionally thrilling, and both can be dangerous.

At the opposite extreme from the point of view of speed is the 400-year-old Scottish game of Curling, which is played on ice, but not on skates. It resembles Bowls (*q.v.*), but the implements used are curling stones weighing about 35 lb., and having handles. Slow, but still-moving stones are encouraged by sweeping the ice in front of them with brooms.

Not a European winter sport, but nevertheless a snow sport in Canada is Snowshoe Running. Like skiing, this is a useful method of travelling about on snow that has been made the subject of races. The Canadian side of the Atlantic is also the home of Snow Snakes, a Red Indian game that consists of throwing a polished wooden stick along an ice trough in the snow. These "snakes" have been known to go for over a mile and to travel at 120 m.p.h. (*See also* **Skating.**)

Wingfield Sculls. *See* **Boat Races.**

Wrestling.

Wrestling, an individual combat in which competitors, using only their bare hands, endeavour to throw each other, is one of the most natural sports, and also one of the oldest. It is practised in many countries, and in many different styles, in most of which the wrestlers are divided into classes by weight.

In Britain, probably the most popular style is Catch-As-Catch-Can, in which the wrestlers start apart, and may try to throw their opponents by grasping them with the hands or by various kinds of trip. During the bout, the competitors may be either on their feet or down on the mat, and the rules contain various provisions to prevent the bout lasting for an indefinite time. Wrestlers reaching a deadlock on the mat may be ordered to stand up and start again, and points decisions after a certain time are also possible. Certain dangerous holds are barred.

Another style is Cumberland and Westmorland Wrestling, which is extremely popular in those counties, and in Scotland. In this, the wrestler clasps his hands together behind his opponent's back, and all throwing is done by the legs, the breaking of the opponent's clasp constituting the fall. The initial hold is, therefore, of major importance, and the taking of it often takes longer than the actual bout.

A further form of British wrestling is Cornish Wrestling, in which the wrestlers wear canvas jackets, by which all holds are taken. A similar form of wrestling is found in Brittany.

In Græco-Roman Wrestling, which has always been very popular on the Continent, though less so in Britain, wrestlers start apart, and may take hold only above the waist. Bouts in this style may take a considerable time. At one time, there were many Græco-Roman handicap matches, in which a top-class wrestler undertook to win a fall, or a number of falls, in a fixed time.

Græco-Roman was formerly the style used in professional wrestling, but, in recent years, professionals have used the 'Free" or "All-In" style. This has rules, but it is not always very clear just what they are, and this, combined with widespread suspicions that bouts are not really genuine contests, has led to the quite large following that it retains going to see it more as an amusing "stunt" than as a serious sporting event. In the United States efforts to widen interest in it have taken the form of staging bouts in a ring that has been turned into a sea of mud, or that has been filled with fish. All this has, of course, done considerable harm to the reputation of what is really a fine sport and a healthy exercise.

Judo. Prominent amongst countries in which Wrestling has been popular for centuries are Oriental countries such as India, China, and Japan. There are various styles, and one of the two main Japanese styles has won popularity in many countries, including Britain.

This is Judo, sometimes, less correctly, called Ju-Jitsu. Governed largely by traditional rituals, and with wrestlers divided into different grades according to ability, Judo is now an international competitive sport; but it is more often taken up as an effective method of self-defence against a stronger or better-armed attacker. Requiring deep study and a thorough knowledge of anatomy, but not a particularly strong physique, it consists partly of defence by knowing how to sustain bad falls without injury, and partly of attack by locks which give the opponent a choice between capitulation and a broken bone, and by paralysing nerve centres. The various locks are potentially highly dangerous and, when practising, should always be released the moment the opponent requests this.

Yachting. *See* **Sailing.**

ATHLETICS

1956 OLYMPIC GAMES WINNERS (HELD AT MELBOURNE).

100 metres, R. Morrow, U.S.A., 10·5 sec.
200 metres, R. Morrow, U.S.A., 20·6 sec.
400 metres, C. Jenkins, U.S.A., 46·7 sec.
800 metres, T. Courtney, U.S.A., 1 min. 47·7 sec.
1500 metres, R. Delaney, Irish Republic, 3 min. 41·2 sec.
5000 metres, V. Kuts, U.S.S.R., 13 min. 39·6 sec.
10,000 metres, V. Kuts, U.S.S.R., 28 min. 45·6 sec.
Marathon, A. Mimoun, France, 2 hr. 25 min. 0 sec.
4 × 100 metres Relay, U.S.A., 39·5 sec.
4 × 400 metres Relay, U.S.A., 3 min. 4·8 sec.
110 metres Hurdles, L. Calhoun, U.S.A., 13·5 sec.
400 metres Hurdles, G. Davis, U.S.A., 50·1 sec.
3000 metres Steeplechase, C. Brasher, Great Britain and Northern Ireland, 8 min. 41·2 sec.
20,000 metres Walk, L. Spirin, U.S.S.R., 1 hr. 31 min. 27·4 sec.
50,000 metres Walk, N. Read, New Zealand, 4 hr. 30 min. 42·8 sec.
High Jump, C. Dumas, U.S.A., 6 ft. 11¼ in.
Long Jump, G. Bell, U.S.A., 25 ft. 8¼ in.
Hop, Step, and Jump, A. da Silva, Brazil, 53 ft. 7½ in.
Pole Vault, R. Richards, U.S.A., 14 ft. 11¼ in.
Putting the Shot, P. O'Brien, U.S.A., 60 ft. 11 in.
Throwing the Discus, A. Oerter, U.S.A., 184 ft. 10½ in.
Throwing the Javelin, E. Danielsen, Norway, 281 ft. 2¼ in.
Throwing the Hammer, H. Connolly, U.S.A., 207 ft. 3½ in.
Decathlon, M. Campbell, U.S.A., 7937 pts.
100 metres (Women), B. Cuthbert, Australia, 11·5 sec.
200 metres (Women), B. Cuthbert, Australia, 23·4 sec.
4 × 100 metres Relay (Women), Australia, 44·5 sec.
80 metres Hurdles (Women), S. Delahunty, Australia, 10·7 sec.
High Jump (Women), M. McDaniel, U.S.A., 5 ft. 9¼ in.
Long Jump (Women), E. Krzesinska, Poland, 20 ft. 10 in.
Putting the Shot (Women), T. Tishkyevich, U.S.S.R., 54 ft. 5 in.
Throwing the Discus (Women), O. Fikotova, Czechoslovakia, 176 ft. 1½ in.
Throwing the Javelin (Women), I. Iaounzem, U.S.S.R., 176 ft. 8¼ in.

1958 EUROPEAN CHAMPIONSHIPS WINNERS (HELD AT STOCKHOLM).

100 metres, A. Hary, Germany, 10·3 sec.
200 metres, M. Germar, Germany, 21·0 sec.
400 metres, J. Wrighton, Great Britain and Northern Ireland, 46·3 sec.
800 metres, M. Rawson, Great Britain and Northern Ireland, 1 min. 47·8 sec.
1500 metres, B. Hewson, Great Britain and Northern Ireland, 3 min. 41·9 sec.
5000 metres, Z Krzyszkowiak, Poland, 13 min. 53·4 sec.
10,000 metres, Z. Krzyszkowiak, Poland, 28 min. 56·0 sec.
Marathon, S. Popov, U.S.S.R., 2 hr. 15 min. 17 sec.
4 × 100 metres Relay, Germany, 40·2 sec.
4 × 400 metres Relay, Great Britain and Northern Ireland, 3 min. 7·9 sec.
110 metres Hurdles, M. Lauer, Germany, 13·7 sec.
400 metres Hurdles, Y. Lituev, U.S.S.R., 51·1 sec.
3000 metres Steeplechase, J. Chromik, Poland, 8 min. 38·2 sec.
20,000 metres Walk, S. Vickers, Great Britain and Northern Ireland, 1 hr. 33 min. 9 sec.
50,000 metres Walk, E. Maskinskov, U.S.S.R., 4 hr. 17 min. 15·4 sec.
High Jump, R. Dahl, Sweden, 6 ft. 11½ in.
Long Jump, I. Ter Ovanesjan, U.S.S.R., 25 ft. 7½ in.
Hop, Step, and Jump, J. Schmidt, Poland, 53 ft. 10¾ in.
Pole Vault, E. Landstrom, Finland, 14 ft. 9¼ in.
Putting the Shot, A. Rowe Great Britain and Northern Ireland, 58 ft. 4 in.
Throwing the Discus, E. Piatkowski, Poland, 175 ft 10½ in.
Throwing the Javelin, J. Sidlo, Poland, 263 ft. 0¾ in.
Throwing the Hammer, T. Rut, Poland, 212 ft. 6½ in.
Decathlon, V. Kuznetsov, U.S.S.R., 7865 pts.
100 metres (Women), H. Young, Great Britain and Northern Ireland, 11·7 sec.
200 metres (Women), B. Janiszewska, Poland, 24·1 sec.
400 metres (Women), M. Itkina, U.S.S.R., 53·7 sec.
800 metres (Women), E. Ermolaeva, U.S.S.R., 2 min. 6·3 sec.
4 × 100 metres Relay (Women), U.S.S.R., 45·3 sec.
80 metres Hurdles (Women), G. Bystrova, U.S.S.R., 10·9 sec.
High Jump (Women), I Balas, Rumania, 5 ft. 9¾ in.
Long Jump (Women), L. Jakobi, Germany, 20 ft. 1¾ in.
Putting the Shot (Women), M. Werner, Germany, 51 ft. 7⅞ in.
Throwing the Discus (Women), T. Press, U.S.S.R., 171 ft. 7¾ in.
Throwing the Javelin (Women), D. Zatopkova, Czechoslovakia, 183 ft. 9½ in.
Pentathlon (Women), G. Bystrova, U.S.S.R., 4733 pts.

1958 EMPIRE AND COMMONWEALTH GAMES WINNERS (HELD AT CARDIFF).

100 yards, K. Gardner, Jamaica, 9·4 sec.
220 yards, T. Robinson, Bahamas, 21·0 sec.
440 yards, M. Singh, India, 46·6 sec.
880 yards, H. Elliott, Australia, 1 min. 49·3 sec.
1 mile, H. Elliott, Australia, 3 min. 59·0 sec.
3 miles, M. Halberg, New Zealand, 13 min. 15·0 sec.
6 miles, D. Power, Australia, 28 min. 47·8 sec.
Marathon, D. Power, Australia, 2 hr. 22 min. 45·6 sec.
4 × 110 yards Relay, England, 40·7 sec.
4 × 440 yards Relay, South Africa, 3 min. 8·1 sec.
120 yards Hurdles, K. Gardner, Jamaica, 14·0 sec.
440 yards Hurdles, G. Potgieter, South Africa, 49·7 sec.
High Jump, E. Haisley, Jamaica, 6 ft. 9 in.
Long Jump, P. Foreman, Jamaica, 24 ft. 6½ in.
Hop, Step, and Jump, I. Tomlinson, Australia, 51 ft. 7½ in.
Pole Vault, G. Elliott, England, 13 ft. 8 in.
Putting the Shot, A. Rowe, England, 57 ft. 8 in.
Throwing the Discus, S. du Plessis, South Africa, 183 ft. 6½ in.
Throwing the Javelin, C. Smith, England, 233 ft. 10½ in.
Throwing the Hammer, M. Ellis, England, 206 ft. 4½ in.
100 yards (Women), M. Willard, Australia, 10·6 sec.
220 yards (Women), M. Willard, Australia, 23·6 sec.
4 × 110 yards Relay (Women), England, 45·3 sec.
80 metres Hurdles (Women), N. Thrower, Australia, 10·7 sec.
High Jump (Women), M. Mason, Australia, 5 ft. 7 in.
Long Jump (Women), S. Hoskin, England, 19 ft. 9 in.
Putting the Shot (Women), V. Sloper, New Zealand, 51 ft. 0 in.
Throwing the Discus (Women), S. Allday, England, 150 ft. 7½ in.
Throwing the Javelin (Women), A. Pazera, Australia, 188 ft. 4 in.

THE DERBY

	Horse.	Jockey.	Owner.
1946	Airborne	T. Lowrey	Mr. J. E. Ferguson.
1947	Pearl Diver	G. Bridgland	Baron G. de Waldner.
1948	My Love	W. Johnstone	The Aga Khan. M. L. Volterra.
1949	Nimbus	E. Elliott	Mrs. M. Glenister.
1950	Galcador	W. Johnstone	M. Boussac.
1951	Arctic Prince	C. Spares	Mr. J. McGrath.
1952	Tulyar	C. Smirke	The Aga Khan.
1953	Pinza	G. Richards	Sir V. Sassoon.
1954	Never Say Die	L. Piggott	Mr. R. S. Clark.
1955	Phil Drake	F. Palmer	Mme. Volterra.
1956	Lavandin	W. Johnstone	M. Wertheimer.
1957	Crepello	L. Piggott	Sir V. Sassoon.
1958	Hard Ridden	C. Smirke	Sir V. Sassoon.
1959	Parthia	W.Carr	Sir H. de Trafford

CRICKET

TEST MATCHES.

England *v.* Australia.
(First played 1876)

Won by England, 62. Won by Australia, 74.
Drawn, 42.

England *v.* South Africa.
(First Played 1888)
(Not including 1960 Series)

Won by England, 42. Won by South Africa, 17.
Drawn, 30.

England *v.* West Indies.
(First Played 1928)
(Not including 1959–60 Series)

Won by England, 14. Won by West Indies, 10.
Drawn, 11.

England *v.* New Zealand.
(First Played 1929)

Won by England, 11. Won by New Zealand, 0.
Drawn, 17.

England *v.* India.
(First Played 1932)

Won by England, 15. Won by India, 1.
Drawn, 8.

England *v.* Pakistan.
(First Played 1954)

Won by England, 1. Won by Pakistan, 1.
Drawn, 2.

COUNTY CHAMPIONSHIP.

1946 Yorkshire.
1947 Middlesex.
1948 Glamorgan.
1949 Middlesex and Yorkshire.
1950 Surrey and Lancashire.
1951 Warwickshire.
1952 Surrey.
1953 Surrey.
1954 Surrey.
1955 Surrey.
1956 Surrey.
1957 Surrey.
1958 Surrey.
1959 Yorkshire.

ASSOCIATION FOOTBALL

WORLD CUP WINNERS.

1930 Uruguay.
1934 Italy.
1938 Italy.
1950 Uruguay.
1954 Western Germany.
1958 Brazil.

EUROPEAN CUP WINNERS.

1956 Real Madrid.
1957 Real Madrid.
1958 Real Madrid.
1959 Real Madrid.

F.A. CUP WINNERS.

1946 Derby County.
1947 Charlton Athletic.
1948 Manchester United.
1949 Wolverhampton Wanderers.
1950 Arsenal.
1951 Newcastle United.
1952 Newcastle United.
1953 Blackpool.
1954 West Bromwich Albion.
1955 Newcastle United.
1956 Manchester City.
1957 Aston Villa.
1958 Bolton Wanderers.
1959 Nottingham Forest.

SCOTTISH CUP WINNERS.

1947 Aberdeen.
1948 Rangers.
1949 Rangers.
1950 Rangers.
1951 Celtic.
1952 Motherwell.
1953 Rangers.
1954 Celtic.
1955 Clyde
1956 Heart of Midlothian.
1957 Falkirk.
1958 Clyde.
1959 St. Mirren.

OLYMPIC GAMES WINNERS.

1908 United Kingdom.
1912 United Kingdom.
1920 Belgium.
1924 Uruguay.
1928 Uruguay.
1932 No Competition.
1936 Italy.
1948 Sweden.
1952 Hungary.
1956 U.S.S.R.

RUGBY LEAGUE FOOTBALL

WORLD CUP WINNERS.

1954 Great Britain.
1957 Australia.

R.L. CUP WINNERS.

1946 Wakefield Trinity.
1947 Bradford Northern.
1948 Wigan
1949 Bradford Northern.
1950 Warrington.
1951 Wigan.
1952 Workington Town.
1953 Huddersfield.
1954 Warrington.
1955 Barrow.
1956 St. Helens.
1957 Leeds.
1958 Wigan.
1959 Wigan.

ROWING AND SCULLING

THE UNIVERSITY BOAT RACE.

		min.	sec.	Lengths won by.
1947	Cambridge	23	1	10
1948	Cambridge	17	50	5
1949	Cambridge	18	57	¼
1950	Cambridge	20	15	3½
1951	Cambridge	20	50	12
1952	Oxford	20	23	canvas
1953	Cambridge	19	54	8
1954	Oxford	20	23	4½
1955	Cambridge	19	10	16
1956	Cambridge	18	36	1¼
1957	Cambridge	19	1	2
1958	Cambridge	18	15	3½
1959	Oxford	18	52	6
1960	Oxford	18	59	1

DOGGETT'S COAT AND BADGE.

1952 G. Green.
1953 R. Bowles.
1954 K. Everest.
1955 J. Goulding.
1956 C. Williams.
1957 K. Collins.
1958 R. Crouch.
1959 G. Saunders.

1956 OLYMPIC GAMES WINNERS (HELD AT MELBOURNE).

Single Sculls, V. Ivanov, U.S.S.R.
Double Sculls, U.S.S.R.
Coxswainless Pairs, U.S.A.
Coxed Pairs, U.S.A.
Coxswainless Fours, Canada.
Coxed Fours, Italy.
Eights, U.S.A.

SWIMMING

1956 OLYMPIC GAMES WINNERS (HELD AT MELBOURNE).

100 metres free-style, J. Henricks, Australia, 55·4 sec.
400 metres free-style, M. Rose, Australia, 4 min. 27·3 sec.
1500 metres free-style, M. Rose, Australia, 17 min. 58·9 sec.
4 × 200 metres relay, Australia, 8 min. 23·6 sec.
200 metres breast-stroke, M. Furukawa, Japan, 2 min. 34·7 sec.
200 metres butterfly, W. Yorzyk, U.S.A., 2 min. 19·3 sec.
100 metres back-stroke, D. Thiele, Australia, 1 min. 2·2 sec.
Highboard Diving, J. Capilla, Mexico, 152·44 pts.
Springboard Diving, R. Clotworthy, U.S.A., 159·56 pts.
Water Polo, Hungary.
100 metres free-style (Women), D. Fraser, Australia, 1 min. 2 sec.
400 metres free-style (Women), L. Crapp, Australia, 4 min. 54·6 sec.
4 × 100 metres relay (Women), Australia, 4 min. 17·1 sec.
200 metres breast-stroke (Women), U. Happe, Germany, 2 min. 53·1 sec.
100 metres butterfly (Women), S. Mann, U.S.A., 1 min. 11 sec.
100 metres back-stroke (Women), J. Grinham, Great Britain and Northern Ireland, 1 min. 12·9 sec.
Highboard Diving (Women), P. McCormick, U.S.A., 84·85 pts.
Springboard Diving (Women), P. McCormick, U.S.A., 142·36 pts.

CROSS-COUNTRY

THE INTERNATIONAL CHAMPIONSHIP.

1947 France.
1948 Belgium.
1949 France.
1950 France.
1951 England.
1952 France.
1953 England.
1954 England.
1955 England.
1956 France.
1957 Belgium.
1958 England.
1959 England

HOCKEY

OLYMPIC GAMES WINNERS.

1920 Great Britain.
1928 India.
1932 India.
1936 India.
1948 India.
1952 India.
1956 India.

BASKETBALL

OLYMPIC GAMES WINNERS.

1904 U.S.A.
1936 U.S.A.
1948 U.S.A.
1952 U.S.A.
1956 U.S.A.

GOLF

CANADA CUP

1954 Australia.
1955 U.S.A.
1956 U.S.A.
1957 Japan.
1958 Ireland.
1959 Australia.

EISENHOWER CUP.

1958 Australia.

LAWN TENNIS

DAVIS CUP.

1946 U.S.A.
1947 U.S.A.
1948 U.S.A.
1949 U.S.A.
1950 Australia.
1951 Australia.
1952 Australia.
1953 Australia.
1954 U.S.A.
1955 Australia.
1956 Australia.
1957 Australia.
1958 U.S.A.
1959 Australia.

BASEBALL

WORLD SERIES WINNERS.

1957 Milwaukee Braves.
1958 New York Yankees.
1959 Los Angeles Dodgers.

Radio, Television and Radar

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Radio, Television and Radar

By T. W. BENNINGTON and M. G. FOSTER, A.M.I.E.E.
(Engineering Division, B.B.C.)

RADIO.

Historical.—Though it is not possible to ascribe the "invention" of radio to any one man, it is true to say that its discovery and subsequent development as a means of communication was primarily due to the work of three. Between them—not, of course, together—these three conceived the idea of wave motion through space, of its use as a means of communication, explained and proved the physical processes involved, and brought the idea to practical fruition.

The theory of electromagnetic waves—of which the radio wave is one—was originated by the British physicist James Clerk Maxwell in 1864. He formulated a set of equations which have become famous as the basis of the behaviour of electromagnetic waves in space. These showed that both electrical and optical phenomena in space are essentially similar in character, and that the waves if short in wavelength are those of light, whilst if of longer wavelength they are radio waves. Maxwell was never, in his own lifetime, to see such waves actually produced by electrical means, yet by his purely mathematical investigations he laid the foundation upon which the art of radio communication was to be built.

When Heinrich Hertz—the second member of the trio—succeeded in 1888 in producing such waves by electrical means he found them to conform to Maxwell's theories in every particular. Although Hertz's work was purely in the nature of laboratory experiments, he made many useful discoveries about the waves themselves, and about their behaviour under differing conditions, and also about the apparatus necessary for producing them.

It fell to Marconi to develop the use of radio waves as a practical means of communication. He came to England in 1896 after carrying out his early experiments in his native Italy, and a British patent for his apparatus was at once granted. Encouraged by the sympathetic interest of the British Post Office, Marconi soon succeeded in establishing communication between Penarth and Weston-super-Mare. Following this achievement, he rapidly effected improvements in the apparatus, which increased its range. In 1897 the first Wireless Signalling Company was formed, and in 1898 the first two paid wireless messages were sent, in this country. By 1900 Marconi had amply demonstrated that communication by radio was a commercial proposition, and radio stations for regular operation on ship and shore were being built.

In 1901 Marconi went to America, there to attempt the reception of radio signals sent out by his station at Poldhu in Cornwall. And on 12th December, 1901—after innumerable difficulties had been encountered and overcome—the famous "S" signals of the Morse code sent out from Poldhu were received in Newfoundland, thus proving that radio waves could pass from the Old World to the New, and—most important discovery of all—could bend around the spherically shaped earth.

It was not easy to explain this point at first, for it was part of the theory that radio waves—like those of light—must, so long as they travelled constantly in a medium like air, move in straight lines. Some slight "bending" or diffraction over the horizon was understandable, but this was insufficient to account for the waves reaching Newfoundland. Then, almost simultaneously the British physicist Oliver Heaviside and the American Dr. A. E. Kennelly came forward with an explanation. They suggested that the air in the upper atmosphere had different electrical properties from that lower down. It was not, like the latter, an electrical insulator, but a conductor, and as such had the property of "refracting" the waves, and so of causing them to curve round in the upper atmosphere so that they returned to earth at a far distant point, thus enabling them to travel round the spherically shaped earth. The Kenelley-Heaviside "layer" theory was soon accepted by the world of science because it explained known facts about the behaviour of radio waves, though it was not until 1925 that the British scientist Sir Edward Appleton first determined the actual position of the layer in the atmosphere.

In the meantime the art of radio communication had progressed by leaps and bounds. Many scientists and inventors, both in this country and abroad, had contributed to this rapid advance, but perhaps the most far-reaching contribution of all was the invention of the radio valve by Sir Ambrose Fleming in 1904. This—one of the most remarkable of all man's inventions—was destined not only to revolutionise radio telegraphy but also to solve the problems which had so far prevented the successful development of radiotelephony, and eventually to make possible the transmission of high-quality speech, music, and even vision signals, and thus lead to broadcasting and television.

Although one of its most useful applications has always been as a means of communicating with ships at sea, radio has spread to so many other fields that to-day the whole world is closely linked by a vast and complicated network of radio communications. The broadcasting of news and entertainment—which began in this country in 1920—is now an almost essential part of normal civilised life, the transmission of still pictures and of living scenes is rapidly becoming so, whilst radar has brought about startling changes in marine and aerial navigation. In little more than half a lifetime the experimental toy of a young inventor has developed into a practically indispensable amenity of everyday life.

A complete understanding of radio can be acquired only by long study of the electrical and scientific facts and principles involved, but in the notes which follow we shall endeavour to give an insight into some aspects of radio communication and into the general working of some of the apparatus in as simple and non-technical a way as is possible.

Radio Waves and How They Travel.—When an electric charge is oscillating along a radio transmitting aerial it produces both an electric strain and a magnetic strain in the surrounding space and these two forces act at right angles to each other. At the conclusion of each oscillation the two strains are "broken off" and lose their contact with the aerial. The resultant disturbance in space constitutes an electromagnetic or radio wave. These waves do not require any material medium to support them—they can exist equally well in a vacuum. Thus we may discard the old conception of an "Aether" in which radio waves were once thought to travel. The waves travel through space with a velocity of 186,000 miles or 300 million metres per second. They travel through ordinary air at the same rate, but if they enter a medium with different electrical properties from those of air their velocity is altered.

We have seen that one complete wave leaves the aerial for each complete oscillation of the electric charge, and thus it is obvious that their rate of emission depends on the "frequency" of the electric oscillations being generated by the radio transmitter. If the charge be oscillating up and down the aerial 300 million times per second the frequency will be 300 million "cycles" per second. At the end of one second the front of the first wave

will be 300 million metres away from the aerial—since the waves travel that distance in that time—whilst the last wave will just be leaving it. Three hundred million waves will, therefore, occupy the listance between the first wave front and the aerial, and thus the distance occupied by each wave, *i.e.* the "wavelength" will be 1 metre. If the charge is now made to oscillate 100 times more slowly than before—at a frequency of 3 million cycles per second—then at the end of one second there will only be 3 million waves occupying the 300 million metres of space. The wavelength will therefore be 100 metres. Thus a wave of low frequency has a long wavelength, whilst a high-frequency wave has a short wavelength. To obtain the relation between the two quantities it is only necessary to remember that Wavelength (in metres) equals Velocity (in metres per second) divided by Frequency (in cycles per second). Radio waves range in length from about 30,000 metres at the long-wave end to less than a centimetre in the case of the shortest waves.

a partial conductor—a property imparted to it by the action of the sun.

On entering the ionosphere the velocity of the wave is changed and, instead of continuing in a straight line, it is gradually turned round and eventually directed downwards again towards the earth. Successive reflections of the wave between the ionosphere and the earth enable it to travel great distances in a series of "hops," as indicated in Fig. 1.

Now the action of the ionosphere upon the waves varies, not only with the time of day and season, but also with wavelength. Medium waves are not reflected—at least not during the day—but are lost within the ionosphere, hence their range depends on that of the ground wave. At night, however, some reflection does take place, and that is why—for example—distant medium-wave broadcasting stations may sometimes be heard at night and not during daylight. It is their "sky" wave and not their normal ground wave which reaches the longer distance. In the case of the

TABLE I

Class.	Wavelength Range, Metres.	Main Characteristics.	Principal Uses.
Long Waves.	Above 1,000	Travel long distances over earth's surface, also to greater distances by reflection from ionosphere.	Navigational aids, medium and long-distance point-to-point communication "National" broadcasting.
Medium Waves.	1,000 to 100	Travel over earth's surface only during the day, some reflection from ionosphere at night. Only medium-distance range during day, somewhat greater at night.	"National" broadcasting marine and aircraft communication, direction finding.
Short Waves.	100 to 10	Travel up to ionosphere, then back to earth. Conditions for ionosphere reflection vary with time of day and season. Very great distance range.	Long-distance "international" broadcasting, point-to-point communication, etc.
Very Short, Ultra Short, Super Short, and Extremely Short Waves.	Below 10	Travel just above and over earth's surface only, and for relatively short distances.	Short-distance communication, v.h.f. broadcasting, television, radar systems, etc.*

* A recent development, whereby the radio energy which is "scattered" at certain levels in the atmosphere is utilised, has extended the range of Very Short Waves to about 1,400 miles, and Ultra Short Waves to about 200 miles. Transmission in the former range is at present limited to telegraphy and telephony communication, whilst the latter is still in the experimental stage.

Although there is no difference in the *nature* of radio waves of differing wavelength, their actual behaviour during transmission varies tremendously according to their wavelength. In particular, their distance range varies greatly, and thus waves of different length are suitable for different purposes. Table I above *roughly* classifies them according to their wavelength, and indicates the purpose for which they are used.

The reasons for the variation in the distances reached by waves of different wavelength are briefly as follows: We will assume that the transmitting aerial will radiate waves in all horizontal and vertical directions. Let us consider first the horizontally radiated energy, which, because it travels close to the earth's surface, is known as the "ground wave." As the ground wave travels along some of its energy is absorbed by the earth itself, and so the wave is weakened and soon tends to die away. The *amount* of energy so lost increases as the wavelength decreases. Long waves lose relatively little energy in this way, and so their distance range is great. As the wavelength is decreased through the medium waveband the ground losses increase and the waves die away more rapidly, having only a medium distance range, whilst when the short waves are reached the range is reduced to a few tens of miles.

The waves travelling upwards from the aerial go on until they reach the atmospheric region known as the "ionosphere," which lies between about 60 and about 300 miles above the earth's surface. In this region the air is not an electrical insulator but

short waves the ionosphere normally acts as an efficient reflector of the upward-travelling waves—the precise manner depending on ionospheric conditions at the time—so the "sky" waves are returned to earth at all times, and consequently reach to great distances. These short waves are therefore most suitable for really long-distance communication of all kinds. Below a certain wavelength, however, the ionosphere no longer

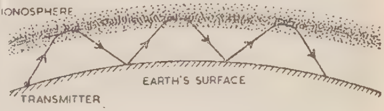


FIG. 1.—WAVE TRAVELLING IN HOPS BETWEEN EARTH AND IONOSPHERE.

acts as a reflector, and these very short waves normally pass right through it. The distance range is therefore that of the ground wave, and so is relatively small. Recently, however, it has been found possible to achieve ranges of about 1,400 miles on the Very Short Waves and 200 miles on the Ultra Short Waves by making use of the "scattering" of radio energy which occurs at certain levels in the atmosphere. This type of transmission is not as yet much beyond the experimental stage.

Wavelengths for Broadcasting.—So far as broadcasting is concerned, therefore, it will be seen that, for "international" or long-distance broadcasting, there is no choice but to operate on the short waves (high frequencies), because it is only on these wavelengths that the sky-wave will be efficiently propagated by the ionosphere so as to travel the great distances required. The overseas services of the B.B.C., for example, are provided upon various "bands" of short wavelengths, these bands being altered to suit the time of day, season of the year, and direction and distance of the target area. Similarly, television services are, perforce, conducted on the very-short or ultra-short waves (very-high or ultra-high frequencies) because the nature of the transmitted material requires a very large band-width for successful transmission, and such large band-widths can only be provided on these, or even shorter wavelengths.

So far as short-distance, or "national," sound broadcasting is concerned, this has, in the past, been carried out upon the long and medium waves internationally allocated for this purpose. But for some years past the demand for these wavelengths has been greater than the supply, *i.e.*, the number of broadcasting stations has increased until there is no longer room for the proper inclusion of their transmissions within the available wavelengths. The result has been such overcrowding and congestion of stations that reception, in many cases, is no longer technically satisfactory, *i.e.*, the radiations from one station produce interference in the form of "whistles" or "chatter" on the programme of another whose allocated wavelength is near its own. Particularly is this so after sunset, when, as already explained, the sky-waves of medium-wave stations travel long distances and so cause interference in areas where they are not heard during the daytime. Short of closing down numbers of these stations altogether (a project which has not been found possible), the only solution to the problem is to conduct the national broadcasting services on wavelengths which are not subject to such interference.

The very short wavelengths (very high frequencies) are the most satisfactory for this purpose mainly because, on these wavelengths, the sky-wave is not reflected by the ionosphere at night, and so does not travel outside the proper service area of the station and cause interference to other stations.

Since 1955, therefore, whilst still retaining the long- and medium-wave transmissions, the B.B.C. has been developing its very high frequency (v.h.f.) sound broadcasting service on wavelengths of the order of 3 metres (frequencies from 88 to 95 Mc/s.) until at the present time (Autumn 1959) the Home, Light, and Third Programmes, together with Network Three, are available on these frequencies to approximately 97% of the population of the United Kingdom. These services also make use of an improved system for modulating the transmitted wave with the programme impulses, known as frequency modulation (f.m.), and thus these transmissions give improved fidelity, much greater freedom from interference and a larger area of satisfactory broadcast service than could be given by a comparable amplitude modified (a.m.) transmitter on the medium waves.

It should be added that under certain ionospheric conditions, such as those occurring near the maximum of the sunspot cycle, a certain amount of interference to the v.h.f. and television services can occur from distant stations during the daytime, principally in those areas where the signal is weak, or in cases where inefficient aerials are used.

Broadcasting.—The technical problems involved in broadcast transmission and reception may be summarised as follows: to convert the sound waves of the programme into electric impulses or currents, each characteristic of the sound itself; to convey these impulses without distortion to a radio transmitting station; to superimpose them on the electromagnetic waves being radiated so that they are diffused into space; to pick the waves up again at a distant point and to separate the electrical impulses from them in their original form; to increase them in magnitude in order to compensate for the losses during transmission, and, finally, to reconvert the impulses into sound waves of a similar nature to those originally produced.

Sound waves are set up in the air in the broadcast studio when any "noise"—musical or otherwise—is made, these air disturbances travelling outward from their source at approximately 1,100 feet per second. The character of a sound wave varies in accordance with a number of factors, one of which is its "frequency." If the number of air vibrations per second is large the "pitch" of the note is high, whilst if it is small a low note is produced. The lowest note of a piano, for example, has a frequency of 27·5 cycles per second, and its highest note about 5,600 cycles per second. The range of frequencies which the average person can appreciate is from about 20 to 16,000 cycles per second. A second feature possessed by a sound is its "loudness," which depends upon the *intensity* of the sound waves produced, whilst a third and more subtle characteristic is the "sound quality." It is this which enables us to distinguish between two sounds of the same pitch and loudness, and to recognise, from the distinctive quality, to which instrument of the orchestra each owes its origin. This quality of a sound is due to the fact that it consists, not of a single frequency, but of a mixture of one "fundamental" frequency and several "harmonics." The proportion in which these harmonics are present determines the musical quality or "timbre" of a note or sound.

In broadcasting the aim is to transmit all these features of the sounds without distortion. Al though this cannot be done perfectly—because the apparatus is unable to handle the full ranges of frequency or loudness—good-quality transmission can be achieved if frequencies from about 30 to 10,000 cycles per second, and a loudness range covering all but the weakest and most intense sounds, are provided for.

Broadcast studios are rooms designed to suit a particular type and size of programme, the walls—which both reflect and absorb the sound waves—being constructed or treated so as to give tha quality to the sounds most desirable and pleasing for the particular type of programme. In addition, there are "General Purpose" studios, whose acoustic characteristics can be varied to suit the programme requirements. Adjacent to the studi there is usually a listening-room, sound insulated from the studio, in which the programme can be heard from a loudspeaker, so that it may be judged as it will sound in a listener's home, as distinct from what it sounds like in the studio. Sometimes it is necessary to add "echo" to the programme, *i.e.*, to give an effect such as would be produced in the interior of a cathedral. This is achieved by taking part of the studio output to a loudspeaker in an "echo room." The sound from this goes echoing round the bare walls of the room and the result—containing the echo—is picked up by a microphone, and may then be added to the original programme.

Each studio contains one or perhaps several microphones, according to the purpose for which it is used, these being the devices which convert the sound waves into electrical impulses. The type of microphone in most common use to-day is the "ribbon" type, in which a strip of aluminium foil is suspended within a strong magnetic field. Any movement of a conductor in a magnetic field causes an electrical voltage to be set up in th conductor, and when the aluminium "ribbon" vibrates under the impact of the sound waves electrical voltages or impulses are set up in i which are faithfully representative of the sound which caused them. The outputs from severa microphones may be mixed in any desired propor tion by means of a simple electrical arrangemen in the listening-room, and the combined output then taken to the control room of the broadcastin centre.

The control room is the electrical "nerv centre" of the whole system, and through it all th programmes pass. It contains "amplifiers" t which the studio outputs are connected, "mixers for combining, when necessary, the outputs of several studios or other programme sources, an switching arrangements and "fade units" fo maintaining the continuity of the programm This equipment is followed by the main contr amplifier and the control potentiometer, by mea of which the intensity of the electrical impulse kept within the range that can be handled b

subsequent apparatus. Finally, there are the amplifiers which transfer the programme to the lines connecting the control room to the radio transmitters.

When the programme originates at an outside point—like a sporting event—apparatus is taken out to the programme site itself, comprising microphones, amplifiers, mixers, and control units, together with means for communicating to the nearest broadcasting centre. The "outside broadcast" is controlled and amplified "on site" and then sent to the control room, where it is fitted into the main programme as if it were from one of the local studios.

No matter where the programme originates, it is eventually sent along the lines connecting the broadcast centre to the radio transmitters, and in this process the impulses soon become weakened by the losses to which they are subject. At intervals of about 40 miles, therefore, a special amplifier, known as a "repeater," is inserted into the lines in order to restore them to a workable level. Arrived at the transmitter, it is found that the high frequencies—corresponding to the high notes of the programme—have become weakened to a greater extent than have the low ones, and in consequence the programme is very much distorted. It is, therefore, passed through an "equaliser" which weakens all the impulses in inverse proportion to their frequency, and thus the distortion introduced by the lines is removed. It is then only necessary to pass them through an amplifier which increases all the frequencies equally and so bring the programme back to a volume suitable for feeding to the transmitter itself.

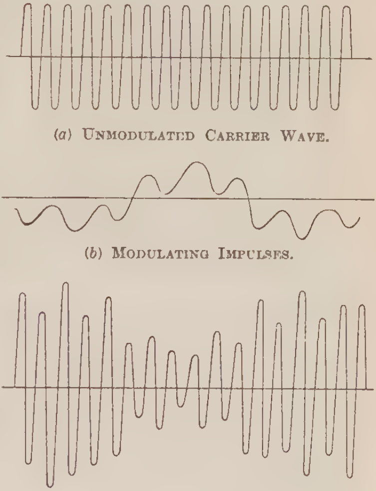
Radio Transmitters.—The first function of a radio transmitter is to generate high-frequency oscillations which, when amplified and fed to an aerial system, will set up electromagnetic waves in space. Its second is to provide some means of "modulating" these waves so that they will carry the intelligence which it is desired to transmit.

The transmitter may operate upon wavelengths varying from several thousand metres to a few centimetres (*i.e.*, the frequency of the oscillations it produces may vary from a few thousand cycles to hundreds of millions of cycles per second) according to the purpose for which it is intended. The form of intelligence transmitted may also vary widely, ranging from telegraphy to broadcast speech and music or television.

In the course of their development radio transmitters have employed many different systems of generating the high-frequency oscillations. Among these may be mentioned the induction coil, the spark transmitter, the Poulsen arc, and the high-frequency alternating voltage generator. All these systems, however, have disadvantages which are not shared by the thermionic valve, and consequently this has gradually superseded them and is now almost exclusively the means used to generate the oscillations in modern radio transmitters.

If a coil of wire is connected in the anode circuit of a valve, and another coil in the grid circuit, the valve can, by means of the electrical interaction between these coils, be made to produce electrical oscillations. By choosing particular values of "inductance" and "capacity" in these circuits the oscillations can be "tuned" to the desired frequency. The "inductance" usually consists of suitably proportioned coils of wire, whilst the "capacity" is provided by means of "condensers," which consist of sheets of metal separated by air or some other insulating material.

Such a circuit, however, exhibits a tendency to change its operating frequency slightly with small changes in the voltages supplied to the valve, and changes in the temperature of the air surrounding the oscillatory circuit. Such changes would, of course, alter the operating frequency, and thus the wavelength, of the transmitter, and, as this is obviously undesirable, steps are taken to control the circuit in such a way as to prevent these changes occurring. Firstly, the oscillatory circuit is usually supplied through a voltage regulator which keeps the voltage nearly constant, despite variations in the voltage incoming to the regulator itself, and it is placed in a small oven whose temperature is maintained constant within very close limits by means of a thermostat; secondly, "crystal control" is applied to the oscillator. Certain crystals such as natural quartz, Tourmaline, Rochelle salt, etc., possess what are known as "Piezo-electric" properties. Very simply, if subjected to mechanical compression or tension these crystals produce an electrical potential difference across certain axes. Conversely, if an alternating voltage is applied to the crystal it will vibrate, and if the frequency of the alternating voltage is close to the natural frequency of the crystal—which is determined largely by its physical dimensions—something approaching mechanical resonance occurs. This mechanical vibration sets up a correspondingly large oscillatory voltage across the crystal, which is applied to a valve and used to maintain the electrical oscillations in the valve and its associated circuit. Since the frequency of oscillation is almost entirely governed by the dimensions of the crystal, a very high degree of transmitter frequency stability can be achieved by using a crystal in this way. The oscillations which are produced by this "drive" circuit (as it is called) are then passed through as many "amplifying" stages as are necessary to increase



(*a*) Unmodulated Carrier Wave.

(*b*) Modulating Impulses.

(*c*) Amplitude-modulated Wave.

Fig. 2.

the power to a level suitable for applying to the aerial. Such oscillations when radiated by the aerial do not themselves convey any intelligence, and the resultant wave is called the "carrier" wave.

To impart the intelligence to the carrier it is necessary to "modulate" this wave with, for example, a broadcast programme. This, as we have seen, is composed of electrical impulses which vary in accordance with the sounds which produced them. Like the output of the drive circuit, the programme signals received over the lines from the studio are amplified until they are of sufficient power to be applied to the modulator valve or modulation transformer, according to the system in use in the particular transmitter. By one of these means these amplified programme currents are made to alter the "amplitude" of the oscillations of the carrier wave. The result is that while the *frequency* of the carrier wave is unaffected, its *amplitude* varies in sympathy with the programme impulses it is carrying. The programme impulses are therefore conveyed through space to the receiver, and at the receiver it is only necessary to cause the *variations* in the amplitude of the received wave to set up electric currents, and these will be an exact replica of those produced by the microphone. Fig. 2 will help to

explain the process of modulation; it shows in diagrammatic form: (*a*) the unmodulated carrier wave; (*b*) the programme impulses; and (*c*) the modulated carrier. The method described above is only one way of modulating a carrier wave, though such *amplitude-modulation* (a.m.) is still the most widely used system for broadcast transmission. However, another rather more complex method, known as *frequency modulation* (f m.), has certain advantages, and is being used both in this country and abroad; in particular, in the v.h.f. sound-broadcasting services of the B.B.C. In this system the *amplitude* of the carrier wave remains unchanged and the programme impulses are caused to vary its *frequency* at a rate corresponding to the pitch and loudness of the programme sounds. See Fig. 3. Under suitable conditions a transmitter using this system can give improved fidelity of reception, greater freedom from interference, and a larger broadcast service area than a comparable amplitude modulated transmitter.

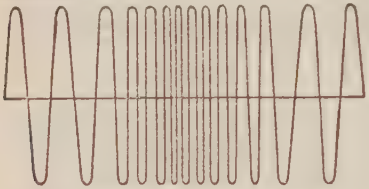


FIG. 3.—FREQUENCY-MODULATED WAVE

The modern high-power transmitting station is an elaborate and complicated plant occupying—with its associated masts and aerial systems—many acres of ground Nowadays most stations draw their power from the public electricity-supply mains, although frequently stand-by generating plant is installed (and in some instances very large-capacity storage batteries from which power can be drawn for limited periods) for use in the event of a breakdown.

Power from the mains (or the station's own generating plant) is fed either to motor-generator sets or to transformers and rectifiers, which produce the necessary voltages for operating the transmitters. The "high-tension" supply for a medium-power transmitter is often of the order of 15,000–20,000 volts, nearly one hundred times that of the ordinary domestic lighting mains! Most up-to-date stations have a control desk from which the filament, grid bias, high-tension, and other supplies are controlled, and on which are duplicated all the voltmeters, ammeters, and other instruments necessary to inform the control engineer of the operating conditions of the transmitter itself.

In the early (low-power) stages the valves are cooled by normal heat radiation in the same way as a receiving valve, but as the power handled by the valves increases it is necessary to provide a blast of air or to use water-cooling to carry away the waste heat. The cooling air is drawn from outside, filtered and blown round the valves through ducts specially designed to direct the air where it is most needed (in some instances the air after being heated by its passage over the valves can be used to warm the station building in cold weather). When water-cooled valves are used the water is circulated through water-jackets round the valve anodes. All the coils, condensers, resistances, and other components associated with the valves are enclosed with them in glass-fronted steel cubicles, the doors of which are interlocked in such a way as to prevent the high voltages being switched on when the doors are open or, alternatively, to switch them off if the doors are accidentally opened while the transmitter is working. This arrangement and other more complicated interlock schemes protect both the engineers operating the station and the equipment itself from accident.

Adjacent to the transmitter and its control desk there is usually a small control room which houses the amplifiers and equalisers associated with the lines bringing the programme from the studios. It is here that the necessary adjustments, described earlier, are carried out before the programme is passed to the transmitter proper.

Individual transmitters may vary very much in detail from the above description, since there are so many different varieties, long-, medium-, short-, or very-short-wave transmitters; some used solely for radio-telegraphy, others for long-distance radio-telephony, for communication with ships at sea, for broadcasting, for television, for radar, and for other purposes.

Some broadcast transmitters are automatic. They are switched on and off by a time switch, and whilst in operation are monitored by automatic equipment which will call attention to any faults which may develop by ringing an alarm at the nearest manned station. In addition, the automatic monitor can, in certain circumstances, change over, or switch off, defective items of equipment without interrupting the service. More and more B.B.C. stations, particularly those used for the v.h.f. f.m. sound broadcasting service, are being built for unattended, automatic operation.

Aerials.—The function of the aerial is to place the high-frequency oscillations generated in the transmitter in contact with as great a volume of space as possible, so as to permit a relatively large radiation of energy into space. Conversely, a receiving aerial, because it is in contact with a comparatively large volume of space, can absorb a larger amount of energy from the passing wave than the receiver circuits themselves. All radio receivers—except those fitted with a built-in "frame" aerial—should therefore be connected to an efficient aerial in order to obtain the best results.

Transmitting aerials vary considerably in design and construction, according to the wavelengths upon which they are intended to operate and the degree of directivity which it is desired to achieve.

Medium-wave aerials generally consist of an earthed vertical radiator a quarter of a wavelength long, this being the best condition for efficient radiation with such an aerial. Sometimes a horizontal "roof" is added to the vertical part, and a "loading coil" is usually provided by means of which the aerial may be "tuned" over a range of wavelengths. By using more than one vertical aerial it is possible to direct the radiated energy towards a particular area, but the effect is limited. In recent years "mast-radiators" have come into use in increasing numbers. In an aerial of this type the mast itself is mounted upon insulators, and the steelwork used for its construction becomes the radiating system. Such an arrangement is not only economical but also possesses other advantages. For example, by fitting a "capacity top"—a series of arms similar in appearance to the ribs of an umbrella—the electrical characteristics of the aerial, in particular its effective height, may be altered. Thus the aerial may be tuned, and in certain circumstances the shape of its service area can be slightly adjusted, which is sometimes very valuable, particularly in the case of aerials being used for broadcast transmission. Mast radiators are sometimes divided into two parts by an additional insulator inserted into the structure at a chosen height. By feeding the output of the transmitter to the two sections of the mast separately—usually at their junction—the effect is that of an elevated half-wave aerial, and it can be adjusted to extend the fading-free range of the station.

Short-wave aerials are usually unearthed horizontal lengths of wire, half a wavelength long, connected to the transmitter by feeder lines so arranged as to have no effect on the wavelength. Short radio waves are easily "beamed," that is to say they lend themselves to transmission in specific directions. In long-distance transmission this is generally desirable, and it is achieved by increasing the radiated energy in certain directions and suppressing it in others. The energy is concentrated not only in azimuthal directions, but, so that it may reach only the desired reflecting point in the ionosphere, in vertical directions as well. This is usually done by using an aerial "array" consisting of a number of half-wave aerials arranged in rows, in both the horizontal and vertical planes; in general, the greater the number of aerial elements there are, the narrower can the beam be made in both planes. The vertical angle in which the beam is projected is controlled by the

height at which the array is suspended above the ground.

In order to suppress the energy in unwanted directions a "reflector curtain" is hung behind the main array and spaced a quarter of a wavelength from it. This "curtain" consists of a similar arrangement of half-wave aerials, but it is not fed with energy from the transmitter. If it is desired to transmit at different times to places lying in opposite directions, special switching facilities are often provided for the arrays. These are so arranged that when a particular aerial has finished transmitting in, say, a northerly direction, it can serve as a reflector for the aerial working in a southerly direction, which had previously acted as a reflector for the north-bound transmission. By such means economies can be effected in the use of materials and ground space.

There are several other varieties of short-wave aerials available, and the precise type to be used for any project is largely dictated by the particular purpose for which it is required and any special circumstances which may be involved.

For television and other ultra-short-wave transmissions it is also usual to employ half-wave aerials, but in these cases the wavelengths are such that rigid conductors may be used. The most important single factor to be considered in this wave range is the height of the aerials above the ground. They should be as high as practicable, as, at these very high frequencies, the waves travel directly through the lower atmosphere, and the greater the height of the aerial the greater the distance range of the transmissions. The most common aerial used in this wave band is the half-wave dipole, which is frequently constructed from rods or tubes, although some transmitting aerials are made from heavy metal strips. For receiving, a rigid vertical rod with a reflector behind it—the familiar "H" aerial—is most commonly used, and increased "gain" in the direction desired is often achieved by the fitting of additional elements in front of the receiving aerial itself. Yet another type of transmitting aerial, suitable for use at very high frequencies, is known as the "slot aerial," and consists of one or more narrow rectangular apertures half a wavelength long in an electrically conductive sheet. In practice, the slots are usually arranged round the periphery of a vertical metal cylinder so as to give a uniform signal in all directions. Each slot is energised by a vertical rod placed just behind it inside the cylinder and connected to the transmitter by a co-axial feeder Since the actual slot may be filled with an insulating material, such as Perspex, an aerial of this type can readily be made weather-proof, and the mechanical construction is relatively simple. Aerials of this type are used at most of the B.B.C.'s v.h.f. f.m. sound broadcasting stations.

Radio Receivers.—Although the broadcast receiver is only one of the many types of radio-receiving equipment in everyday use, the general principles underlying its operation are common to all radio-receiving apparatus.

As stated earlier, its main functions are to accept the energy picked up by the aerial from the passing radio waves; to separate the low-frequency programme impulses from the high-frequency carrier wave; and, having separated them, to amplify these programme impulses to a power level sufficient to operate the subsequent apparatus, usually a loudspeaker, for reconversion into sound.

Tuning the Receiver.—In order that the receiver may respond to the waves sent out by the station it is desired to listen to, and not to those of stations operating on other wavelengths, means must be provided to adjust it to accept signals of one wavelength, and to reject the others. This process is called "tuning" and makes use of the principle of "resonance."

When travelling by bus it is frequently noticed that at a certain speed a particular window will commence to rattle violently; above or below that speed the window is quiet. This phenomenon is caused by mechanical resonance. The window—due to its shape and size and the physical properties of the materials of which it is made—possesses a certain natural frequency of vibration. When the engine of the bus is running at the speed which sets up vibrations in the vehicle at or very near that natural frequency, the window starts to vibrate in sympathy. Now in electrical circuits which are made up of inductance and capacity each individual circuit has a resonant frequency. At this particular frequency the circuit will pass its maximum current, and, like the bus window, if it is "excited," this time by electrical oscillations at or very near that resonant frequency, it will respond readily, whereas it will be almost unaffected by oscillations of a different frequency. In the radio receiver therefore it is arranged, by the process of "tuning," to alter the resonant frequency of the circuit to which the oscillations picked up by the aerial are fed. This alteration can be achieved either by changing the number of turns of wire on the tuning inductance, or by altering the capacity of the tuning condenser, or both. In practice, it is not very convenient to keep changing the number of turns of wire on the coil, so the circuits are generally arranged in such a way that for a particular waveband—say the long waveband—the inductance is kept constant and the capacity of a variable condenser connected across it is varied to effect the necessary changes in the tuning circuit. To make the operation of the receiver as simple as possible it is usual to choose a value of condenser and inductance such that a complete waveband can be tuned by altering the condenser from maximum capacity to minimum capacity. When it is desired to make a larger change in the wavelengths to which the set will respond, the value of the inductance is changed—by switching in another coil, by the operation of the "wave-change" switch. This enables the same condenser to vary the circuit characteristics over yet another range, the wave-change switch usually providing "long" and "medium" wave range. The tuning condenser is operated by turning the tuning knob on the front of the receiver, the precise wavelength, or frequency, to which the set is tuned being indicated on a dial or other indicator suitably geared to the driving spindle of the variable condenser. Some broadcast receivers are equipped with push-buttons for tuning, and these buttons are either arranged to switch in and out different circuits, each tuned to a specific wavelength, or to operate an electric motor geared to the tuning condenser so that the latter is driven round to the required position and then stopped until a different button is pressed.

Coils and Condensers.—A very desirable, in fact almost essential, feature of a modern broadcast receiver is high selectivity. This means that it must be able to receive the desired station adequately, but without any overlapping and interference from others. It should be apparent from foregoing sections that if this result is to be achieved, the receiver must respond not to one precise frequency only, but rather to a small band of frequencies on either side of the carrier frequency. This is because the modulation of the carrier by the low-frequency programme impulses causes the radiated energy to be spread over a limited band of frequencies known as the "sidebands." In order that the quality of the received programme shall not be impaired, it is necessary that the receiver shall respond to these sidebands as well as the carrier. A selective receiver tuned to a given point will therefore respond to the desired carrier wave and its sidebands, but not to frequencies outside this range.

One important factor in securing a high degree of selectivity is the efficiency of the tuning coils, and much care and ingenuity has been devoted to the design of modern coils in order to reduce all the avoidable losses to an absolute minimum. Almost equally important is the actual arrangement of the circuits themselves in the receiver. The use of several tuned circuits operating together is a potent influence in providing the selectivity necessary under modern conditions, when large numbers of transmitting stations are operating simultaneously on closely adjacent frequencies.

As described earlier, such circuits are generally tuned by varying the capacity of a condenser connected across a coil. The variable condensers usually consist of two sets of interleaving metal plates, one fixed and one movable, insulated from

each other by an air space or other insulator. The amount of capacity in circuit is determined by the degree of interleave of the plates, the moving set being controlled by the tuning knob. When several circuits are required to be tuned simultaneously the condensers in each circuit are "ganged" together by mounting them in one rigid assembly holding the fixed plates, and providing a common driving spindle for all the moving plates The movement of the one tuning knob thus varies all the condensers at once, and so all the circuits are tuned together in one operation.

Detectors.—Having made provision to tune the receiver to the incoming waves, the next step is to incorporate within it some means of detecting the intelligence carried by them. This is necessary, because the incoming waves as received, although modulated by the programme, are still at frequencies far too great to be audible to the human ear, even if the loudspeaker could reproduce them. In some way therefore the low-frequency programme impulses must be sorted out from the carrier, and the latter removed. This is the function of the detector. What it does is to produce a low-frequency current in the receiver, a current which varies in sympathy with the *amplitude* of the waves being received. It does this in the way described below, where the detector is assumed to be a crystal.

Reference to Fig. 2 (*c*) will show that the low-frequency programme currents caused the variations in the amplitude of the carrier wave. The *rate* at which the amplitude of the carrier is changed therefore is the *frequency* of the programme current at any instant, and the *amount* by which the amplitude is changed is the strength or loudness of the programme. The detector, whether it be a crystal or a small metal rectifier, acts as a one-way device, and so when the high-frequency oscillations produced in the tuning circuit by the modulated carrier are applied to it, current passes freely in one direction, but not in the other. The result is that half of the high-frequency oscillations are stopped, and a series of pulses of high frequency are left, all acting in one direction. The rate of change of amplitude of these pulses is the same as that of the currents which modulated the carrier wave at the transmitter. The diagram Fig. 4 shows the pulses in

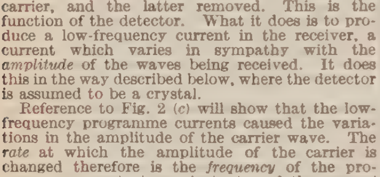


FIG. 4.—SHOWING DETECTION PROCESS.

full lines, and the varying mean current which results from them as a dashed line. Now if a pair of headphones is connected across the detector the individual pulses will be of such a high frequency that they will not operate the diaphragms in the headphones, but the mean current indicated by the dashed line is changing much more slowly, and to this slower change the diaphragms will respond. The mean current is, in fact, varying at low frequency, and is the modulation imparted to the carrier wave by the original programme sounds (compare Fig. 2 (*b*) with the dashed line of Fig. 4), and so the telephone diaphragms, as they respond to its variations, faithfully reproduce the sounds which caused the electrical impulses in the studio microphone.

In a receiver designed for the reception of frequency-modulated waves a frequency discriminator has to be employed, in which the frequency variations are made to cause amplitude variations at the output end, in accordance with the original programme impulses. The wave is then applied to a detector, operating in the ordinary way.

The Diode Valve Detector.—Fleming's original thermionic valve had only two electrodes, and although the addition of more electrodes has increased its usefulness, the original two-electrode type or "diode," as it is called, is still used to-day, being one of the most popular modern detectors. The diode valve consists of the familiar highly evacuated glass envelope containing a fine wire filament and a metal plate called the "anode." If an electric current is passed through the filament it becomes heated and gives off electrons. When the anode of such a valve is positively charged it will attract the negatively charged electrons, which will flow through the valve to the anode and thence through the external circuit, thus producing an electric current. If, however, the anode is negatively charged it ceases to attract the negatively charged electrons emitted by the filament, and the current stops flowing. From this it will be clear that, if the high-frequency voltages set up in the receiver circuits by the radio waves are applied to the anode of a diode valve, current will flow through the valve during each positive half-cycle, while during each negative half-cycle the current will stop. Such a valve, therefore, behaves in a manner identical to the crystal detector already described, suppressing every other half cycle of the high-frequency currents and allowing the remainder—all flowing in one direction—to pass. The resulting uni-directional current impulses produce a "mean valve current" varying at low frequency in the same way as that described for the crystal, and this low-frequency current can be used to actuate the diaphragms of the headphones.

The Triode Valve.—This valve, as its name suggests, is one which contains three electrodes, and was developed by Lee de Forest from Fleming's original diode.

It has a filament and an anode like the diode, but in addition it is fitted with a "grid." This grid is usually in the form of a fine wire mesh placed between the filament and the anode. Normally the electrons leaving the filament can pass through this grid without interruption, and reach the positively charged anode. If, however, the grid has a negative potential applied to it, it will restrict or even stop the flow of electrons to the anode, depending on the strength of the negative potential This important property of a triode can be used to *amplify* weak signals so as to render them strong enough to be useful. If this amplification—the principle of which will be described later—is used before the detector stage it is called high-frequency or radio-frequency amplification, and if used after the detector stage it is called low-frequency amplification.

Both types of amplification are frequently employed to increase the "sensitivity" of a modern radio receiver. The currents flowing in the first receiving circuits are very weak, as they are only those set up by the incoming waves. If the ends of these circuits are connected between the grid and filament of a triode valve the oscillating voltages set up in them by the incoming waves will make the grid alternatively positive and negative. Now if the grid is positive it attracts electrons; if negative it repels them, thus the anode current, or current passing *through* the valve, is caused to rise and fall in sympathy with the incoming signals. These incoming signal voltages are thus enabled to control the much greater power flowing between anode and filaments, which is derived from local batteries or from the electric mains.

Fig. 5 explains this action more clearly. The sloping curve on the left is a typical valve characteristic, and consists of a graph showing the relationship between anode current and grid voltage.

Let us suppose that the normal grid bias applied to the valve whose characteristic is shown in Fig. 5 is $-1{\cdot}5$ volts. It will be seen that with this amount of bias the anode current will remain steady at a value of about 3·5 milliamps., corresponding to point *A* on the characteristic curve. Now the currents set up in the receiver circuits by the passing radio waves are very much less than this. So if the voltage produced by them is applied to the grid, and, for example, varies the grid potential from zero to 3 volts negative, as indicated by the curve below the base line, the anode current will be varied between point *B* and point *C* on the curve. Thus we have a varying current many times stronger than the original, yet, as will be seen from the curve on the right, varying exactly in sympathy with the original.

If a coil is connected in the anode circuit the rising and falling current passing through it produces a rising and falling magnetic field, which, in turn, sets up an oscillating voltage across the coil. Since the changes of anode current are greater than the original changes set up by the radio waves in the first circuit, the voltages appearing across the anode coil will be correspondingly greater, and thus the original signals have reproduced themselves—via the valve—in a considerably amplified form.

A similar type of valve and circuit arrangement may be used for amplifying the low-frequency voltages obtained after detection, thus strengthening them to a power level sufficient to operate a loudspeaker.

The triode can also be used as a detector if a suitable circuit arrangement is employed. One method—known as the "anode bend" method—is to arrange for the grid-bias voltage to restrict the anode current to the point where the curve bends sharply—indicated by point *X* in Fig. 5. When biased to this point, only grid voltages swinging in a positive direction are able to increase the anode current, negative swings having

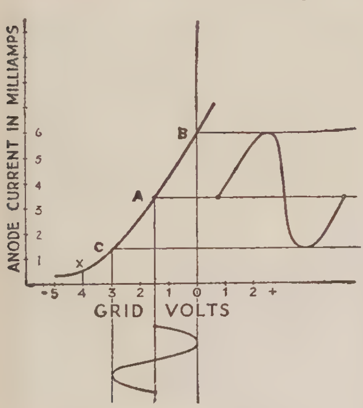


FIG. 5.—SHOWING RELATION BETWEEN GRID VOLTS AND ANODE CURRENT.

no effect upon it. In this way the alternate negative half-waves are suppressed, and the circuit behaves in much the same manner as that of the diode described earlier and illustrated in Fig. 4. Yet another method is to insert a fixed condenser in the grid lead, and a resistance—known as the grid leak—between grid and filament.

Multi-Electrode Valves.—So far we have dealt only with the simpler types of valve—the diode and the triode—but nowadays there are many more complicated types. These have been evolved by the introduction of additional electrodes into the earlier valves in order to improve their amplifying properties for both high and low frequencies, and for various other purposes.

One of the deficiencies of the triode valve is that when used as a high-frequency amplifier there is a limit to the amount of amplification that can be attained owing to the liability of energy being fed back from the anode to the grid—as it were through a capacity—thus causing the arrangement to become unstable. This tendency can be overcome by interposing an extra grid between the anode and the ordinary control grid, and valves of this type—known as the "screen-grid"—are often employed for high-frequency amplification. The extra grid, which is kept at a steady potential somewhat lower than that of the anode, screens the latter from the control grid, prevents the feed-back of energy from the anode to the control grid, and so permits greater amplification to be achieved without instability.

For low-frequency amplifiers the "pentode" valve, having five electrodes, is commonly used. This valve is capable of handling a large amount of power and has a high amplification factor: it is therefore particularly suitable as a final amplifier in a receiver, where it can be utilised to provide a relatively large amount of power for the loudspeaker. Five electrode valves of a different type are also employed for high-frequency amplification.

It is also common practice to perform the functions of more than one valve within a single glass bulb—*i.e.*, one valve envelope may, for example, contain assemblies to amplify high-frequency oscillations, generate local oscillations, and detect. The diode detector is often included within the bulb of another valve; sometimes there are two diodes—one to act as a detector and the other for automatic volume control—as well as a triode assembly, all within the one bulb. In superheterodyne receivers it is necessary to generate local oscillations in the receiver itself and to mix these with those set up by the incoming signals, and for this purpose several different valve types having various arrangements of electrodes are in use.

Semi-Conductors.—Many of the functions of thermionic valves are nowadays being performed by various types of semi-conductors, the increasing use of which promises to effect big changes in the design of radio receivers and other radio equipment. It is interesting to note that the crystal detector, which was in use for many years before the advent of the valve detector and whose function has already been briefly described, was itself a particular example of the use of a semi-conducting device. During recent years the properties of certain crystalline materials have been more closely investigated, and as a result crystal diodes have been produced which possess several advantages over valves. But, more important, it was soon found that crystals, if built up or arranged in a suitable manner, could provide amplification, and thus could be used as amplifiers or as oscillators, in many instances in the place of valves. The crystal material used—principally germanium into which an impurity has been introduced, or sometimes silicon similarly treated—performs its function in a way which is not easily explained, but the following simplified description may serve as an indication of the uses to which semi-conductors are being put in modern radio-equipment.

Crystal Diodes.—Crystal diodes are of two main types: (*a*) junction diodes, and (*b*) point-contact diodes.

Junction diodes consist, typically, of a germanium crystal into part of which indium has been introduced at a high temperature. The part consisting of the pure germanium contains, essentially, only negative electrons and is known as "*n*-type" material, whereas the part which has been adulterated with indium possesses positive electric properties, containing only positive "holes" as they are called, and is known as "*p*-type" material. The transition from the *n*-type to the *p*-type material is called the junction. If a voltage is applied across the junction in such a direction as to cause negative electrons to flow over the junction from the *n*-type to the *p*-type material and positive holes from the *p*-type to the *n*-type, then a large current will flow. If, however, the voltage is applied in the reverse direction, then no current (or very little) can flow, because there are no negative electrons in the *p*-type material to flow to the *n*-type, and no positive holes in the *n*-type to flow to the *p*-type material. The crystal, therefore, behaves as a one-way device and acts in the manner described in the section "Detectors," and in a manner similar to that of a valve-diode, already described. It is therefore suitable for use as a detector in radio circuits, *i.e.*, for separating the low-frequency programme currents from the high-frequency oscillations of the radio wave, and for other uses to which a valve diode may be put.

Point-contact diodes consist of a pointed wire in contact with a crystal, and the old crystal detector, already mentioned, was, in fact, just such a device. The crystal may be of germanium

(n-type) or silicon (p-type) and the wire "whisker" of tungsten or platinum, in each case the whisker being of the opposite electrical characteristic to that of the crystal. In effect, a junction is formed in the crystal just below the point of contact of the whisker, and the arrangement, therefore, behaves as a one-way device in a similar manner to that of the junction diode.

Transistors.—Crystal arrangements designed to act as amplifiers are known as "transistors" and these again are of the two main types: (*a*) junction transistors, and (*b*) point-contact transistors.

Junction transistors consist, typically, of crystals in which there are two zones of p-material separated by a thin section of n-material. (The reverse arrangement may also be used.) Imagine such a crystal with p-material on its left-hand side, n-material in the centre, and p-material on its right-hand side. The left-hand side is known as the *emitter*, the centre as the *base*, and the right-hand side as the *collector*. The "input" circuit is connected between emitter and base in such a direction that large current can flow across the junction, whereas the "output" circuit is connected between collector and base so that only a small current can flow across its junction with the base. However, the large currents flowing in the base from the input circuits are common to the collector circuit as well, and they increase the previously small collector currents. These increases in the collector currents are of great account, for, owing to the direction in which the output circuit is connected across the collector and base (*i.e.*, its greater impedance) they can give rise to much greater voltage variations in that circuit than could the same current variations in the input circuit. Thus amplification has been achieved and the transistor can be used to perform the functions of a valve amplifier or of an oscillator, though to do so it must be connected in circuit in a somewhat different way from that in which the valve is connected.

Point-contact transistors consist of crystals, usually of germanium, with two wire whiskers touching the surface only a few thousandths of an inch apart. The action of this device is similar to that described above the whiskers forming the emitter and collector respectively, and the crystal the base. If the emitter and collector are sufficiently close, currents flowing in the crystal under the former can cause current variations under the collector, and so vary the currents in the output circuit. The latter can be considerably greater than those in the emitter circuit, and this, together with the different impedance in the two circuits, gives rise to the amplifying effect.

It will be evident that crystal diodes and transistors possess several advantages over valves which are designed for similar work, since there is no need for evacuated glass bulbs nor for a heated emitter to give off electrons. This leads to much greater compactness and economy as well as to a much longer life. However, there are certain limitations to their use, and they are not yet suitable as substitutes for valves in all cases. But their development and improvement is proceeding at such a rate that their uses are continually increasing, and it appears that this trend will continue into the future.

The Super-Heterodyne Receiver.— Most modern broadcast receivers are of the "super-heterodyne" type, in which the "heterodyne" principle of reception is employed. In this system local high-frequency oscillations are generated within the receiver, but of a slightly different frequency from those being received. The two sets of oscillations are allowed to "beat" together, and the result is that, after detection, a third set of oscillations of yet another frequency is produced.

The advantages of the super-heterodyne receiver are that the necessity for tuning all the circuits of the amplifiers to the wavelengths or frequency of the incoming wave is avoided, and most of the amplification required can be performed at one fixed high frequency, no matter what wavelength is being received. This permits the amplification to be carried out in a particularly efficient way, since the circuits can be designed to work at maximum efficiency when only a single frequency has to be handled; furthermore, the system greatly facilitates interference-free reception.

The super-heterodyne receiver uses an oscillator so arranged as to be always mistuned to the frequency of the incoming signals by a certain fixed amount, so that "beats" at, for example, 465 kilocycles per second are produced, irrespective of the frequency being received. These beats are detected and passed to the anode of a valve, where oscillations at 465 kilocycles per second are established. This frequency is termed the "intermediate frequency," and the circuits of the succeeding amplifying valves remain constantly tuned to this one frequency. If a broadcast programme is being received, then the amplitude of the intermediate frequency oscillations varies at audio-frequency, and a second detector is required to sort out the audio-frequencies of the programme from the intermediate frequency, so that they may be fed to the loudspeaker.

Automatic Volume Control.—As has already been explained, the anode current flowing through a valve may be limited by the application of a steady negative voltage to its grid. This is called grid "bias," and it may be derived from a battery or from the voltage developed across a resistance in the circuit. In modern receivers this characteristic is made use of to counteract "fading," *i.e.*, the rise and fall in the strength of the incoming waves due to variations taking place during their journey from the transmitter to the receiver. A diode valve is incorporated in the circuits following the intermediate-frequency amplifier and supplied with voltages at the intermediate frequency. These are then detected and fed back to the control grids of the pre-detector amplifiers. Thus, when the strength of the incoming signals rises above normal a negative voltage is applied to the amplifying valve control-grids, and so their amplification is reduced. Conversely, when the incoming signal strength drops below normal, less negative voltage is fed back from the diode to the amplifier-valve grids, their amplification is increased, and more voltage is delivered to the second detector. In this way most types of fading can be overcome, or at least considerably reduced, and the input to the low-frequency end of the receiver maintained at an approximately constant level.

Stereophonic Broadcasting.—A person having normal hearing is able to determine the direction from which a sound reaches him by virtue of the fact that he has two ears, and, therefore, the sound will reach one of them a fraction of a second before it reaches the other. This difference in arrival time allows the brain to calculate direction.

It will, therefore, be apparent that if the same person listens to, say, an orchestral concert in a large hall he will be able to determine—even with his eyes shut—the approximate position of a particular instrument with respect to the rest of the orchestra. If, however, he listens at home to a broadcast of the same concert, then, due to the fact that he hears the music after it has been picked up by a single microphone located at one point and radiated over a single-channel transmission system, he will be unable to allocate a definite position to any instrument.

The aim of stereophonic broadcasting, or sound reproduction, therefore, is to restore the listener's ability to locate the position in space of the various sources of sound and to follow movement.

To do this it is necessary to use two microphones in the studio—to simulate the two human ears—and to transmit their outputs, through two similar, but separate, chains of equipment, to two radio receivers and their two loudspeakers, which must be placed some distance apart, in the listener's home. The idea of stereophonic broadcasting is not new; as long ago as 1926 the B.B.C. carried out experiments using two medium-wave transmitters. The advent of stereophonic records, both discs and magnetic tapes has, however, re-awakened interest in the subject, and

during 1958 and 1959 the B.B.C. carried out a series of experimental broadcasts, in which the "left-hand" channel was carried by the medium-wave and v.h.f. Third programme transmitters and the "right-hand" channel by the television sound transmitters.

The system outlined above, which was used for the experimental broadcasts, suffers from a number of disadvantages which would render it unsuitable for a regular service. For example, at least two transmitting stations must be used to radiate the signals, which is very costly and wasteful of transmitter facilities, whilst it is impossible for those listening to only one of the transmitted channels to obtain properly balanced reproduction. These difficulties, to mention only two, have prompted broadcasting authorities all over the world to re-examine the problem. The B.B.C. is therefore investigating the various possible methods of radiating stereophonic programmes from a single v.h.f. transmitter. The European Broadcasting Union has set up a committee to examine the results of various tests and to endeavour to formulate a common specification for stereophonic broadcasts in the European area. In the United States a committee is also examining numerous different systems and suggestions. It will be apparent from the foregoing that the matter is being very fully investigated to ensure, as far as possible, that whatever system may be adopted it shall give the most satisfactory results whether received stereophonically or not. If any such system is introduced in the future it will necessitate special receiver circuits capable of separating the left- and right-hand channel programme information and followed by twin amplifier and loudspeaker equipment similar to that at present used for the reproduction of stereophonic recordings.

Power Supplies.—Portable radio receivers and certain sets intended for use, for example, in ship's lifeboats or in remote country districts, derive their power from batteries, but the vast majority of modern receivers are fed from the electricity-supply mains. There are two kinds alternating current (A.C.) and direct current (D.C.). Alternating current mains supply is nowadays almost universal, and in the A.C. mains-operated receiver power is supplied to a transformer which changes the voltage to values appropriate for the "high-tension" and "low-tension" supplies for the valves. In the case of the "high-tension" supply the power has to be converted to direct current (D.C.), and this is done by a rectifier, which may be a metal-rectifier, a mercury-vapour rectifier, or a double-diode valve. Like the detector any of these rectifiers produces a series of unidirectional pulses of current. These pulses require "smoothing," and this is carried out by means of condensers and a choke coil, the final smoothed D.C. supply being fed at a suitable voltage to the anodes of the receiver valves.

Receivers working from D.C. mains cannot be fitted with transformers, and their circuits have therefore to be designed to operate at voltages slightly below those commonly found in D.C. mains supplies. Resistances are used to provide voltages below those of the mains, and smoothing equipment is incorporated to remove any "ripple" present in the supply, as this, unless smoothed out, would produce unwanted noises in the programme heard from the loudspeaker.

The valves may be heated directly or indirectly, and the filaments of the directly heated type or, the heaters of the indirectly heated type, are supplied from low-voltage windings provided for the purpose on the mains transformer in the case of A.C. operated sets. In the case of sets operated from D.C. mains they are supplied through high resistances which "drop" the mains voltage to the appropriate value.

The development of semi-conducting devices as detectors and amplifiers has led to their introduction in place of valves in an increasing variety of miniature portable equipment. Since the power requirements of the crystal diodes and transistors used in this apparatus are much less than those of comparable valves they are operated from small dry batteries of similar size to those used in pocket flash lamps.

TELEVISION.

Historical.—So important is the sense of sight that men have, from very early times, been constantly trying to increase its range and to enlarge its power. It is not surprising, therefore, that many of the scientific discoveries that have gone to make television possible took place before radio itself had become a practical proposition. One of the most significant of these was the result of a pure accident, which led to the discovery by Willoughby Smith in 1873 that the electrical properties of selenium vary according to the amount of light to which it is exposed. This discovery pointed to the possibility of converting light waves into electrical impulses.

Here certainly was the first requirement for the transmission of sight by radio or by wire, but it was evidently by no means enough, for it did not show how all the infinite variations of light and shade in a scene were to be transmitted to a distance and yet presented to the viewer's eye simultaneously. It was evident that the scene would have to be broken down into a number of small elements, each of which could be transmitted separately and then reassembled at the receiving point. The thing must be done so rapidly as to deceive the eye into thinking that it sees all the elements at once, and furthermore, consecutive pictures must be built up so rapidly as to give the eye the impression that it sees a continuously moving scene.

A means of doing this was provided by Nipkow in 1884, when he invented his famous scanning disc, and later Weiller invented the mirror drum for the same purpose. Such mechanical devices as these held the field for many years, and in 1923 Baird in this country and Jenkins in America were both using them for the experiments which, in 1925, led to the successful transmission of shadows and simple outlines. It was not until 1926, however, that the first practical demonstration of television, as we understand it, took place. In London, on 27th January of that year, Baird transmitted by radio moving pictures of living human faces over a short distance.

In 1927 transmission of a picture by wire over a distance of 250 miles took place in America, and the demonstration was repeated by radio shortly afterwards.

In 1929 the B.B.C. gave facilities to Baird Television Ltd. for experimental television transmissions. The programmes, which originated in Baird's studio in Long Acre, were radiated by the B.B.C.'s Oxford Street (2LO) station on a wavelength of 365 metres. These transmissions used 30 scanning lines to the picture, and 12½ pictures per second were transmitted. The Oxford Street station radiated vision only, but in 1930 this low-definition television service was transferred to the B.B.C.'s new London Regional transmitting station at Brookmans Park, and sound was added to the programmes. The 30-line transmissions were of sufficient technical interest for the B.B.C. to equip one of the studios in Broadcasting House, London, with Baird apparatus, and this was brought into operation in 1932.

At this time much thought and energy was being expended upon the problem of improving the "definition" of the television pictures, and it was becoming apparent that a satisfactory standard could not be reached using mechanical scanning methods. Attention was returned to an idea which had been put forward by A. A. Campbell Swinton as long ago as 1908, when he had suggested a television system using cathode-ray tubes at both the transmitter and receiver. He had expanded this idea in his presidential address to the Röntgen Society in 1911, when he envisaged a special type of cathode-ray tube at the transmitter—the forerunner of the television "camera" of to-day. At the same time he described in detail arrangements for moving the beams of the transmitting and receiving tubes exactly in synchronism. The great advantage of this idea was that by using an agent like the cathode-ray, which possesses practically no weight or inertia, and is, therefore, capable of being swung about with tremendous speed and accuracy, the great difficulty with the mechanical systems of securing the extremely accurate yet rapid motion of the scanner, disappeared.

By 1934 "cameras" on these principles had

been developed both by the Marconi-E.M.I. Co. in this country and by Zworykin in America, and it seemed possible that a television service with markedly improved definition might be practicable. In May 1934 the Postmaster-General appointed a committee under the chairmanship of Lord Selsdon to report on the relative merits of the various systems then being developed

On the recommendations of this committee the B.B.C. was entrusted with the task of erecting a television transmitting station at Alexandra Palace, London, and Baird Television Ltd. and the Marconi-E.M.I. Television Co. Ltd. were invited to tender for the supply of apparatus for their respective systems. These two systems were operated alternately, the Baird system on 240 lines, 25 pictures per second with sequential scanning; the Marconi-E.M.I. system on 405 lines 25 pictures per second with interlaced scanning, giving 50 frames per second. The Radio Exhibition at Olympia in August 1936 was the occasion of the first public transmissions by the two systems from Alexandra Palace on an experimental basis, and the station recommenced transmissions with a series of trial programmes in October, these lasting for two hours daily.

The Alexandra Palace Station was formally opened by the Postmaster-General on November 2, 1936, and this marked the start of the world's first public high-definition television service. Programmes were radiated for two hours each day, the two alternative systems being used during alternate weeks. On February 5, 1937, the Postmaster-General announced that the Television Advisory Committee, as a result of the experience gained from these transmissions, recommended the adoption of a single set of standards—those of the Marconi-E.M.I. Co. Accordingly, from February 6, 1937, this became the standard system for British Television, and the service from Alexandra Palace continued until the outbreak of war, when the station closed down. Alexandra Palace reopened to provide a television service for the London area on June 7, 1946, using the pre-war standards.

Since that date the B.B.C. has built and brought into service twenty-three new high-, medium-, and low-power television transmitting stations, and by the end of 1959 its television service was available to over 98% of the population of Great Britain. Many other television stations are, of course, operating in America, Europe, and elsewhere.

The London Television Transmitting Station was moved to Crystal Palace, Sydenham, in March 1956, and its power increased. This and other measures, including the provision of satellite or translator stations, such as that at Folkestone, to serve areas in which satisfactory reception is at present difficult or impossible, will increase the coverage of the B.B.C.'s television service still further.

A translator, like the one at Folkestone, which came into service in July 1958, converts the sound and vision transmission frequencies from one channel to another without demodulation to audio and video frequencies as would be necessary if a conventional receiver and transmitter relay installation were used. This simplification increases the reliability of the equipment and enables it to be arranged for automatic operation without attendant staff. As the equipment is small it can be housed in weather- and insect-proof steel cabinets of existing design, thus dispensing with the need for station buildings. It is so designed that it only requires the connection of a local electricity main to supply all its power requirements.

A translator needs to be situated on high ground where good reception from an existing station is possible and whence its transmissions can be radiated over line-of-sight paths in the area to be served. Such siting allows a very low-power output to be used, and thus does not add to the already serious co-channel interference problem.

The B.B.C. is developing similar translator transmitters to extend the v.h.f. sound broadcasting service to small areas at present prevented by intervening high ground from obtaining direct reception from the main stations.

In June 1959 the Postmaster-General approved in principle the construction by the B.B.C. of twenty-four additional low-power stations within the next three years to extend the coverage of its television and v.h.f. sound services. Most of these stations will be translators.

The B.B.C. has in existence plans for the provision of alternative programmes and for the development of a system of colour television. The Television Advisory Committee has recommended, however, that any colour television system which may be used in the future should be so arranged that its transmissions would provide black-and-white pictures on receivers not designed for colour. The B.B.C. has done much preparatory work on colour television, starting as long ago as 1946. Close liaison is maintained with the Television Advisory Committee, the G.P.O., and the Radio Industry. Since 1955 the B.B.C.'s Research and Designs Departments have collaborated in a series of experimental colour-television transmissions from Alexandra Palace and latterly from Crystal Palace. For use in these experiments the B.B.C. installed a colour-television studio at Alexandra Palace provided with two colour cameras, 16-mm. and 35-mm. colour telecine machines, and all the necessary control-room equipment.

The colour system used in these experiments is a modified form of the N.T.S.C. (National Television System Committee) system used in the U.S.A. This system has been adapted by the B.B.C. to suit the British 405-line standards and can be radiated by a normal transmitter as used for the black-and-white service. The transmissions can also be received in black-and-white by a normal television receiver tuned to the appropriate channel, thus complying with the recommendation of the Television Advisory Committee. Colour television using this system has been successfully demonstrated by the B.B.C.'s Engineering Division to the members of both Houses of Parliament, to the Institution of Electrical Engineers, and other bodies, while colour test transmissions are frequently radiated from the Crystal Palace station outside normal programme hours.

In addition to the television programmes provided by the B.B.C. separate programmes have, since September 22, 1955, been radiated by the Independent Television Authority starting with its station near Croydon, Surrey. The I.T.A. had, in the autumn of 1959, ten transmitting stations covering approximately 90% of the population of Great Britain, and additional stations are planned to increase this figure.

The General Principles.—There are certain fundamental differences between the broadcasting of sound and television, and these differences are mainly concerned with the senses by which the broadcasts are perceived. The ear, with which sound broadcasting is concerned, will respond to a single note, but if a chord is struck it does not differentiate between each individual note, but presents to the brain a composite sound made up of all the notes in the chord. In all cases where there is a combination of sounds, such, for example, as in speech or music, it is a complex wave combining all the sounds together which excites the ear-drum and is passed to the brain.

The sense of sight, however, is completely different in its method of operation, and to understand the problems of television it is necessary to consider the action of the human eye. Basically the eye consists of a lens which projects an image of the scene before it upon the retina, a light-sensitive screen at the back of the eye. The retina is made up of several millions of tiny light-sensitive elements, each quite separate and distinct from its neighbours, and each separately connected to the brain by an individual fibre in the optic nerve. Thus the eye is a very complex organ, and it is able to pick out numbers of tiny details from a scene and convey each detail separately and simultaneously to the brain. It does not send a blend of different points of light and shade in the same way that the ear sends a blend of different sounds; if it did the brain would receive a completely unintelligible blur. From this it will be seen that a television system which transmitted a mixture of detail would be useless; it must transmit all the details in a scene separately, yet almost simultaneously, and re-assemble them at such a speed that the eye cannot observe the

building-up process. The photo-electric cell reacts to light in a manner similar to the light-sensitive elements of the eye, and would therefore reproduce picture details as electrical impulses, but in order to produce a picture having good definition it is necessary to transmit nearly a quarter of a million separate details. As it is obviously out of the question to use such a large number of cells, each requiring a separate radio transmitter and receiver, to convey the information, some artifice is necessary to make television practicable. The one used is known as "scanning." This process, which is carried out in the television camera, consists of dissecting the scene into a large number of small pieces, rather like the dots visible in a newspaper reproduction of a photograph. Each one is then transmitted separately, and they are re-assembled at the receiver so rapidly that the eye is tricked into believing that it sees the whole picture at the same time.

In the scanning process the picture is divided up into a large number of horizontal lines, each line consisting of a number of the small pieces just mentioned, and the detail in each line is detected by the scanning beam and faithfully reproduced by a similar beam at the receiver. The scanning beam sweeps along a particular line and then flies back to the beginning of the next line to be scanned, much as the eye, in reading, sweeps along a line of print conveying the sense of each separate word to the brain. Just as the eye pauses at the end of a page or column and starts again at the top of the next one, so the scanning beam pauses at the end of each complete "field" of the picture and returns to the starting-point for the next scan. The scanner also transmits "synchronising pulses," which tell the receiver when to start each new line and each new "field" or picture. As the eye normally takes about $\frac{1}{16}$ of a second to register a scene, any happening taking less than $\frac{1}{16}$ of a second is not properly observed. Thus, if successive pictures are built up with sufficient rapidity the fact that they *are* separate pictures is not conveyed to the brain. The ordinary cinematograph relies on this principle of "persistence of vision" to create the impression of continuous movement.

The television standards used in Great Britain are based on the transmission of twenty-five complete pictures every second, each picture being composed of 405 horizontal lines. The twenty-five pictures per second are not in themselves sufficient to avoid "flicker," and this is overcome by using "interlaced" scanning. In this system the scanning beam first passes over all the odd-numbered lines from top to bottom of the picture, and then returns to the top and scans all the even numbered lines. The two "fields" thus produced mesh together to form the complete picture, but as the fields are transmitted at the rate of fifty per second, there is no noticeable flicker.

Let us now consider some of the apparatus which makes television possible.

The Television Camera.—Although there are several different types of television camera in use at the present time, they all make use of a lens system to produce an image of the scene before the camera upon a photo-electric plate. Probably the simplest one to understand is the original "Emitron" camera, a simplified diagram of which is shown in Fig. 6. It will be seen to consist of a highly evacuated glass tube with a large bulb at one end. This bulb contains the mosaic screen (*a*) upon which is focused, by means of the lens (*b*), an image of the scene to be, transmitted, the light rays passing through the "window" in the bulb. The mosaic screen consists of a sheet of insulating material backed by a metal plate. On the front of the screen is the mosaic itself, which is made up of several thousands of minute light-sensitive elements—each virtually a tiny photo-electric cell—every one of which is electrically separated from those surrounding it. Each of these little cells takes up an electric charge proportional to the amount of light falling upon it, and thus the mosaic as a whole acquires an "electrical picture" of the scene. In the tube below the bulb is situated the "electron gun" (*c*), which aims a finely focused beam of electrons at the mosaic. The deflector coils (*d*), near the neck of the tube, cause the beam of electrons to move across the mosaic in a series of horizontal lines, first the odd-numbered lines then the even-numbered lines, as mentioned earlier. As the electron beam passes over each of the "cells" of the mosaic, the cell is discharged and, as a result of this, a series of minute electrical impulses is induced into the

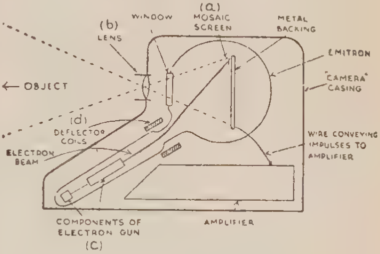


FIG. 6.—TELEVISION CAMERA.

metal back plate of the screen, each impulse being proportional to the amount of light falling upon the cell from which it emanated. These impulses are extracted from the tube, along the wire which passes out of it. In this way the picture is taken from the camera spot by spot and line by line as a series of electrical impulses. These impulses are amplified and have added to them the "line-synchronising" and "frame-synchronising" pulses, and are finally used to modulate the carrier wave of the vision transmitter, which carries them through space to the receiver. The emitron high-velocity type of camera tube described above has been superseded by later types of tube including the "C.P.S. (cathode potential stabilized) emitron," the "image orthicon," and the "vidicon." These tubes have various advantages over the earlier type, for example, the C.P.S. emitron produces a definite black-level output signal; being cylindrical, it is more conveniently mounted in a camera; it does not produce spurious signals, and its sensitivity and resolution are much better. Its chief disadvantage is that blurring can occur on moving images unless careful control of the operating conditions is exercised.

The image orthicon camera tube has a very high sensitivity, it can resolve images at very low lighting levels, at which other camera tubes would be useless, and this high sensitivity makes it particularly valuable for outside broadcast work. It produces a definite black-level output and gives good reproduction of rapidly moving high-lights. The chief disadvantage of the image orthicon tube is that it is necessary to maintain the temperature of the mosaic or "target" within narrow limits and to obtain normal operating temperature it must be switched on at least half an hour before it is required.

All the camera tubes described above are of the "photo-emissive" type, that is to say each of the minute photoelectric cells forming the "target" emits electrons in direct proportion to the amount of light falling on it. A different type, the "photo-conductive" or "vidicon" tube, has come into use in recent years and depends for its operation on the fact that the electrical resistance of certain materials changes when they are exposed to light. The change is usually rather slow, and if such materials are used for camera-tube targets the images of rapidly moving objects are smeared.

This type of tube, however, is small and comparatively simple, facts which render it particularly suitable for use in small or lightweight cameras. It has applications in television broadcasting for programmes in which rapid movement is unlikely and is also well suited to many industrial uses or for some telecine equipment where the high-light levels possible reduce smearing. Another valuable feature of the vidicon tube is that it can be used as soon as the electron gun has warmed up.

The Television Studio.—As with sound broadcasting there are several intermediate stages between the camera and the transmitter. In this country the studios operated by the B.B.C. in London and the Provinces contain up to four cameras each, and their outputs are taken to the "vision" mixer panel in the vision control room associated with each studio. In this room the pictures viewed by each camera (and sometimes a picture obtained from a "telecine machine") are displayed on picture monitors in front of the producer. As the programme proceeds he and his assistant select the particular camera or telecine output to be transmitted. They can make an instantaneous change from one picture to another, fade one out and another in, or superimpose one upon another according to the programme requirements.

Telecine machines are devices which allow cinematograph films to be included in television programmes either as effects inserts, *e.g.*, a street scene with moving vehicles to establish a particular location in a play, or full-length documentary or feature films, much as a gramophone pick-up allows records to be used in sound broadcasting.

Early telecine machines operated on the basic principle of pointing a standard television camera at the lens system of a special cinematograph projector, and although some machines still make use of this arrangement for certain purposes, the method had numerous disadvantages, and more modern machines have been developed using different systems for televising normal types of cinematograph film. A very brief description of one sort of telecine machine must suffice. In this the film is run through smoothly and continuously at a speed corresponding to 25 film frames per second. The picture in the "gate" of the equipment is "illuminated" by passing it in front of a cathode-ray tube displaying a "plain raster" or blank television line structure. This raster is, however, compressed to half its vertical height and arranged, through a system of dual lenses and a shutter, so that as the film frame moves downwards through the gate it is scanned by, say, the odd line scan of the television raster. Due to the fact that the film is moving in one direction and the scanning beam in the other, the beam will traverse the entire film frame whilst the latter has moved only half-way through the gate. At this moment the shutter opens to expose the scanning beam—this time the even-line scan—to the lower half of the gate, and cuts off the beam to the upper half. The scanning process is then repeated for the even lines of the picture. The light from the raster passes through the film and falls on a photo-cell. As the light level received by the photo-cell changes in accordance with the light and dark areas in the picture, so the photo-cell produces a changing output which constitutes the vision signal.

In addition, other special effects devices permit sections of a picture produced by one camera to be replaced by pictures produced from a second. This allows, for example, one camera to reproduce, say, a photograph of the Savoy Hotel, whilst another looks at a full-size window of identical design with those in the photograph of the Hotel. By means of a device known as "Inlay" the picture seen by the viewer will be composed of the outputs of the two cameras in such a way that the real window replaces one of the windows in the photograph. Thus an actor can, apparently, open a window in the Savoy Hotel, lean out and wave to a friend, although he is, of course, still in the television studio. Another technique, known as "Overlay," permits a similar subterfuge to be perpetrated, but in this case the shape and position of the suppressed part of the first camera's output is determined by the shape and position of the selected portion of the second picture which is to be "overlaid." The two pictures can be moving ones and, if desired, their scales may be different so that a real dancer may appear only a few inches high and may be made to vanish into a cigarette box or to dance on a man's hand.

The principle involved in both inlay and overlay is that of switching from one camera output to another at a particular instant of time. Obviously the speed of the camera-scanning beam precludes the use of a mechanical switch for this purpose, and an "electronic switch," a device containing some twenty valves, is used instead. This switch is controlled by a device known as a "silhouette generator" which comprises a cathode-ray tube facing upwards and normally displaying a plain raster to a photo-electric cell mounted above it. The light from the raster falling upon the photo-cell causes a small current to flow from it, and this is used to operate the electronic switch to, say, camera 1. If the light is interrupted the photo-cell current ceases and the switch changes over to camera 2. Since the scanning beams of the silhouette generator and the two cameras are all synchronised, they will all, at any given instant, be directed at the same point of the picture area. In the example given above, therefore, if we consider one line of the television picture the scanning beam of camera 1 travels across the image of the photograph of the Savoy Hotel until it reaches the edge of the desired window frame. Simultaneously the beam of camera 2 travels across its target until it arrives at the edge of the image of the real window-frame in the studio. At precisely the same instant the scanning beam of the silhouette generator tube reaches a point at the edge of a black paper mask placed on top of the tube face. As the silhouette generator beam passes under the paper mask the light from its spot is obscured, thus causing the electronic switch to change over to camera 2, which is now scanning the real studio window. At the end of the paper mask the light spot on the silhouette generator reappears, the photo-cell current is restored, and the switch reverts to camera 1, thus reinstating the photograph for the remainder of that line scan.

To facilitate exact registration of the paper mask means are provided whereby, on setting up, the silhouette generator tube can display the output of camera 1 and thus permit the mask to be fitted accurately to the part of the image it is desired to remove.

In the case of the overlay technique the subject is placed in front of a brightly lit white screen and particular attention is given to clothes, make up, etc., to ensure that the signal level emanating from the subject shall be appreciably lower than that from the white screen. The result is that on any line scan there is a sharp drop in the signal level as the subject is reached and a corresponding increase as it is left and the screen reappears. This drop and rise in signal level is used to operate the electronic switch and changeover from camera 1 to camera 2 and back again at the required instant. It will be seen that the subject in front of camera 2 is free to move about within the limits of the particular camera angle in use and will automatically cut an appropriately shaped and moving area from the scene viewed by camera 1, thus giving the impression that the composite scene is being viewed by a single camera. Either or both cameras could be replaced by a telecine machine is required.

Another very useful subterfuge in the television studio is known as "back projection." Adapted from film-studio practice, it makes use of a translucent screen behind the actors and any necessary properties or scenery, on to which can be projected, from behind, a lantern slide or a moving picture as part of the scene. This is particularly useful for creating a realistic background, which can be changed instantaneously or for simulating movement. For example, one scene in a play might take place on a yacht anchored off Cowes. A lantern slide of Cowes as seen from the sea could be projected on the screen, which would be erected behind the physical scenery representing the deck of the yacht. A gentle rocking of the slide would give the impression of the yacht rising and falling on the swell. In a matter of seconds the play may demand the same yacht in Falmouth harbour. A change of slide would meet this requirement.

Simulation of movement is sometimes required, for example the action of a play might take place in a train between Paddington and Plymouth. A dummy compartment erected in the studio would have a screen placed outside its windows and a film taken on an actual journey would be back-projected on to it. The viewer would see the scenery and stations passing by, and so gain the impression of being on a moving train.

For certain items in television production, particularly news and interviews, it is sometimes difficult to get the subject to the studio at the right

time. In the B.B.C. television service these problems have been overcome to some extent by the provision of unattended studios and by remotely controlled cameras. Such a studio in Westminster is frequently used by the B.B.C.'s Parliamentary correspondents.

The outputs from the individual studio control rooms are passed through a central control room which performs a similar function to that of its sound counterpart. In addition, means are provided for adjusting the technical quality of the pictures. From the central control room the vision signals are fed to the distribution network linking the studio centres with the transmitters.

Television Distribution Network.—This is the apparatus employed for conveying the television programme from the studio to the distant transmitters, and in this country the G.P.O. provide and maintain this equipment. Since the frequency range required for picture signals is very much greater than that necessary for sound broadcasting, different and more complex apparatus is required. Cables are used for conveying the picture signals from London to Birmingham, although a radio-link is also available in case of need. The former are of a type known as "co-axial" cables, and are specially designed to carry very high frequency currents. Since the losses are greater at vision than at sound frequencies, repeater stations have to be closer together than would be necessary for sound circuits. Co-axial cables are also used between Birmingham and Manchester and London and Cardiff. The programme for the Kirk o' Shotts station in Scotland is relayed from Manchester by a series of radio links.

In the case of some stations, such as Rowridge in the Isle of Wight, Divis in Northern Ireland, and Norwich, the vision programme from one of the high-power transmitting stations is received by the G.P.O. on specially designed receiving equipment. It is then passed either directly over a short length of cable or over one or more radio links to the transmitting station. Other stations such as North Hessary Tor pick up their vision signals by radio direct from an adjacent B.B.C. television transmitter without the intervention of the G.P.O.

The Television Transmitter.—The principle of the television transmitter is similar to that of transmitters used for sound broadcasting, except for certain special features. In order to convey the extraordinarily large number of impulses which go to make up the vision information, the frequency band required for the radiated energy is much wider than for a sound transmission, and this large band-width of about 5 Mc/s. (5 million cycles per second) can only be provided in the very high frequency bands. The television transmitting stations at present operating in Great Britain occupy the frequency band 41–68 Mc/s. and 174–216 Mc/s., Bands I and III respectively.

As explained earlier, the use of these very high frequencies limits the range of the transmitters and consequently good reception is usually obtained even from the high-power stations only out to a distance of about 50 miles, although satisfactory pictures are often obtained beyond this distance under favourable conditions. The bands mentioned above are divided into channels. Nos. 1–5 in Band I and Nos. 6–13 in Band III. Each of these channels carries, or will eventually carry, a television programme—although not all channels will be receivable in all districts—and in some cases transmitters widely separated geographically may share the same channel. For example, the B.B.C. transmitters at Kirk o' Shotts in Scotland and Rowridge in the Isle of Wight share channel 3, whilst the I.T.A. transmitter in London shares channel 9 with its counterpart in Lancashire.

The Television Receiver.—So that viewers may select the channel or channels appropriate to the districts in which they live, most modern television receivers are fitted with some form of tuning device covering all thirteen channels in Bands I and III. There is, of course, no point in providing continuous tuning as is commonly done in sound receivers. The vision and sound signals from the transmitters are received by a single aerial, but, owing to their being on different frequencies they are separated by the tuned circuits in the receiver, and fed to the vision and sound sections of the receiver respectively, the sound section following normal broadcast-receiver practice. The vision signals are amplified in much the same way as that described for sound broadcasting, and are ultimately applied to the circuits controlling the cathode-ray tube. This consists of an evacuated glass tube containing an electrode which, when heated, emits electrons. The electrons are accelerated and focused into a very thin beam, which can be deflected in vertical and horizontal planes by coils provided for the purpose. Beyond these coils the glass tube is splayed out, and its end is flattened so as to form the viewing screen, the inside of this part being coated with a very thin layer of fluorescent material which glows when bombarded by the electron beam. The brilliance of the glow is proportional to the number and speed of the electrons striking it. The amplified vision signals are caused to vary the strength of this beam, and it is made to move across the screen in horizontal lines one below the other, this movement being controlled by the "line-synchronising pulses," which are added to the vision signal before transmission. It will be seen, therefore, that as the beam moves across a particular line it causes the fluorescent material on the end of the tube to glow more or less brightly according to the strength of signal which the cathode-ray tube receives, and as this signal is originally derived from the impulses from the camera tube, the light and shade of the line varies according to the light and shade of the corresponding line of the scene which the camera is viewing. In this way the original picture is re-assembled spot by spot and line by line. At the end of each picture or "frame" the frame-synchronising pulse deflects the electron beam back to the top line, so that it is ready to trace out the succeeding frame.

The size of the picture in direct-viewing receivers is, therefore, governed by the size of the cathode-ray tube, and the larger tubes are rather costly. However, to meet the demand for large pictures a different type of receiver, known as the "projection" receiver, was produced. In this a very small cathode-ray tube is used, but one which produces a very bright picture. The light from this is passed through an optical system of mirrors and lenses and thrown on to a translucent screen. In this way the viewed picture on the screen has an area very much larger than that on the actual tube. The increased demand for the larger cathode-ray tubes has, however, led to a decrease in their price within the last few years, so that the projection system is not now so common in domestic television receivers.

The above description of the elements of the television system is, of course, a very brief and simplified one, and there remain several aspects and developments of television that we can do no more than mention. The technique for covering outside television broadcasts, for example, is highly developed in this country, though it follows, in general, along the lines of that described for giving broadcasts from the studio. On the Continent standards different from the British 405-line pictures are in use (441, 625, and 819 lines per picture), and this fact has complicated the international exchange of television programmes. Nevertheless, the B.B.C. has developed means for overcoming this difficulty, and in 1952 pictures from the French system were relayed by the B.B.C., whilst the B.B.C. television broadcasts of the Coronation were relayed over the systems of several Continental countries. Frequent exchanges of television programmes with countries on the Continent now take place, and the first part of a permanent television link between London and Europe—a two-way co-axial cable link between London and St. Margaret's Bay—is already in use. The differing television standards used in Great Britain and on the Continent necessitate "standards conversion" equipment to change, for example, a picture on the French 819-line standards to the British 405-line standards. The solution of this problem

by the B.B.C.'s Research Department as long ago as 1952 made these international exchanges possible.

The B.B.C. has also developed, within the past twelve months, a method of transmitting film pictures across the transatlantic telephone cable so that news shots, for example, can be seen on television within a much shorter time than would be required to fly the films across the Atlantic.

RADAR.

Historical.—In September 1939 Britain's Fighting Services already had in regular operation a new radio technique, by means of which it was possible to detect the approach of hostile aircraft, to plot their positions, and to follow their movements, and by the aid of which the defending forces could be rapidly brought into contact with them. Though the principles of this device were well known abroad, Britain was the first country in the world to evolve a practical system of radar and to put it into regular operation.

The original English name for the technique was "Radiolocation," a term which well describes the process, but during the war the "synthetic" word "Radar" was adopted from America, a word which we are given to understand is derived from the phrase "*RA*dio *D*etecting *A*nd *R*anging."

As in the case of so many of the inventions primarily developed for the purpose of waging war, many useful applications have been found for radar in times of peace, and, in particular, it has proved of great service as an aid to aerial and marine navigation.

The basic principle of radar is very similar to that of sight. We switch on a light in the dark, and we *see* an object because the light waves are reflected from it and return to our eye, which is able to detect them. Similarly, the radar station *sees* an object because the invisible radio waves sent out from the transmitter are reflected from it and return to the receiver, which is able to detect them.

The utilisation of radio waves for the detection of reflecting surfaces began with the classical experiment of Dr. (now Sir) Edward Appleton in 1925, which he conducted in order to demonstrate the existence of the Heaviside layer in the upper atmosphere. Then two American scientists found a somewhat different way of doing the same thing—they sent short, sharp "pulses" of radio energy up towards the sky, and found that the Heaviside layer reflected them and sent them down again so that they returned to earth as echoes.

The development of these methods of atmospheric-layer location into a radar system for the detection of smaller objects was only a matter of time, and in this country was placed in the hands of a team of scientists headed by Sir Robert Watson Watt. An experimental station was set up on the East Coast, and soon it became possible to see, on a cathode-ray tube, a clear image of an aircraft flying many miles beyond the range of ordinary vision, and to determine with good accuracy its position in space. Next the process had to be reduced from a scientific experiment to a common routine measurement, capable of being performed by relatively unskilled personnel, whilst equipment had to be produced capable of standing up to the wear and tear of continuous operation under Service conditions. As has been said, all these things were accomplished before war began, whilst during its course developments took place which tremendously improved the methods and instruments used.

Principles.—The essential difference between radar and the older methods of radio position finding is that with radar no active co-operation on the part of the located object is required. Radio waves are sent out from the radar station and, being reflected or scattered by the object whose position is desired, some of them are returned to the radar station, which is then able to tell the direction and distance of the object from which they were reflected, and, in the case of an aircraft, the elevation angle as well.

All that is necessary for this to happen is that the object to be located shall be of a material possessing different electrical properties from those of the medium surrounding it, in which case, when a radio wave impinges on it, part of the energy is scattered at the surface of the new medium. What happens is that the wave sets up electric currents in the material, and these reradiate energy, so that the new material behaves like a small transmitter. Fig. 7 will help to make the matter clear. Note that the reflected waves

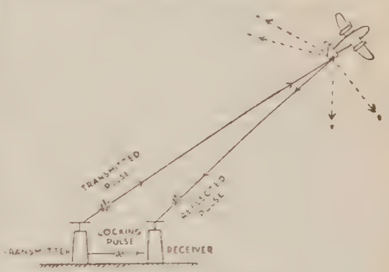


Fig. 7.—Radar System.

go out in all directions, but that some part of the energy is returned in the direction from which the wave has come. It is thus received at the radar station again, and from it is obtained the desired information about the object from which it was reflected.

A radar station consists of a transmitter and receiver working usually on centimetre wavelengths, and employing directional aerials which concentrate the radiated energy in the form of a sharp beam. The transmitting aerial can be swept around so as to cover different azimuthal and vertical directions, and the receiver aerial also sweeps around so as to receive only from the direction in which the transmitted beam is being sent.

The energy is sent in very short bursts called "pulses," and the receiver output is connected to a cathode-ray tube, upon whose screen the received pulses appear, as in Fig. 8. It is so arranged that as a pulse is sent off the fluorescent spot starts its sweep from the left of the tube, at *O*.

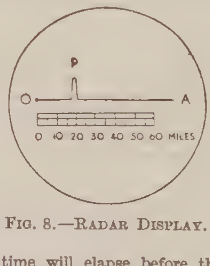


Fig. 8.—Radar Display.

A certain time will elapse before the reflected pulse is received, during which time the fluorescent spot is moving to the right (towards *A*) at a certain speed, and a bright line therefore appears on the screen. When the reflected pulse is received it is made to produce a deflection of the spot such as will produce a pattern like *P* in Fig. 8, and the position at which the pulse appears, as measured from the left, depends upon the time taken for the pulse to travel to the "target" and back, in other words upon its distance away. As we know that the speed at which the pulse travels is substantially 186,000 miles per second and as the speed at which the spot travels is also known, its sweep across the tube can be marked in a scale

of miles, and the distance of the "target" read off directly.

The distance thus indicated is only one of the pieces of information necessary in order accurately to plot the actual position of the target. It is necessary also to ascertain its direction or azimuth, and, if the target be an aircraft, its angle of elevation above the horizontal, as well. The means for obtaining these vary somewhat with the wavelength used, but in most modern radar installations they are determined by training the receiving aerial most accurately in the direction from which the received pulses are coming, a fact which is indicated by maximum deflection of the spot on the cathode-ray tube. Then the azimuthal direction and angle of elevation are read off from horizontal and vertical scales, and, the range being observed from the position of the pulse along the tube, the position of the target in space is given.

FIG. 9.—THE DISPLAY SCREEN OF A SHIP'S "RADIOLOCATOR" PRODUCED BY THE MARCONI INTERNATIONAL MARINE COMMUNICATION CO., LTD.

The ship is in the Straits of Messina, its position being indicated by the white dot, and its direction of heading by the white line.

Radar Developments.—The above is a brief outline of the basic principles of radar, and of its use in determining the position of a distant object, such as an aircraft or ship. Many variations and developments of the original idea have taken place, some of which have tremendously useful applications of a peace-time character One or two of these may now be mentioned.

Quite early there was developed a special type of cathode-ray tube known as the "Plan Position Indicator" or P.P.I. In this the fluorescent spot is caused to start in the centre of the screen and to sweep outwards to the edge, but at the same time to revolve about the centre so that it covers the whole screen perhaps twenty times a minute. Used in conjunction with aerials which rotate in synchronism with the spot, this causes located objects to appear on the screen in their true position relative to that of the radar station, whose position is represented by a mark at the centre of the screen. Fluorescent screens with a long "afterglow" are used, so that the brighter spots indicating the located objects persist on the screen until the spot sweeps over them again.

A further development of this idea takes the form of a compact radar equipment for use on ships or aircraft, by means of which a kind of television picture of the area surrounding the ship, or that below the aircraft, is shown upon the screen of the cathode-ray tube. As fitted on ships the equipment consists of a radar transmitter and receiver working on centimetre wavelengths, with a small aerial which radiates a beam of energy and which rotates in synchronism with the fluorescent spot of the P.P.I. tube. As the aerial rotates the beam sweeps over a large circle of territory corresponding to the size of the screen of the tube, the centre of which represents the point at which the ship is located. Anything that stands well up above the surrounding territory sends back strong reflections, whilst flat portions do not. Thus the surrounding sea appears black on the screen, ordinary level soil sends back weak reflections which cause the screen to glow faintly, but buildings and other structures, coast-lines, ships, and other outstanding features send back strong reflections and the tube glows brightly. Since the receiving aerial is at any instant "seeing" only that part of the landscape being illuminated by the beam, and since the fluorescent spot is, at the same instant, moving over the appropriate part of the screen relative to the ship at the centre, every reflected echo appears at the correct position upon it. Thus a "map" of the surrounding territory appears upon the screen showing all the prominent features of the landscape. It may be imagined how useful this can be in marine or aerial navigation, for it enables the navigator virtually to see through darkness or through fog, and to observe with clarity those objects surrounding him which are dangerous to navigation under conditions when they would otherwise be totally invisible to him. This apparatus is of particular use when approaching or traversing a tortuous channel or estuary, and furthermore, since it permits of the observation of other mobile objects, it is of great help in the avoidance of collisions. Fig. 9 depicts the sort of display which appears upon the radar screen of a ship proceeding up a restricted channel, the instrument in use being the Marconi Company's "Radiolocator," and the ship's position being indicated by the dot in the centre, and its direction of heading by the thin white line.

Great use is made of radar in the control of civil aircraft, both for the surveillance of aircraft flying along the airways between one region and another and also in the control of their approach to airports. A Marconi high-power radar installation working on a wavelength of 50 centimetres can perform either or both of these operations, since it can observe incoming aircraft to touchdown and outgoing aircraft from take off, and has a distance range of 100 miles. It is a dual trasnmitter/receiver installation, either unit of which can be switched to a common radar aerial, which is rotatable, and which is capable of being remotely controlled from an Airways Control Centre.

A further class of navigational aids has been developed, and is now widely used, which, though not actually working on the radar principle, may conveniently be mentioned in this section. In these systems the aim is to produce, in one way or another, a radio "pattern" over a wide area, so that the ship or aircraft can, by observation of the radio signals, tell at which point in the "pattern" it lies, and so fix its position upon a chart or map. As an example of this class of radio navigational device we may mention the "Decca Navigator," an apparatus by means of which the geographical position of a ship or aircraft may be found instantaneously at any time. The system here is for several synchronised transmitting stations on shore continuously to emit unmodulated waves, which, because of the interaction between the waves from the separate stations, produce a "space pattern" over the adjacent land and sea territory which is recognisable by instrumental means. Thus the waves from two such stations can be made to interact, so as to produce a series of maxima and minima, which take the form of curved "lanes" running across the line joining the two stations. An instrument on the ship somewhat like an ordinary electricity-meter continuously records the maxima and minima passed through as the ship moves along, so that when consulted by the navigator at any given time it tells him the number of the "lane" which he is in. A third transmitter, whose waves also interact with those from the first, produces another independent pattern of "lanes" which criss-crosses the first pattern, whilst a second instrument on the ship continuously records the ship's position in this pattern, and tells the navigator the number of the "lane" he is in within the second pattern.

Actually the "lanes" are divided into numerous subdivisions, which are indicated by the numerical indications of the two meters. In order to fix his position the navigator merely reads off the number indicated by the first meter and that indicated by the second, and then looks for the two correspondingly numbered lines in the two criss-crossing patterns on the chart. The point of intersection of these two lines is the ship's position. It will be appreciated that the above is a simplified description of the working of this system, and that various details have been omitted. It is easy to see, however, that such a continuously recording navigational aid is of great use in ships and aircraft, especially under conditions of fog or darkness, for it enables the position to be ascertained at any time with considerable accuracy, and independently of the ability to observe the usual navigational aids, such as lights, buoys, the sun, or the stars.

A recent development of the Decca system is the "Flight Log," or, for marine use, the "Marine Automatic Plotter." With these instruments the "pattern" of interacting waves from the Decca stations as just described is made use of, but, instead of it being necessary to read off the indications of various meters in order to find the position, this is continuously plotted upon a roller-mounted chart by a plotting pen. Thus, not only is the position of the aircraft or ship instantly indicated, but a continuous record of its track is continuously available.

In the fishing industry the high navigational accuracy of the Decca system is made use of in the location of shoals of fish, the grounds where these lie being approached exactly by the use of the system and the fish then being "spotted" by echo-sounding.

It will be seen, therefore, that a ship fitted with radar by means of which it is able to "see" the main features of the surrounding territory, with the addition of an aid like the Decca Navigator by means of which its position is accurately indicated at any time, is able to navigate through darkness and fog with almost the same security as would ordinarily apply under conditions of clear visibility. Thus has radio, apart entirely from its value as a means of communication, continued to prove a boon to the seaman and the airman.

Radio Astronomy.—The relatively new science of radio astronomy makes use of radio apparatus and techniques for the observation of events occurring in far distant parts of the universe, and, in so doing, is able to enlarge upon the observational field of optical astronomy in a remarkable way. By means of radio telescopes it is possible to observe parts of the universe so far distant that the radio waves received have taken thousands of millions of years to travel from their source to the earth, and thus to observe happenings which may have occurred near the beginning of the history of the universe.

There are two main types of radio telescope. The first, known as the interferometer, uses aerials spaced at large distances so as to cover a wide tract of ground. This has a high "resolution" but suffers from the disadvantage that it can "observe" only a very limited area of the sky overhead, as the earth turns upon its axis. The second, and "steerable," type, is that of the radio telescope at Jodrell Bank, Cheshire, which consists of an enormous concave metal bowl, with the radio aerials at its centre. This, though it has a lower "resolution," can be directed or "steered" on to any part of the sky which is above the horizon, and so can undertake a much more comprehensive observational programme. It can be used either to receive radio waves coming from desired sources or to transmit them and then pick up the echo from, for example, the moon or a planet, as in radar.

One source of radio waves which can be detected by radio telescopes is our own sun, whose behaviour under "quiet" and "abnormal" conditions can be observed in this way. Some of the planets also appear to emit radio waves from parts of their surface. But much more remarkable are the waves which are received from the so-called "radio stars," some of which are in the Milky Way, but others of which are situated in much more remote galaxies. It will be appreciated, therefore, that radio techniques are a powerful tool for the study of the universe, and that radio-astronomy is of great importance in modern science.

Tracking and Reception of Information from Satellites.—An important recent application of radio and radar is in the tracking and reception of scientific data from man-made satellites which have been put into various orbits by rocket propulsion from the earth. It is important, in the first place, to be able to follow the satellite in its orbit in order to interpret correctly the information received from it. One way of doing this is constantly to observe the direction from which the radio signals sent out by the satellite's transmitter are coming, by the use, for example, of the Jodrell Bank radio telescope. Another, which is of special use in cases where the satellite transmitters have ceased functioning, is to use such an instrument as a radar apparatus, and so to follow the course of the satellite by means of the radio-echoes received from it. The tracking of satellites can, of course, also be performed by the use of radar and radio receiving apparatus of a less-complicated kind than the Jodrell Bank radio telescope.

The scientific data which is recorded in the satellite, and which may be of many different kinds—ranging, for example, from the density and temperature of the atmosphere to the number of corpuscles of various kinds being encountered—is sent back to earth by a process known as "telemetering." In this the observations made are arranged to "modulate" the satellite's radio signals in a certain way and in accordance with a predetermined code, and the data are extracted from the received signals by decoding this modulation. As many as six sets of observations may be modulating the signals during any particular flight. Photographic and television techniques may also be employed for obtaining the desired information and sending it back to earth, as in the case of the recent Russian picture of the reverse side of the moon, and, again, the information may be stored within the satellite for a time, and then, upon receipt of a particular radio signal from the earth, may be transmitted by the satellite at a time convenient for its reception. Already man's knowledge of what surrounds this planet in space is, by this means, being revolutionised, and many interesting discoveries, such as those of the Van Allen radiation belts, have already been made.

Poultry and Pigeons

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Poultry and Pigeons

By Dr. W. P. BLOUNT

ANCESTRY OF THE DOMESTIC HEN.

Perhaps the best question to ask in order to get an idea as to the place of the hen in nature is the old one about "which came first, the hen or the egg?" This is because a semi-scientific reply immediately puts one into the picture by recalling that birds are very closely related to reptiles; and it would not be too great a stretch of the imagination to suggest that it was probably a reptile's egg which really began the development of the class of animal we now call birds (*Aves*).

There are in fact fossils dating back to an era at least 50 if not 150 million years ago, of reptilian-birds; animals which can be considered intermediate between the true reptile and the true bird. Animals apparently developed from a reptilian framework, yet having "wings" covered by feathers, a very long feathered "tail," and "teeth." Over a period of hundreds of thousands of years there appeared the necessity for the reptile to adapt itself to flight—hence the growth of wings and, of course, the change from a horny type external skin to one consisting of feathers. Egg production is also a common feature to this group of animals, although of course reptiles are divisible into those producing true offspring (viviparous) and those laying eggs (oviparous).

In contrast with the eggs of fishes, those of the reptile and bird are covered by a hard outer shell to give protection against evaporation—a feature unlikely to occur in the case of eggs laid by fishes. One sees therefore a wonderful adaptation by nature—the fish swimming freely in water; the amphibian frog commencing life in water, passing through the tadpole stage to the frog proper, and ending its life on dry land. Thence to the reptile, at home both in the water and out of it, with its adaptation later to tree life involving the appearance of "flying" or perhaps only "gliding" reptiles. Finally, the development of birds as we now know them.

To-day therefore we accept the existence of *Archæopteryx* the fossilised reptile-bird as being definitely related to the ancestry of birds generally. Amongst living birds we have those which have only a miniature breastbone and are therefore incapable of flight, *e.g.*, the ostrich; and the remainder are the *Carinatæ*—birds with a well-marked keel. And chief amongst the many *Orders* concerned in *Aves* (birds) are: (*a*) *Galliformes*, *e.g.*, domestic fowl and turkey; and (*b*) *Anseriformes*, *e.g.*, the duck and goose. It is worth noting that the pheasant and peacock, which belong to the same Order as the hen, may all suffer from certain common diseases, *e.g.*, Blackhead. As a contrast the duck tribe appear resistant to this ailment, and for all practical purposes they are also immune to the Fowl Paralysis complex.

BRITAIN'S POULTRY INDUSTRY.

Poultry were for many years the hobby of the back-yarder, being valued for their brightly coloured feathers and general conformation. Our poultry industry developed through such fanciers, and there are now some millions of hens on general farms, but the fancier still exists however, his interests being maintained largely by shows.

The poultry industry began because of demands by the housewife for eggs and table poultry, and her special requirements and those of hotels must always be given first consideration.

A study of poultry has shown that some are best fitted for egg production, others producing meat more economically, but dual-purpose breeds or crosses are also available. There are, therefore, three main aspects to our present poultry industry: (1) the pedigree breeder; (2) the commercial producer of eggs intended for the housewife and bakery; and (3) the rearer of table poultry particularly broilers, which now number many millions. The fancier has successfully maintained the external appearance (conformation) of his different breeds, but it is only as a result of studies based on economics that we have discovered those breeds and strains best fitted for either egg or table poultry production.

The development of the industry to its present state, now comprising over 90 million head of poultry, has been achieved only by means of hatcheries, where thousands of eggs are received each week and incubation carried out in large, mammoth machines. The day of the broody hen has long since disappeared, except when very small numbers of chicks are being hatched. The domestic poultry keeper usually keeps half a dozen or more birds to provide eggs for his household, and a few cockerels may be reared for festive occasions. He is, however, not advised to undertake the breeding or rearing of day-old chicks unless well experienced in these subjects.

Breeds.—For *egg production* the R.I.R. is our most outstanding breed, but there are many good strains of Light Sussex, Wyandottes, and Buff Rocks (among the heavier breeds), the Leghorns amongst the light breeds. Many cross-breds are equally suitable, with certain light-heavy crosses outstanding in this respect.

RHODE ISLAND RED PULLET.

Hybrids.—A comparatively new development has been that of commercial *hybrids* for egg production, and whilst the earlier examples of this type of bird were the result of crossing inbred lines—incrossbreds—more recently recurrent reciprocal selection has been used as a basis for their breeding programmes. The advantages of hybrids are that they are more uniform than standard-bred stock, and their average egg production is also higher. Their mortality rates differ, however, some being quite susceptible to the avian leucosis complex, whilst others are resistant. Well-known examples of to-day's hybrids are: Sterling's "Gold, Silver, and Red-Links"; Thornbers "404–505"; Fairbairn's "Hy-cross"; Evan's "Maxilay", etc. Already some of these hybrids have won high awards at various Laying Trials. As they can be "mass-pro-

duced " easily, some are already being marketed by the million. As a result many fewer pure breds are now being sold for commercial egg production, although the largest competitor to the hybrid is still the light × heavy crossbred, particularly the Wh. Leg. × R.I.R. and Br. Leg. × Lt. Sx.

For *table poultry production* the Light Sussex is ideal, because of its splendid conformation and plentiful supply of both breast and leg meat also its white skin and legs. The housewife unfortunately has a prejudice against yellow-legged breeds, although the taste and quality of their meat is just as good as that from the white breeds. Lt. Sx. crossed with R.I.R., W. Rock or Ind. Game are very popular, also New Hamps. and N. Holl. Blue.

The *pedigree breeder* maintains his breeds in pure form, and is able to identify his chicks and relate them to their parents. His is an exacting task, for he is particularly concerned with the intricacies of fertility and hatchability. The pedigree breeder is not able to provide sufficient stock for sole use commercially, but as a result of his work pure-bred cockerels can be mated to non-pedigree pullets and the resultant chicks used for commercial purposes.

LIGHT SUSSEX COCKEREL.

The Ministry of Agriculture, Fisheries, and Food sponsor a scheme of *Accreditation* for those poultry breeders who are prepared to conform to certain regulations. These comprise compulsory blood testing (for B.W.D.), the keeping of essential records, farm inspections, etc.

These accredited poultry farms and hatcheries are all part of the Ministry's Poultry Stock Improvement Plan (P.S.I.P.), and comprise farms where special precautions are taken for the prevention of disease and where there is a high standard of management under the supervision of the Ministry's advisory officers. The names and addresses of those who have been accredited are published, county by county, annually in a register. It is hoped that this will enable poultry keepers to know from where they can buy stock with a minimum risk of disease and with a reasonable measure of security regarding the quality, health, and vigour of the parent stock. It should be appreciated, however, that accredited stock are no more free from Fowl Paralysis than other stock, nor are they any more resistant to such diseases as Fowl Pest (Newcastle Disease), Coccidiosis, Nephritis, etc.

SYSTEMS OF POULTRY KEEPING.

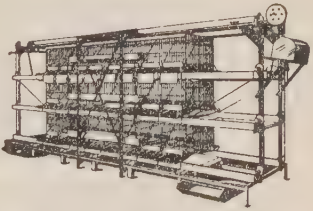
The tendency to-day is for poultry to be kept *intensively*, that is with no opportunity to get out on to grassland, and the three main systems are: (*a*) Hen Batteries; (*b*) Deep Litter; and (*c*) Hen Yards.

Hen Batteries.

Here birds have their own cages, which are arranged in tiers, usually three high, and each pullet has its own individual food and water trough. The birds can be seen separately at all times, and it is, therefore, possible to decide whether or not they are paying for their keep. They are free from attacks by foxes and rats, and do not suffer from those diseases contracted by running over infected ground, *e.g.*, Tuberculosis. Their main disadvantage is the initial cost of the cage which varies from 18*s*. to 24*s*. This is compensated for by their better average egg production and the opportunity this system gives to the poultry keeper for culling. (Culled birds are those which do not appear to be profitable.) There is also the fact that after laying for one year in batteries, pullets can be sold at a premium, for laying stock kept intensively in this way are fatter (internally) and their flesh is very tender. Hen batteries are not cruel, because the birds eat well, lay well, " talk " contentedly, and do not suffer from many diseases which affect stock housed on other systems, *e.g.*, Worms and Coccidiosis. Mortality averages 13%.

Twin-bird hen battery cages, each of which holds two birds, are popular nowadays because of the considerably reduced capital expenditure. It is important that such birds are fed on dry mash *ad lib*. Bullying may develop in a few cases, but this can be avoided by selection of stock, or by the use of spectacles or de-beaking.

Hen batteries to hold from three to six pullets are now also being marketed, and even larger ones holding up to twenty birds have been tried out. Results generally have been satisfactory, but attention to ventilation is important. In general, it is necessary to de-beak any pullets which are being housed three or more per cage *before* they are put into the batteries, as this overcomes any tendency there may be to fighting. Their feed should always consist of a balanced " Hen Battery " mash or crumbs (" chips "). A supplement of pellets assists feed intake when mash is used.



SWIFTS CAFETERIA HEN BATTERY UNIT.

Cafeteria-type battery cages in which the food and water troughs travel up and down or around the cages are also marketed in this country. They are very labour saving, and one man can look after 2500 to 3000 birds on this system. It is important that the birds are given a minimum of fourteen hours' feeding time.

Special cages for domestic poultry keepers and for the keeping of bantams are sold, and the former can be arranged so that the birds are kept out of doors the whole time, but winter production will not be high unless specially good birds are chosen. Under B.O.C.M. laying-trial conditions at Stoke Mandeville egg production (forty-eight weeks) in hen battery cages was as follows:—

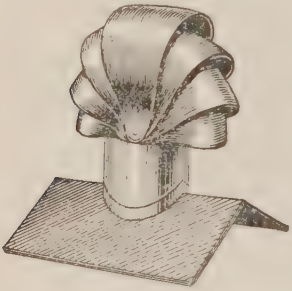
	Average Egg Production: Team.	Highest Egg Production: Bird.
Ducks . .	191	320
Pullets . .	201	309
Bantams . .	108	220

Food consumption (pellets) per bird per day averages:—

Ducks	4–8 oz.
Pullets	4–6½ oz.
Bantams . . .	2–3 oz.
Turkeys . . .	5–10 oz.

Deep Litter.

The deep-litter system, introduced successfully from America, makes use of any intensive type poultry house; but the more insulation provided by the walls and roof of the building the better. The object is to build the litter higher and higher, during which process heat is produced by the decomposition of the droppings from the birds. This gives rise to some ammonia, but the heat also dries out the litter. In other words, the birds are kept dry and warm, but special ventilation is necessary to dispose of the moisture vapour and ammonia which are natural by-products of this system. It is very labour saving, and one man can look after several thousand pullets, probably twice as many as kept in batteries. To maintain egg production, particularly in the winter months, a generous ration of balanced feed is essential, and there should be from 4 to 6 in. of hopper space per bird. Where large numbers



"ASHANCO" TYPE FIXED-EXTRACTOR COWL.

of pullets are kept in one house (*e.g.*, 750) an automatic feeder is economical as well as automatic water devices; and instead of using single nests a communal type nest—measuring 5 ft. × 2 ft per fifty pullets saves labour but encourages broodiness. Unless attention is paid to the ventilation arrangements, the litter will get wet in the winter-time, and moisture will condense on the roof, iron girders, windows, or other cold surfaces. This leads to the production of dirty eggs. To keep the birds occupied—so that they do not develop vices from boredom—supplementary feeds of pellets or corn are advisable.

Mortality is but little greater than that of hen batteries, but should any infectious disease break out it will spread rapidly throughout the flock. "Colds," worms, and intestinal coccidiosis are the chief diseases which attack birds kept on deep-litter. "Pullet-Disease" and nephritis may also prove serious.

The type of material to use for the bedding of deep-litter houses varies from sawdust to peat moss, but in general it is the cheapest product available which should be used. Wood shavings or chopped straw are excellent, and except when peat moss is expensive the foundation for good deep litter should consist of 1 in. fresh horse manure, 2 in. wood shavings, 2 in. chopped straw.

The speed with which the litter "works"—that is the production of heat—depends upon the number of birds per given area, the depth of the litter, the time of year, drainage, house construction, etc. In general deep litter is easier to start in the warmer summer weather; when the birds are given a droppings pit (to keep the night's droppings away from the litter of the house proper), and when each bird has not more than 3 sq. ft. of floor space apiece. Long straw does not break down as satisfactorily as short, cut straw; and sawdust is not as good as wood shavings, but all these materials can be used if needs be, as well as chaff, husks, etc.

The bacteria and fungi which are responsible for the heat and ammonia produced under built-up litter conditions also synthesise certain nutrients which are of value to poultry, *e.g.*, vitamin B_{12} and vitamin B_2 (riboflavin). It is, however, not a good plan to rely upon this as their sole source of water-soluble "B" vitamins. Balanced feeds containing these and the other vitamins necessary for health and production should be used; for breeding stock special rations are available.

It will be appreciated that when poultry are kept confined on deep litter for any length of time there is often a build-up of bacteria, parasites, worm eggs, coccidia, etc., which may eventually prove harmful. For this reason it is not recommended that the same litter should be kept going from one batch of *chicks* to the next (as in broiler production) unless it has been "heated." This is accomplished by piling the litter into as large and as high a heap as possible and letting it remain heated for about four days. (The internal temperature of the heap should exceed 130° F.). For laying stock the litter can remain throughout the full laying season (*i.e.*, 11–12 months), unless coccidiosis or worms have appeared.

Hen Yards.

The hen-yard system is really an adaptation of the deep-litter system to that of the old-fashioned semi-intensive method of keeping poultry. A small house (with a droppings pit and communal type nest) providing about 2 sq. ft. per bird is supplemented by a yard twice this size. As a contrast to the semi-intensive system, the yard is covered by straw, which is gradually built up throughout the winter months. Grain feeds can be scattered on top of the litter each day, but continuous dry-mash feeding is essential to help to prevent feather pecking and cannibalism. This is the cheapest system of housing layers, and many old farm buildings can be adapted for this purpose, but egg production is usually somewhat inferior to the other two systems mentioned.

The true *semi-intensive system* of housing birds, in which they have access to both a house and run, has become much less popular because of the incidence of disease; for maladies such as Worms, Coccidiosis, and Fowl Pox are liable to be encountered year after year with this method of keeping poultry.

Colony Houses.

When poultry are kept on pasture in small (colony) houses this is sometimes termed *the extensive system* of poultry keeping, and in order to avoid any build-up of disease the houses are moved about 25 yd. each week. They are less satisfactory for winter egg production, and much time may be spent washing dirty eggs.

Fold Units.

Fold units are an improvement over the use of colony houses, the birds being confined to small, portable, combined houses and runs, approximately 5 ft. wide by 18 ft. long. Each fold holds about twenty birds, and is moved its own length every day, and in this way the birds get fresh grass and exercise. Lighted "static" folds are very useful for improving winter egg production. Such portable units can also be used for breeding stock, but feather pecking, cannibalism, and dirty eggs must be avoided if the system is to be successful. Folds are best used on level ground, and the soil should be sand or gravel—not clay.

Area Requirements.

On the free range (extensive) method of keeping poultry only about 75 to 100 birds are allotted per acre of ground, *i.e.*, about 60–70 sq. ft. per bird; whereas on the semi-intensive system 200 birds per acre is normal (20–25 sq. ft. per bird). In folds each bird has about 5–6 sq. ft., which is the same amount as that allowed for hen yards.

In deep-litter houses 3½–4 sq. ft. for heavy breeds and 2¾–3 sq. ft. for pullets of the light breeds is usual, contrasted with 2¼ sq. ft. for hen batteries. (In twin-bird batteries, of course, the area is reduced even further.)

These facts show how modern methods of housing have economised on ground (or floor space) without deterioration in health or loss of egg quality—provided that the food given to the birds is "balanced," *i.e.*, complete in vitamins, minerals, trace elements, etc.

Advisory Services.

Many of the larger compound feeding-stuffs manufacturers (*e.g.*, B.O.C.M.) have their own advisory service comprising qualified field staff, veterinarians, etc. The Ministry of Agriculture's National Agricultural Advisory department (N.A.A.S.) also consists of personnel specially qualified to advise farmers on matters of husbandry, nutrition, disease control, etc. Enquiries should be addressed to the Chief Poultry Officer, Ministry of Agriculture, Fisheries, and Food, Horseferry Road, London, S.W.1 (Vic. 8511).

INCUBATION.

If the temperature surrounding fertile eggs is raised to about 100° F. and maintained there for about twenty-one days they will hatch, provided the eggs are "turned" several times daily and the humidity kept within certain levels. This in fact is what happens when a broody hen sits on fertile eggs, but for commercial purposes artificial incubation is preferable if only because mammoth machines have now been manufactured capable of dealing with thousands of eggs instead of a mere ten to fifteen as in nature.

Broody Hens.

Broody hens, of course, are perfectly satisfactory for incubating small clutches of eggs, but they should be de-loused and de-wormed and examined for Pox and tested for B.W.D. before use; and also tried out with pot eggs before being given fertile eggs. Heavy breeds are often broody, but non-broody strains are available. Light breeds seldom go broody; crossbreds vary greatly.

Broodies require to be removed from their eggs only once daily for 15 minutes' exercise, feeding, and watering. After hatching takes place the hen and her chicks are best kept in a coop for two to three weeks before being transferred to more commodious surroundings.

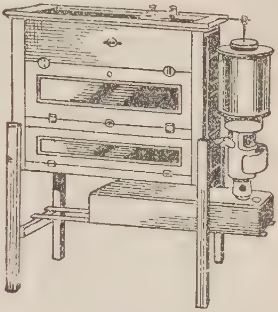
To improve on the hatching results obtained from broody hens, great advances have been made during the past century, although exceedingly good results from the incubation of large numbers of eggs were obtained, and still are, by the Egyptians, who use "ovens." Charcoal fires provide the source of heat, the eggs being laid out in their thousands in ovens above. At about the fifteenth day the hot ashes are raked out, by which time the chick embryos provide sufficient residual heat for hatching to take place on the twentieth to twenty-first day. Whilst no accurate control over temperature or humidity is possible, the results are worth while, the whole process being both cheap and labour saving.

It is probable that Charles Edward Hearson (1846–1920) made the greatest single contribution to artificial incubation when he invented the thermostatic envelope ("Hearson's Capsule") in the eighties. Originally a pharmacist's assistant in Barnstaple, he left for London in 1865 to continue his studies in chemistry, physics, and electricity. A friend was visited in Surrey, and it was there that he saw a poultry farmer endeavouring to keep hatching eggs constantly warm by means of a water-jacketed box. After months of research Hearson devised a unique piece of apparatus for regulating the heat from a paraffin-oil burner, his first incubator having been made in 1875. His "capsule" became standard equipment on all hot-air and hot-water incubators for upwards of half a century, and it is still in fact being used in many type of incubators, both egg and bacteriological.

Until about 1920 the size of poultry incubators had purposely been kept small so as to hold only a few hundred eggs, but during the succeeding fifteen years many mammoth and cabinet incubators came on to the market, including one to hold 70,000 eggs exhibited at the British Industries Fair, London, in 1933. Later developments included the provision of separate setting and hatching compartments, automatic (hourly) turning, large built-in brick incubators, electric alarm bells etc.

Fertility.

Poor fertility can result from defects in either the cock or hen, but it is also related to management. Most cocks and hens are fertile, but a small percentage are genetically defective. If the male is subjected to very cold weather and his comb becomes frost bitten fertility will fall sharply; it will also be poor if he has too many females with which to mate. If mating takes place at only infrequent intervals fertility deteriorates. Matings should take place at not more than seven-day intervals for cocks, for turkeys the period can be extended to 2–3 weeks. The diet of breeding stock should be "complete," as for hatching purposes, or fertility will be impaired.



Paraffin-oil-heated, Hot-air, Small-size Incubator.

The implantation of stilbœstrol or other selective female sex hormone (as in chemical caponisation) into cockerels causes a severe temporary loss of male characters, and infertility also results. After about eight weeks it returns, and it may be normal again in one or two months' time. If hatching eggs are held longer than seven days fertility begins to fall, parallel to the length of the storage period, particularly if the temperature of the room is either too high or too low. Certain maladies, such as Newcastle Disease, also cause a marked temporary infertility in poultry. Nicarbazin in a breeder's ration also lowers hatchability.

Hatchability.

Hatchability is governed by breed factors and also by environment, and in this connection the most important single factor, apart from the actual incubation, is nutrition. It is the foodstuffs given to the breeding stock which must contain vitamins A, B_2, B_{12}, D_3, and E, and minerals (calcium, phosphorus, manganese), since these are all known to affect the development of the chick embryo. Hatching is, of course, governed by the ability of the chick to emerge safely from the egg in order to live its own independent existence, and this automatically implies that it must have been free from defects such as "crossed beak" and that both the shell and its membranes are sufficiently "softened" to allow the chick to emerge at about the twenty-first day of incubation.

Factors Affecting Incubation.

Storage of Eggs.—Hatching eggs are best stored broad end uppermost at 55° F.; if the temperature exceeds 80° F. incubation will start automatically. Storage temperatures below 35° F. should be avoided whenever possible.

If stored longer than seven days hatching eggs should be turned daily, but hatchability will deteriorate the longer they are kept; in any case it is unwise to keep them longer than 10–14 days.

Humidity should be quite high—between 80 and 90 per cent. Eggs received by train or lorry should be allowed to stand for twenty-four hours before being set, otherwise there is a risk of "tremulous air cell" developing.

Cleaning Eggs.—Eggs should *not* be washed

except using warm water at about 80° F. containing a detergent-germicide. Mechanical dry cleaning is generally preferred.

Incubation.—Be certain to run the incubator at the temperature recommended by the manufacturers—each make of machine may differ in this respect. In still-air machines the temperature at the top of the eggs is important, and if too high this leads to embryological deformities; low temperatures delay the hatch. In the event of an electricity cut keep the incubator room warm (90° F.) but open the machine every half hour or so to get fresh air into it.

It is not necessary to cool eggs—this is only actually necessary in small machines *for turning purposes*. Cooling itself delays hatching, and is to be avoided.

Humidity is very important as follows: Papworth machines require 55 per cent. relative humidity; Stephens 55 per cent. in the setter and 75 per cent. in the hatcher (when the eggs are pipping); Western 55–60 per cent.

If humidity is low it may lead to a parching of the membranes, which then offer a physical barrier to hatching. Too high a humidity is also wrong, because it interferes with embryonic development and can cause death-in-shell.

Correct *turning of the eggs* during incubation is very important, as it imitates a physiological process carried out by the broody hen herself many times each day. It prevents the embryo from "sticking" to the inner shell membrane, and also makes certain in small machines that the temperature of the egg is equally distributed. Improper turning is believed to be one important cause for chicks finishing with their heads at the small end of the egg at hatching time. Hatching eggs should be turned in small machines at least twice and preferably three times in twenty-four hours; in cabinet incubators they may be turned each hour mechanically. It is not advisable to turn eggs during the three to four days immediately prior to hatching.

The Ventilation of the incubator room is vitally important, and as much fresh air as possible should be circulated—to supply oxygen and to remove carbon dioxide and moisture—without creating draughts. This air should also be warmed, if practical, to 60° F. Consideration must also be given to removing the foul air by outlet cowls or vents at the top of the room. Incubators should not be placed in a corner of a room nor up against one of its walls, as this impedes air circulation.

Nutrition of the Breeding Stock.—Unless stock cockerels and pullets or hens used for breeding receive a balanced diet, hatchability will be poor. Firstly, they should not receive large quantities of bulky food such as swill, Tottenham pudding, or steamed potatoes. Secondly, their diet should contain at least 4–5 oz. of "breeder's" pellets or mash, rich in vitamins; together with 1 oz. of whole grain. (Unnecessary if the breeder's ration contains vitamin E.) Breeder's rations must contain adequate levels of those vitamins and minerals essential for the growth of the developing embryo, *e.g.*, vitamin B_2, B_{12}, etc. When not present in feed ingredients, supplements of these must be added at the time of manufacture.

Candling.—The method of testing eggs for fertility is known as "candling," and it can also be used for the determination of egg faults. The eggs are taken to a dark room or cupboard, where they are subjected to the bright rays of an electric lamp. Hatching eggs may be tested in bulk by lifting the trays over a special table with the electric light beneath it; the poultryman then marks the infertiles, which he subsequently removes. In the case of fertile eggs a small dark area can be seen as early as the fourth day, but candling is normally carried out on the seventh, tenth, or eighteenth days. In the case of infertile eggs they remain clear because of the lack of development of the embryo chick. When fertile eggs are tested on the eighteenth day the whole of the egg is dark except for the air space.

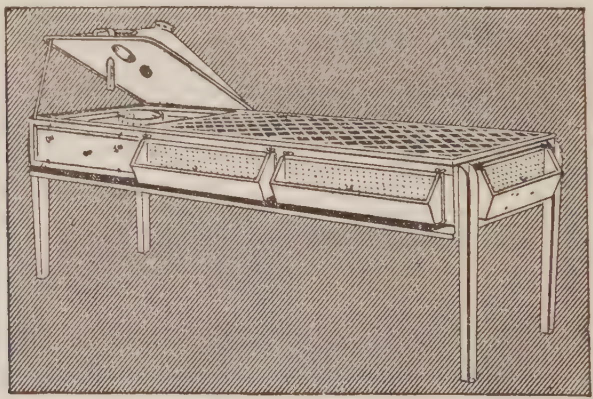
Fumigation of Incubators.—Due to the fact that large numbers of disease-producing germs may develop in eggs during incubation, and also because the "fluff" from newly hatched chicks may also be heavily contaminated with germs, it is important that incubators are thoroughly disinfected immediately after each batch of chicks passes through them. The common method is to add 1½ oz. of liquid formalin to ¾ oz. of potassium permanganate crystals (for each 100 cu. ft. of air space). A violent chemical reaction takes place, liberating large quantities of formaldehyde gas, which, however, is more effective as a disinfectant if the interior of the incubator is humid and damp. All exits should be sealed for one hour. Poultrymen using the method for hatching eggs must see that no eggs are fumigated between 24 and 84 hours of incubation, or poor hatchability will result.

It has recently been shown that concentrations of formaldehyde gas three times those normally used should be recommended when infection (*e.g.*, Salmonellosis) is known to be present. Thus 4½ oz. of 40 per cent. formalin is used per 100 cu. ft. of air space. For dispersing the residual gas, ammonia can be used.

Sexing Day-old Chicks.

The crossing of certain breeds, *e.g.*, R.I.R. cock × Lt. Sx. hen, results in chicks the colouring or pattern of whose down at birth readily separates them into two groups, male and female; This is termed sex-linkage, and the basis for such matings provides an interesting study for students of animal breeding.

The sexing of pure-breed chicks at day-old was



SINGLE-TIER TABLE BROODER FOR CHICKS.

ade possible in this country in 1934 following the scovery in Japan by Masui and Hashimoto of a ethod whereby the vent of a day-old chick is erted and a small vestigial genetical eminence amined. If completely absent the chick is a illet, those with an eminence are usually male, it a small percentage may be female. It takes i expert some two years to be able to sex all eeds accurately and speedily, *e.g.*, about a ousand chicks per hour; 95 per cent. accuracy.
In 1950 the Japanese again astounded the oultry industry by inventing a small instrument r insertion into the vent of newborn chicks in der to view indirectly the gonads by reflected ;ht, thus allowing the operator to decide whether ie ovary (on the left side) or two testes were esent. The former being typical of pullets and e latter of cockerels. This is a more accurate ethod than that originally used—98–100 per nt. frequently being obtained—and also easier learn. It takes only two or three months to quire a reasonable degree of accuracy, but the eed of the operation is little more than half that the ordinary vent-sexing method.
It should be noted that in neither the "vent" or the "machine" method are chicks damaged any way in the hands of efficient chick-sexing erators.
A British method for sexing chicks accurately as developed by Punnett and Pease at Cambridge niversity during the thirties, resulting in the roduction of "Auto-sexing" breeds based on own colour. The "Legbar," "Cambar," and Brussbar" are typical examples of the breeds ncerned, but as their economic qualities are ten inferior to those of the established pure eeds and crosses, the auto-sexing breeds have ot become as popular as was at one time expected.
Older chicks, aged four to ten weeks, can be xed as soon as they show distinctive sex charac- rs—*e.g.*, by the size of their comb and wattles, e shape of the bird's head and shanks, and also the appearance of the neck, saddle, or sickle athers.

CHICK REARING.

To-day very few chicks are reared under broody ens, partly because broodies are usually only ailable during a limited period of the year and so because unless chosen very carefully they ay spread certain diseases to their chicks. ore particularly, however, because to rear 100 iicks would require at least half a dozen broody ens, and these would not be easy to find at short otice, nor would they be easy to manage. Mod- n methods are such that 100 chicks can be ared to eight weeks of age *on the floor* of a room ft. × 12 ft., but in tier brooders a room of this ze might hold over 1000 chicks.

Requirements.

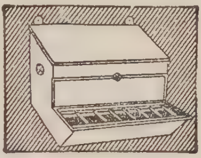
Artificial heat, food, water, bedding, and good entilation provide the essentials for chick rearing, it the skill of the poultryman is an equally im- ortant factor. Day-old chicks can be purchased -day in large or small numbers, suitably sexed— ckerels for table poultry and pullets for egg oduction—at a few shillings each, and as soon they are received they should be put under artificial foster-mother—a *hover*. Electric or fra-red ray lamps are very popular nowadays, ecause they need so little attention yet provide adequate source of heat. The temperature the level of the chicks' heads should be about ° F. during the first week; thereafter it can be duced gradually until the chicks are free from tificial heat by four weeks of age (five weeks in nter-time). Oil-heated hovers of circular and ramidal patterns are equally successful, but ains, "Bottogas," or "Calor" gas brooders are pecially popular in rural areas where there is no ectricity.

Ventilation.

No matter what system of brooding is adopted, e air in the room or compartment should be kept ite fresh, and if it feels muggy or creates a nsation of headache in the attendant something is wrong. Too often the amateur keeps the atmosphere too hot and also too dry—it is only under the hover that the air needs to be heated, elsewhere it can be quite cool, so long as there are no draughts. Cold air stimulates feathering, and also increases the appetite. The adjustment of windows is very important, and requires constant attention because of climatic differences from day to day. Electric extractor fans capable of supplying 1 cu. ft. of air per 1 lb. liveweight per minute are desirable.

Equipment.

Young chicks have little initial sense as to their ability to get warmed up under a hover, but they soon learn this by instinct if given assistance. For this purpose a metal or cardboard surround (15 in. high) about 3–4 ft. in diameter is invaluable during the first few days. Its use prevents chicks from straying, and in this way they quickly learn where to find heat, food and water.



FOOD HOPPER FOR CHICKS.

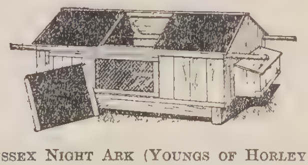
Food Hoppers should be such that chicks do not walk over the food, nor foul it with litter, etc. As soon as possible they should be raised on blocks of wood, or the feed will be constantly covered by litter scratched there by the chicks. Fresh supplies of food should be used daily, and sufficient hopper space allowed so that each chick has ample opportunity to feed. Allow 1 in. at day-old, 2 in. at 4 weeks, 3 in. at 8 weeks and 4–6 in. at point-of-lay.

Water Troughs must be large enough to hold a full day's supply of water and also be capable of being cleaned thoroughly. Water troughs should not be so large that day-old chicks can get into them, or they may drown.

For day-old chicks an inverted 2-lb. jam jar over a large saucer can be used in an emergency, but portable, inter-locking, two-piece water fountains are preferable. Provide 6 pints daily per 100 chicks at day-old, 2½ gallons at 5 weeks, and 5 gallons daily per 100 adults.

Housing.

Considerable skill is required when chicks are to be reared out of doors, and for this reason they are best brooded under hovers, on solid floors; or in tier brooders. By 4–6 weeks of age, however, when they should be fully feathered, they can be taken outside. Two of the best pieces of equipment for rearing pullets are the well-known Sussex Night Ark, and the Hay-box Brooder.



SUSSEX NIGHT ARK (YOUNGS OF HORLEY).

More recently portable Range Arks of a type used in America to hold sixty to eighty growing chickens have become popular. They comprise open-sided, low-roofed houses with perches and feed hoppers, etc.

Litter.

For bedding purposes a variety of materials are available, but peat moss, chopped straw, or wood

shavings are often preferable to chaff, coffee husks, or sawdust. A layer ½ in. thick should cover the floor, but its renewal will depend upon the risk of Coccidiosis, and unless replaced every day an anti-coccidiosis drug may require to be used in the feed or water. Many poultrymen are successful in building up the litter to a depth of about 4–6 in. (so-called "deep" litter), but considerable skill is required, or it will get damp and soggy and become a source of disease. Good ventilation and the use of splash-proof drinkers will help to keep the litter dry. It should also be turned regularly.

Feeding.

The system and method of feeding day-old chicks is vital to their success. *The first feed should be given at floor level,* below or near to the hover. A sheet of cardboard, or part of a feed bag, can be laid on the floor and the mash, crumbs, grain, wet mash, or whatever feed is being given scattered over it *as soon after the chicks have settled down as possible.* It is a completely mistaken idea to deprive chicks of their first feed for 24–48 hours, and the earlier they can get to it the better. A few ounces of food scattered over the floor in this manner will occupy the chicks during their first hour or two, until in fact they have learned where to find their ordinary food troughs. Chick box lids or Keyes trays make good temporary feeders, until wooden or metal troughs can be used by the chicks after about 48 hours. Supplies of fresh water alongside are equally important.

Note.

Even in the case of chicks being reared on wire floors it is still a good plan to give them an early feed, on paper, at floor level. After the first day more feed can be given on egg flats for example; this encourages the chicks to forage, during which period they will soon discover the site of their proper feed troughs.

Amongst the feed should be scattered some coarse sand or fine flint or gravel grit, because although this may not be actually necessary for grinding up the food in the gizzard it will prove invaluable should chicks attempt to eat some of their litter.

Some poultrymen insist that the first feed for their chicks shall be grain—groats, cut wheat, or maize grits—others prefer dry bran, but both practices are wrong. The feed should be "balanced," from both the growth and health standpoints, and this means a properly prepared ration which can be given as crumbs or mash—wet or dry. The greater the palatability of the feed (assuming it to be balanced) and the more food eaten the quicker the growth rate of the chicks. The following data taken from Stoke Mandeville trials refer to as-hatched stock:—

	Weights		
	Table Chicken (Broilers)	*Aylesbury Ducks*	*Turkey Poults* (B.B.B.)
	lb.	lb.	lb.
2nd week	0·36	0·76	0·75
4th week	1·0	2·75	1·44
6th week	1·70	4·5	2·88
8th week	2·75	6·1	4·22
10th week	3·50	6·8	6·50

Weighing Scales are necessary to check the progress of one's chicks, because a steady growth rate is essential for the successful rearing of poultry, no matter what the species. They should preferably be capable of weighing between 1 oz. and 10 lb., for they can then be used on any bird between day-old and three months, and they will be equally valuable for weighing food. If weights are known for both growth rates and the amount of food consumed, then a "feed conversion" factor can be obtained.

Feed Conversion is related to the particular strain of bird; the nature of the ration; the construction of the feed hoppers; the weather and housing. For example it takes 2½ lb. of feed per 1 lb. liveweight gain for 10 week chicken.

Food Consumption.

Assuming that poultry are being fed on balanced compounded feeds rather than swill, cooked potatoes, or other bulky feeds, their needs can be calculated from the following table:—

	Chicks	
	(1).	(100).
1–7 days .	1½ oz.	9½ lb.
1–14 days .	5 oz.	31 lb.
1–28 days .	1¼ lb.	1 cwt.
To 8 weeks .	6 lb.	5½ cwt.
To 16 weeks .	27 lb.	1 ton 4 cwt.
To 26 weeks .	35 lb.	1 ton 11 cwt.
1st Laying Year	1 cwt.	5 ton
	90–140 lb.	4 tons–6¼ tons

In the case of "light" breeds these figures can be reduced by one-fifth to one-eighth, and for t[illegible] heavy crosses increased similarly. Where gra[illegible] is being fed this should not replace more th[illegible] 15 per cent. of the chick ration. For growers a[illegible] layers it is best used in conjunction with a *Poul[illegible] Grain Balancer* ration.

POULTRY NUTRITION.

Rations.

Manufacturers of compound animal fe[illegible] usually offer the following balanced rations:—

1. "**Baby Chick**," intended for use from day-[illegible] to about four to six weeks of age; complete a[illegible] balanced in every way, such feeds do not requ[illegible] any grain, fresh greenfood, skimmed milk, or lime-stone grit. Baby chick rations are often avai[illegible] able in two forms, *i.e.*, as mash, and crumbs—th[illegible] latter is just as palatable as wet mash, but d[illegible] away with the extra labour involved in prepari[illegible] it. The continuous *ad lib* method of feeding [illegible] which the chicks help themselves is common[illegible] practised, because it satisfies the appetite a[illegible] saves labour as well.

2. "**Growers**" **Rations** contain less prote[illegible] and fewer vitamins than those intended for you[illegible] chicks, and are given to stock aged six to twent[illegible] weeks. "Growers" rations are complete i[illegible] themselves, but if grain is to be fed in any quan-tity, then a poultry "grain balancer" feed shou[illegible] be used instead. This is available as mash [illegible] pellets (⅛ in.), and although the former is oft[illegible] given *ad lib*, pellets are usually restricted to 1½–[illegible] oz. per bird per day according to age.

3. "**Layers**" **Rations** are also complete, a[illegible] it is a mistake to dilute them with grain, becau[illegible] egg production may then fall in proportion to th[illegible] amount of grain fed. (See next para.)

4. "**Poultry Grain Balancer**" **Rations** a[illegible] necessary because grain itself is unbalanced[illegible] being rich in energy, and low in protein a[illegible] vitamins, therefore, a special balancing ration [illegible] desirable. But not more than 40–50 per cent. [illegible] the total diet should comprise grain. This ca[illegible] consist of wheat, oats, or barley. All sto[illegible] receiving grain need regular monthly supplies [illegible] flint or granite grit. Limestone grit should [illegible] given to laying stock daily but not to baby chicks

5. **Hen Battery Mashes and Pellets** ($\frac{3}{16}$ in.) a[illegible] specially prepared for use by stock kept in h[illegible] battery cages, and they, too, are best used libe[illegible] ally and without any addition of grain. H[illegible] Battery Mash can also be recommended for u[illegible] by stock housed intensively, *e.g.*, on Deep Litte[illegible] but pellets are not recommended for continuo[illegible] feeding. (This is because with pellet feeding [illegible] full crop is obtained quickly, and the birds, havi[illegible] little to do, look around and may start pulli[illegible] out one another's feathers. This leads to unsigh[illegible] liness and also occasionally to actual cannibalism

De-beaking or the use of spectacles will prevent many cases of feather pecking or cannibalism.

6. **"Breeders'" Rations** (mashes or pellets) are compounded with a view to supplying the requirements of birds whose eggs are going to be incubated. They supply additional vitamins and minerals which pass over to the day-old chick *via* the yolk sac. If an ordinary layer's ration is used instead, hatchability will fall and an increased number of "dead-in-shell" may show characteristic defects.

7. **Ducks, Turkeys, and Pheasants.** Ducklings thrive equally well on chick pellets, but special "starter" rations are now being marketed for turkey poults and pheasant chicks. In both cases the protein and vitamin levels are much higher than those intended for chickens and ducklings. "Pre-starter" rations for turkey poults are also available (0–3 weeks of age). Dilution of these feeds with grain is to be avoided.

8. **Antibiotic Feed Supplements.**—Procaine Penicillin, Aureomycin, and Terramycin are the three antibiotics used as feed supplements for poultry in this country. At *low* levels (5–10 gm. per ton) they overcome sub-clinical diseases due to intestinal bacteria, etc., and as such are used to stimulate the growth of table chickens and also to improve their feed conversion. At *high* levels (50–100 gm. per ton) antibiotics may be used to overcome various stress factors (*e.g.*, chilling), as well as certain maladies, such as Pullet and Round Heart Disease. They are also sometimes used to boost egg production, and to improve hatchability, but this takes place only if the depression is due to the presence of pathogenic organisms which are capable of being killed off, directly or indirectly, by antibiotics.

No harm can follow the giving of antibiotic feed supplements to poultry; nor is there any risk to humans from such practices, but they are expensive supplements to be used cautiously.

9. **Grit.**—There are two types of grit. (i) *Insoluble*—flint, granite, gravel, etc.—required by poultry of all ages, at approximately monthly intervals, if they are being given grain, grass, or other feeds which require grinding in the gizzard. (Mashes, crumbs, and pellets break down in the gizzard satisfactorily without grit.) An excess of grit may pass through the gizzard to cause irritation of the intestines. (ii) *Soluble*—limestone, oyster, etc.—required by layers daily, unless a completely balanced ration is being used. Chick rations usually require none.

Digestion in the Hen.

Unlike most farm animals, poultry swallow their food whole. It passes through the crop and preventriculus (stomach) to the gizzard, where it undergoes slow disintegration under the powerful contractions of its dark-red muscles coupled with the presence of hard, flint-like pieces of grit or stone. As soon as the gizzard is full all succeeding feed is stored in the crop—at the base of the neck—where it is warmed, softened, and acidified by lactic and other acids formed as a result of bacterial fermentation. The semi-fluid foodstuffs passing from the gizzard to the small intestines are part digested, but intestinal juices and those from the pancreas complete this process prior to its assimilation and transformation into meat and eggs. (Bile assists the emulsification of the intestinal contents, but does not supply any digestive ferments.) The semi-fibrous residues which remain pass quickly through the succeeding portions of the digestive tract and leave the body later as droppings—tinged with a whitish "cap" so well known to the poultryman. This latter consists of compounds of uric acid which are being continuously excreted *via* the kidneys.

A hen passes eight to ten lots of fæces each day, one such mass coming chiefly from the blind guts. It is bright in colour, usually yellowish-brown tinged, and of a semi-liquid consistency. It is free from fibrous material, but very evil smelling, and sometimes it contains a number of small Heterakis worms ($\frac{1}{4}''$–$\frac{1}{2}''$ long).

Feeding Poultry on the General Farm.

Chicks.—It is vital to give chicks the best possible start in life, and this means using a special chick ration from day-old. The nutritional requirements of chicks are complex, but their actual food *consumption* is low and, therefore, for both these reasons it is a really sound plan to use a well-balanced chick feed containing animal and vegetable proteins, vitamins A, B_2, D_3, and E. Since chicks eat only 5–6 lb. of feed up to 8 weeks the cost of feeding a special, balanced Baby Chick ration is only about 2*s*.

Do not try to economise by using home-grown grains at this period, because they are somewhat unbalanced and better reserved for the later growing stages. In other words, feed a balanced chick ration as long as possible, and do not dilute it even with skimmed milk, because this upsets the balance of the other ingredients.

Growers.—As a contrast, growing stock aged six to twenty weeks can be given a more bulky ration, and grain can then be used freely, also household scraps, minced vegetables, etc. Wheat is the best grain, but oats or barley are also quite satisfactory. If dried grass or clovermeal is available 5 per cent. can be added to the ration, providing it is of good colour and quality.

As regards special foods a Grower's pellet or mash is best if little grain is available, but if there is plenty, then a "Grain Balancer" ration is better. Broadly speaking, one should give 1 part of grain balancer mash or pellets to 2 parts of grain in the early stages, then half and half when the birds are about four months old, and at point-of-lay pullets should be given three parts of grain balancer to two parts of grain.

Laying-Stock.—The feeding of layers is simple, but the ration must be balanced for economic egg production. It is important that a layer receives 4–5 oz. dry matter containing not less than 15–16 per cent. of good-quality protein. This can be given in the form of pellets or mash; generally provided *ad lib.*, but a 2-oz. feed of wet mash is popular for breeding stock. For hen batteries the ideal ration consists of 4–6 oz. of hen battery pellets.

Special high-energy layers' feeds are prepared for use in cold weather by heavy breed pullets, 3–4 oz. being eaten daily.

Table Poultry.—Special rations are now also available for table poultry production. They contain added proteins and vitamins and special growth factors such as antibiotics like *penicillin*; also anti-coccidiosis agents like the "sulpha" or "nitro" drugs; they are higher in energy and lower in fibre than ordinary chick rations, and as such have a better feed conversion. "Broiler Starter" crumbs are fed during the first 6 weeks, then "Finisher" or "Fattener" pellets.

Breeding Stock.—The feed for breeding stock must support the bird for its maintenance and egg-production requirements, and it must also supply nourishment for the resultant day-old chick. This can be supplied by 4–5 oz. breeders' pellets (or mash) plus 1 oz. grain. Such feeds should commence 3–4 weeks before the hatching season starts. For those poultry breeders keeping their stock intensively (on the deep-litter system) it is advisable to omit the grain, and to feed a "Poultry Breeders" ration exclusively. Fresh greenfood is not essential.

EGG PRODUCTION.

Most domestic hens of the improved breeds—R.I.R., Lt. Sx., W.W., Buff Rock, Leghorns, etc.—are capable of laying 180–220 eggs per bird during their pullet year, provided they receive a balanced diet and are managed with common sense. As a fact, many families have been bred to lay from 240 to 250 eggs per year, and just as there are a few cows which can be expected to give 3000 gallons of milk, so there are occasional pullets which lay over 300 eggs in a year.

Laying stock should receive as few checks as possible during their rearing stages, which implies that they will have remained free from B.W.D., Coccidiosis, etc., and that they will have received a good, generous diet and will not have been unduly exposed to severe climatic conditions.

Chicks hatched in the spring of the year start laying about twenty to twenty-six weeks later, the light breeds laying earlier than "heavies" by about two to four weeks. The ovary starts to develop actively about one month before production commences, and the associated oviduct

becomes equally active, increasing in both length and diameter. Both these functions are governed to a large extent by hormones, formed by certain small glands, *e.g.*, the pituitary gland at the base of the brain, the thyroid gland, etc. In this connection light plays an essential part.

There are no obvious signs that laying is a painful process, but in a few instances slight cloacal hæmorrhage occurs at the time the first egg is laid, and sometimes this is known to coincide with the passage of a much larger egg than normal. The first twelve to twenty-four eggs are generally the smallest, weighing on the average about 1¾ oz., but once maturity is reached, egg size remains relatively constant, averaging 2–2¼ oz. in most cases. But even larger egg strains of poultry have been developed, by selective breeding, and in such cases their eggs will weigh 2¼ oz. and over. The production of very large eggs is to be discouraged because they are uneconomic to produce.

Egg size tends to fall in the hotter, summer months when day temperatures exceed 85° F., and shell texture also deteriorates.

When pullets first come into production not infrequently they lay soft-shelled or double-yolked eggs, but neither should be considered seriously, as in most cases normal eggs quickly follow.

Double-yolked Eggs.—Should the ovary release two yolks simultaneously or separated by only a very short interval, this will result in the formation of a double-yolked egg; whereas if the yolks are liberated at an interval of several hours, two eggs are likely to be laid during the succeeding twenty-four hours.

Cracked and Soft-shelled Eggs.—Cracked eggs may result from: (i) a defective diet, the rations being defective in calcium (lime), phosphorus, or vitamin D_3; (ii) a weakness of the oviduct; or (iii) local damage, as from the use of a faulty nest-box or badly constructed hen-battery cage.

When soft-shelled eggs appear, the "egg" being expulsed before the shell has had time to be laid, this may be a temporary defect due to faulty nutrition or disease such as Fowl Pest. Isolated cases should be ignored.

Mis-shapen Eggs.—These are proof that the oviduct is functioning peculiarly, and in a few cases they are associated with the presence of a tumour or other obstruction involving a ligament of the oviduct. Therefore the repeated laying of such eggs indicates that such a bird should be removed from the flock.

Annual Production.—Egg production falls as a bird gets older, and the following figures give an indication as to what may be expected from hens as they get older:—

Pullet Year	200
Second Year . . .	160
Third Year	125
Fourth Year . . .	100

Composition of Eggs.—The increase in albumin which occurs in large eggs can be seen from the following tables:—

Egg Size.	*Albumin.*	*Yolk.*	*Shell.*
1¾ oz.	57%	32%	11%
2¼ oz.	62%	27%	11%

The colour of the yolk is dependent almost entirely upon the diet, and if the latter is devoid of greenfood and maize the resultant yolks will be almost white. In general, the more greenfood the deeper the yellow-golden colour, but in some cases believed to be due to certain weeds, reddish orange colours may occur. Green yolks may be due to feeding an excess of acorns or using certain samples of cottonseed meal, or from too much herbage.

Value of Daylight for Egg Production.—Farmers do not always appreciate that there is a minimum amount of daylight required by Nature as her normal stimulus to egg production. Experiments at Stoke Mandeville have shown that where daylight is restricted, as by the absence of suitable windows or roof-lights, such pullets will each lay sixteen eggs less during the winter months compared with sister pullets kept in hen-battery cages facing good daylight. Light is the stimulus to ovarian activity, not heat or humidity. It can be from the sun, electricity, gas, or paraffin. Its intensity is important.

Value of Night Lighting.—In the autumn when the hours of daylight are decreasing, egg production can be stimulated if electric or other artificial lighting is used to extend the period of daylight to about fourteen hours. Using 60-watt lamps placed one per 200 sq. ft. of floor space, suspended about 6 ft. above the floor, the right intensity will be achieved. Fluorescent lights are not superior to incandescent lighting. Experiments have shown that the use of 1500-watt lamps for 20 seconds 3–4 times during the night also acts as an efficient stimulus to the ovary—the light effect being *via* the eyes and pituitary gland at the base of the brain. This is known as "flash" lighting.

Controlled Environments.—Experiments have confirmed that pullets given twelve hours of light and a constant temperature of 65° F. laid twenty-four eggs more in the year (forty-eight weeks) than comparable stock housed on deep litter but receiving no artificial light or heat. But pullets from the same batch given twelve hours of light but no artificial heat laid twenty-two eggs more than their controls. Thus the essential factor in increasing winter egg production is light (2–3 ft.-candles) and not heat.

TABLE BIRD PRODUCTION.

Poultry for human consumption readily fall into several classes:—

(i) **Poussin** (weighing 1¼–1½ lb.) are required for the hotel trade. Double-poussins weigh 2 lb.

(ii) **Broilers.**—Broilers are young chickens aged 9–10 weeks, of either sex, weighing about 3–3½ lb. at killing time. They are now being mass produced by the million, this system of production having recently been introduced into this country from the U.S.A., where over 1700 million broilers were reared in 1958. A suitable standard to aim for to day is 3½ lb. bodyweight, in 10 weeks, with a feed conversion of 2·5 : 1.

Broilers sell at about 8*s*. to 13*s*. apiece to housewives, and are available throughout the year.

(iii) **Roasters** (weighing 4–6 lb.), for both the housewife and restaurant trade, can be carved into four or six portions. They are aged ten to sixteen weeks, and will reach the required weight all the more quickly if they receive special "Table Poultry" rations throughout.

Heavy-weight roasters of 7 lb. or more are also available, usually as *Capons*, but they are less economic to produce. They are most popular at Easter and Christmas. The heaviest are obtained by caponisation—surgically or chemically—and are aged from fourteen to twenty-six weeks.

Capons are male birds deprived of their testes in order that they may fatten quickly. The operation is carried out at about eight weeks of age, but "slips" occur, and a few cockerels may even die. Six months later such capons will weigh 2–3 lb. heavier than ordinary cockerels, *i.e.*, about 9–12 lb. apiece.

Chemical Caponisation by means of implants (15-mg.) of female sex hormones (stilbœstrol, hexœstrol, etc.) is rapidly becoming popular, because it is cheaply and easily carried out, causes no deaths, few slips, and the results are positive in 4–5 weeks' time, when the injected birds will be considerably fatter than normal. Such birds stop crowing, go pale in the comb, and lose their combative instincts. Internally there are heavy deposits of fat lining the abdomen and also between the muscle fibres. Older cocks aged one to three years can be tenderised by being given two such implants at six-week intervals, the first to be given three months before killing.

A new method for the chemical caponisation of poultry is to inject the drug in paste-form so that after injection it is all absorbed, because pellet implants sometimes remain only partly absorbed. Another method is to give the drug in the feed, in which case *dienœstrol diacetate* is used, and not stilbœstrol. Although less body fat is deposited internally with this method, it might become popular because of the ease of administration.

Chemically Caponised Turkeys.—Female turkeys respond very well to chemical caponisation, and should be implanted with two 15-mg. Hexœstrol

tablets three or four weeks before killing. Stags however, are less reliable, and require 30 mg. six weeks before and a further 30 mg. three weeks before killing; even so, the results are doubtful. For turkeys being killed off at 16 weeks caponisation 1 × 15 mg. tablet should be used in conjunction with a high-energy ration.

(iv) **Boiling Fowl** are of two classes: (*a*) specially, fat, tender, yearling pullets (5–7 lb.), taken direct from hen batteries, where their special environment will have meant that they will not have been subjected to exercise (which toughens the meat). A premium of about 2*d*.–4*d*. per lb. can usually be obtained in favour of such birds at the end of their first laying season. (*b*) Hens of all other classes and ages—these are less tender and, if taken from free range, are usually lighter (3¾–5½ lb.).

(v) **Ducklings** for roasting purposes are young, succulent, and tender, and weigh from 4½–8 lb. at 8–8½ weeks of age. Older ducks are seldom profitable unless special circumstances demand their retention to about 15 weeks of age.

(vi) **Turkeys** for roasting at home vary in weight from 6–20 lb.; the females weighing about two-thirds that of the male. Older birds are only of use to the hotel trade. The world's heaviest turkey weighed 65 lb.

(vii) **Geese**, like turkeys, are mainly fattened for the restaurant trade, and weigh at nine months 10–20 lb., but their popularity is not increasing in spite of the fact that they eat large quantities of grass and very little "concentrates."

BRITAIN'S BROILER INDUSTRY.

The development of a broiler industry in Britain is a recent innovation, for whereas none were sold in 1953, last year (1959) about 90 millions were marketed. This is the result of specialisation—hatcheries producing special chicks, which grow quickly, feather rapidly, and are mainly white skinned. They are reared in intensive houses which have certain unusual features, allowing 0·7–1·0 sq. ft. per bird. They are 30–40 ft. wide, insulated, and often ventilated by electric fans. Broiler houses hold 5,000–10,000 birds and the aim is to get them weighing about 3½ lb. at 10 weeks. Large packing stations, capable of plucking and eviscerating thousands of broilers daily, have been built, often in conjunction with organised "broiler groups". These are co-ordinated units designed for the economic production and marketing of broilers at a profit. Broilers are sold whole (eviscerated), or in parts—breasts, half chicken, etc. Their present-day retail price ranges from 8*s*. to 13*s*.

DUCKS.

Ducks have many advantages over chicken—they grow faster, weigh heavier, lay more eggs and suffer from fewer diseases; yet they are not as popular as might be expected—why is this?

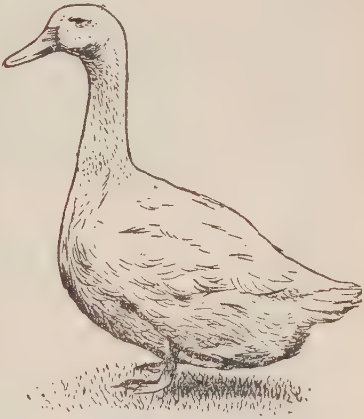
Firstly, they may not make a profit, because there is sometimes a consumer prejudice against eating duck eggs, but like eating pork in a month without the letter "r" in it, this prejudice is more fanciful than real. It arose no doubt because there have been occasional deaths or illnesses due to the consumption of Salmonella-contaminated eggs; but there are also other and more important sources of this type of infection.

Secondly, the egg production of the table breeds of ducklings—as opposed to the layers—is often low, and therefore there is a very seasonal trade in ducklings, except in the case of Penines and Pekins now being hatched the year round.

Breeds.—As layers the Khaki Campbell breed is supreme, many strains laying upwards of 275 to 300 eggs per year. The *Pekin* is an excellent dual-purpose breed, some strains of which are also good layers; and there is also the *Indian Runner*. But for table work the *Aylesbury* is easily the heaviest and most rapidly growing breed in the country, but its poor egg production is against its expansion. The new *White Penine* breed is nearly as good as the Aylesbury for table purposes, and is also an improved layer. Average weights are: Khaki Campbells 4 lb; Indian Runner 4½ lb.; White Penines 5–5½ lb.; Pekins 5¼–5¾ lb.; Aylesburys 5¾–7 lb. at 8–9 weeks.

Rearing.—Ducklings are easy to brood, and where electricity is available infra-red ray lamps are ideal for the purpose. They can be taken off heat at two-and-a-half to three weeks of age—at least one to two weeks earlier than chicken. Although they need plenty of drinking water, a pond or stream is not a necessity, and puddles should always be avoided, as they may harbour disease parasites. Ducklings grow best on pellets or crumbs given from day-old to killing at 8–9 weeks. By four weeks of age ducklings can be given bulky feeds containing steamed potatoes, swill, Tottenham pudding, etc. They will reach their second feathering stage by 9–10 weeks of age, and should be killed off before this period is reached, otherwise stubbing will be difficult. Wet plucking is not satisfactory for ducks, and dry plucking requires to be followed up by careful hand stubbing—but the feathers fetch 7*s*. per pound. (Hen feathers fetch only about 6*d*. per pound.) Alternatively, wax plucking eliminates hand stubbing, but the value of the feathers is lost.

As table ducklings reach 6 lb. by eight to nine weeks of age compared with fourteen to sixteen weeks for cockerels, they should be cheaper to produce, but day-old ducklings at 3*s*. apiece cost three times that of cockerels. In proportion there



AYLESBURY DUCK.

is less meat on a duck, and for these reasons it falls into the luxury class of table poultry.

Diseases.—Ducks do not suffer from Coccidiosis, Gapes, Newcastle Disease, Fowl Pox, or Fowl Paralysis, but they do get Salmonella infections (Keel Disease), virus hepatitis, diseases of the reproductive and excretory systems, and tumours. *S. œrtrycke* infection is responsible for very heavy losses in young ducklings aged three to fifteen days; and survivors may lay contaminated eggs for long periods. Eggs from such birds may be the cause of food poisoning, but it would not occur if attention was given to avoiding the consumption of raw eggs, or of boiling them for ten minutes. This will destroy any Salmonella infection present. (Table ducklings are never the cause of food poisoning in man.) Attention should always be given to collecting duck eggs in as clean a state as possible, and if they are dirty they should be cleaned in hot water (80–90° F.) containing a detergent, *e.g.*, a quarternary ammonium compound; or one such as "Santobrite."

TURKEYS.

Whereas an average fowl will weigh from 5 to 7 lb. at maturity, a turkey hen will weigh more than twice as much; male birds ("stags" or "toms") weighing from 20 to 35 lb. apiece.

These large birds were ideal for family parties

thirty to forty years ago, but with smaller families, and small ovens, the day of the really large turkey has passed, except for the restaurant trade. To-day housewives demand a bird weighing 8–15 lb., which calls for hen turkeys or specially " finished " young males aged 14–18 weeks.

Breeds.—For breeding pens one stag to seven hens is commonly practised. Up to 1950 the most popular turkey in Britain was the *American Mammoth Bronze* (A.M.B.) weighing 14–24 lb. A peculiar sheen to the dark feathers giving the bird its " bronze " character.

Broad Breasted (white and bronze) turkeys carry additional breast meat and weigh 15–30 lb. at five to seven months of age. Of North American origin these are now our most popular turkey.

The *Norfolk Black* is an excellent bird for the general farmer, being lighter than the A.M.B., but with a particularly nice, plump breast.

The *British White Turkey* (also known as the " Austrian White ") is almost as heavy as the A.M.B., but its feathers are more valuable. They are very popular in the south-eastern counties. A smaller white turkey recently imported from America, the *Beltsville Small White*, matures two to four weeks earlier, and weighs about 8–15 lb. Its economical qualities are making it very popular, particularly its good egg production and better hatchability.

The demand for smaller turkeys has led to the production of " Baby " turkeys (" Broilers ") aged twelve to sixteen weeks, weighing 6–10 lb. Any breed can be used, but at this age they lack fat under the skin, unless " finished " with specially prepared rations in conjunction with chemical caponisation, using Vet-jecta paste or pellet implants.

Rearing.—Turkeys are not difficult to rear if given: (i) a correctly balanced diet right from hatching; (ii) plenty of heat under the hover (95° F.); they should be (iii) kept away from all other poultry; and (iv) preferably reared intensively for the first eight weeks.

AMERICAN MAMMOTH BRONZE TURKEY.

The first feed should be placed on a piece of coloured paper laid over the floor under the hover; a scattering of flint grit is also necessary, and the drinking-water must be close at hand. Turkey Starter rations must be kept in front of the poults all day long, and no grain or greenfood should be given for the first eight to ten weeks. By this time they will weigh from 4–6 lb., and their teething troubles will be over, except for diseases such as Blackhead and Coccidiosis. The new drug " Entramin-A " is specific for Blackhead, and Coccidiosis can be controlled by the use of sulpha drugs. A separation of turkey poults from domestic hens commonly avoids serious losses from Worms, Gapes, Fowl Pox, and Blackhead. *See also* Y14.

GEESE.

Few geese are kept commercially, although many farmers keep half a dozen for their own use at Christmas-time. They eat large quantities of grass, and require little extra feeding beyond that which can be supplied by home-grown grains.

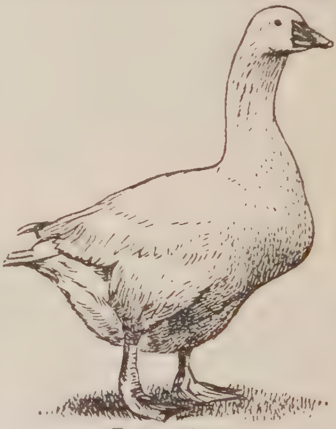
Breeds.—In general, the larger the breed, the smaller the number of eggs laid by the females, thus the Chinese may lay 60 or more eggs, compared with only 20 by the Toulouse. The *Grey and White Chinese* are, however, less popular because, although of attractive external appearance, their flesh is dark, and they are very noisy. Among white-feathered breeds the *Roman* and *Embden* are favoured, as is the grey *Toulouse*; but many farmers prefer a crossbred, *e.g.*, Embden × Toulouse; or Roman × Toulouse. The very rapid growth rate of geese can be seen from the following results at Stoke Mandeville (1954):—

Weeks.	*Chinese.*	*Roman.*
1	8·8 oz.	9·9 oz.
4	3 lb. 1 oz.	4 lb. 5 oz.
8	7 lb. 0 oz.	8 lb. 8 oz.
12	8 lb. 15 oz.	10 lb. 6 oz.
14	9 lb. 6 oz.	11 lb. 12 oz.

Although when mature geese weigh from 15–30 lb., they are much less popular than turkeys, partly because they carry less flesh (on the breast), also because the flavour and colour of the meat is less attractive.

Breeding stock are not chosen until they are 2–3 years old, but they may be used for upwards of 5 years. For light breeds one gander to 4–5 females is practised; for heavy breeds one gander to 2–3 females. Geese often mate for life, and it may be difficult to re-mate them if breeding pens are broken up.

Incubation takes twenty-eight to thirty days, and from ten to twelve eggs may be set under a goose, but an ordinary domestic hen can only take about four—which must be turned daily by hand. They should be sprinkled with warm water during the latter half of the incubation period, because they need more moisture than hen's eggs. Newly hatched goslings can also be brooded rather like



EMBDEN GOOSE.

ducklings, and can be taken off heat at ten days of age. Chick crumbs, freely available with *ad lib.* water, provide their best feed, but by three weeks of age they will be eating grain and grass freely. Rather than give them nothing but grass during the summer months, a small daily feed of " Growers " pellets is recommended. About one month before killing they should be given more pellets, preferably " Poultry Fattener."

Goose feathers are valuable, about 1 lb. being obtained from each mature goose, and they may fetch up to 10*s*. per lb. for the finer types. In Holland geese are plucked twice a year—alive—but this practice is not allowed in this country.

Diseases.—Geese are comparatively disease resistant, and in this country seldom suffer from any epidemics except when they become heavily infested with gizzard worms or coccidia. Goslings require careful management during their first two to three weeks in case of chilling, impactions of the intestines, etc., but from then on they usually make good progress.

POULTRY MORTALITY.

The degree of mortality experienced during the rearing season often gives an indication as to the efficiency of the poultryman and his methods. Providing that there are no actual outbreaks of disease, the following are average figures:—

		Mortality, %.
Chicks	1–8 weeks	5
	9–26 weeks	5
Pullets	6–18 months	10–15
Hens	19–30 months	8–12
Turkeys	1–26 weeks	4–8
Ducks	1–9 weeks	5
Geese	1–4 weeks	2

PREVENTING FEATHER PECKING AND CANNIBALISM.

Apart from attention to management—keeping birds occupied by continuous dry-mash feeding, pecking at greenfood, roots, etc.—there are three main methods used for controlling these vices.

Hen Spectacles.—These are made of plastic or of light-metal alloys and fit snugly over the upper beak so as to cover the eyes in order to interfere with long vision. Thus, a bird fitted with "Dewdrop" spectacles can be expected to see its food but not its neighbours, and therefore Vent Pecking and Cannibalism are prevented.

De-beaking.—De-beaking consists in removing a small portion of the upper beak so that the bird concerned is unable to approximate its two mandibles (upper and lower) accurately. In this way feather pulling is avoided and fighting propensities reduced. It can be carried out at any age, even at day-old, but the younger the bird, the greater the need to carry out de-beaking again in a few weeks' or months' time. The operation can be performed quite successfully by any intelligent poultry farmer who has had the necessary tuition in using a proper de-beaking instrument. This comprises an electrically heated "knife" which cuts through the horny portion of the beak (upper), searing it at the same time, and in this way hæmorrhage is avoided. Day-old broiler chicks are sometimes de-beaked for table-poultry production; laying stock are not generally de-beaked until the time of their entry intc intensive conditions at point-of-lay.

Visors.—Visors made of metal, like hen spectacles, are applied to the bridge of the nose, and are now being popularised for use with turkeys. They are kept in position by means of a split-pin passed through the nostrils. Turkey "*bits*" are equally successful in preventing feather pecking. These consists of a rustless metal ring (incomplete) which lies between the mandibles but above the tongue: its ends are inserted into the nostrils and clipped into position.

Causation.—Boredom combined with bullying, accentuated by intensive conditions of management.

DISEASES OF POULTRY.

It should be remembered that, in the case of some diseases, birds which recover remain as carriers of the causal germs; this applies particularly to B.W.D., Infectious Colds, and certain Salmonella infections. For this reason alone it is wise to purchase all one's stock from one source and not go to two or three suppliers, or there will be two or three chances of introducing infection on to one's premises.

When any birds die they should either be incinerated or buried deeply in lime, but in the case of commercial poultry farmers it is a good plan to have such birds examined *post-mortem* by a veterinary surgeon or some other competent person, who will be able to state from what the bird has died and what steps to take in order to prevent other poultry from catching the same complaint.

Quarantine.—Whenever birds are purchased or brought back from Laying Trials, Shows, etc., it is a good plan to keep them isolated in quarantine for three or four weeks, during which time if they are going to suffer from any infectious disease it should show itself.

Disinfection.—Before attempting to rear chicks always make certain that the brooder house and equipment are thoroughly disinfected. Food and water troughs, hovers, etc., should be scraped and soaked in hot, strong, soda water (½ lb. to a gallon); immersed in a disinfectant (Jeyes Fluid 1 : 100), and finally rinsed in clean, cold water. In this way disease germs and viruses will be destroyed and the equipment rendered quite suitable for future use. In the case of incubators and large intensive or broiler houses fumigation with formaldehyde or sulphur is recommended.

COMMON POULTRY AILMENTS.

Aspergillosis, due to a fungus, causes respiratory symptoms in all species of poultry with gasping as the most prominent symptom; mortality is high. The lungs and air sacs show multiple pale nodules. There is no treatment. Avoid musty hay in chick-boxes; mouldy straw bedding, etc. Sterilise feed and water containers daily. *This disease can be transmitted to man.*

B.W.D. (Pullorum Disease), due to a specific germ, attacks chicks and poults during the first few days after hatching, and mortality is high. White diarrhœa may be evident. The new drug *Furazolidone* ("Neftin") is valuable for treating B.W.D. in chicks and even for eliminating a high percentage of "carriers." B.W.D. is egg transmitted, and all breeding stock should be blood tested each season before use. When hens die from this disease they show degenerate, nodular ovaries from which can be cultivated the causal germ *S. Pullorum.*

Big Liver Disease (Lymphomatosis) is a form of Fowl Paralysis, the liver appearing four to five times as large as normal; the spleen is often enlarged too. Affected pullets often show a scanty, green diarrhœa a short time before death. Believed to be caused by a virus, there is no cure or treatment for Big Liver Disease.

Bumblefoot represents a local infection of the ball of the foot. Usually only one foot is involved, and the site of entrance of the pus-forming bacteria is seen easily. Occasionally the trouble is tuberculous, but more frequently it is due to *cocci* which penetrate to the region of the tendons below the foot, where the pus which they form shows as a marked swelling. Surgical treatment is often successful.

Cloacitis (Vent Gleet) is an inflammation of the vent, commonly seen in pullets; its origin is not clear, but it is certainly not the venereal disease believed in by many farmers. Some cases respond to local treatment, but in many others a stench develops which indicates clearly the unsuccessful nature of the treatment, and such cases are better killed.

Coccidiosis is a specific disease of the intestines affecting chickens, broilers, turkeys, and occasionally ducks and geese. There are two main forms: (i) cæcal, and (ii) intestinal. Both are caused by microscopic parasites—coccidia—whose life cycle takes place in the mucous membrane lining the gut. Affected birds appear listless, ruffled in the feathers, and many die. Acute Cæcal Coccidiosis is characterised by bloody droppings; in the intestinal form diarrhœa may be prominent. In geese the kidneys are frequently attacked. *Treatment* using sulpha drugs is highly effective. Sulphamezathine (I.C.I.), and Embazin (M. & B.) can be given in the feed or water. Each coccidium gives rise to its own immunity, so that a chick having suffered from Cæcal Coccidiosis may be attacked later by one of the other intestinal forms of Coccidiosis. The sulpha drugs mentioned cure the disease and also allow immunity to be developed at the same time.

Coccidiosis Prevention.—Apart from good management practices, the prevention of many outbreaks of coccidiosis is by the inclusion of certain drugs in the feed *continuously at low levels*, *e.g.*, Arzene, Bifuran, Glycamide, Nicarbazin, Nitrofurazone, Nitrophenide, Sulphaquinoxaline, Trithiadol, or Zoalene. These, however, can only neutralise a given number of coccidia, hence the importance of a careful check on feed intake.

Damp litter should be avoided, and ample feed trough space provided or the birds may not eat enough medicated feed to prevent coccidiosis.

Colds may either affect isolated birds or be of a highly infectious nature. Sneezing, coughing, gasping, and a swelling of the face and wattles appear in this disease, which is commonest in growing stock. Sulphathiazole (M. & B. 760) and allied drugs are specific for certain types of infectious colds, and should be given at the earliest opportunity. Persistent cases and those due to pleuro-pneumonia-like organisms (P.P.L.O.) as in Chronic Respiratory Disease (C.R.D.) require to be treated with streptomycin (0·2 gm.), for which a veterinary prescription is required. Mortality is not high, but severe culling is necessary.

Crooked Breastbones occur in young stock receiving improper feeds lacking calcium, vitamin D, etc. Some strains and breeds are more susceptible than others.

Crop Binding is a stoppage of the crop, generally through eating long grass, straw, etc. It never occurs in hen batteries, seldom on deep litter, but be seen in hen yards, and is commonest in birds kept on free range. Good management will avoid most cases, the remainder require surgical treatment.

Diphtheria (*see* **Fowl Pox**).

Dropsy is characterised by an accumulation of fluid in the abdomen. It is often secondary to cancer of the intestines. There is no cure or prevention, and affected stock should be killed and buried or incinerated.

Egg Binding implies an impaction of the oviduct either by yolks or shell-less eggs, etc., or it may refer to cases where a fully shelled egg has failed to be extruded at laying time. The former cases are without treatment, but the latter can be removed by manipulation. Only isolated cases occur, and their prevention is not easy.

Fowl Cholera is a specific disease due to a germ —*P. avicida*—affecting all species of poultry and having a high death-rate. Sometimes there is a swelling of the wattles with local abscess formation. Affected stock suddenly become ill, the birds are dejected, and a number will die overnight. Broad spectrum antibiotics (aureomycin and terramycin) reduce the mortality, but "carriers" may remain.

Fowl Paralysis.—The Fowl Paralysis "complex" comprises cases of leg, wing, neck, and eye paralysis, all due to an infiltration of the parts by an accumulation of abnormal cells. A second form of the disease, characterised by tumour formation, is known as Lymphomatosis, and included in this group is "Big Liver Disease." These diseases, collectively termed the "Avian Leucosis Complex," are all believed to be due to viruses, but there is no cure or any medicinal treatment of value. Many of them are of an infectious nature, spreading amongst young stock during the first few weeks after hatching, but a few cases may be egg transmitted.

The domestic fowl is chiefly affected, frequently pullets at point-of-lay; turkeys are but rarely involved, whilst ducks and geese never suffer from Fowl Paralysis. Some families and breeds are more resistant or susceptible than others, and pedigree breeders are now trying to establish Fowl Paralysis resistant strains. *To minimise the introduction of these diseases, purchase all replacement stock from one source only at day-old.* Rear them as far apart as possible from all other poultry, especially adult layers and manure heaps. Keep them so isolated for as long as practical, certainly 12–16 weeks.

Fowl Pox is due to a virus, and is characterised by wart-like or cheesy growths on the comb, eyelid, face, and wattles. Chicken, turkeys, pigeons, and canaries can all suffer from pox; ducks and geese appear immune. When the mouth or throat are involved the disease is termed *Avian Diphtheria*

Prevention is by the use of vaccines—*Pigeon* Pox Vaccine giving a shorter period of immunity than that following the use of *Fowl* Pox Vaccine. Immunity is established in fourteen days.

Fowl Typhoid is caused by a germ—*S. gallinarum* (closely allied to that of B.W.D.)—and gives rise to symptoms and losses easily to be confused with those of Fowl Cholera, hence the need for expert advice. *Treatment* (curative)—Furazolidone 0·04% for 10 days in the feed. For preventive purposes use 0·01% continuously. New vaccines prepared at Houghton Grange appear valuable.

Gapes is a disease of young chicks aged less than eight weeks, and also of turkeys. Gapeworms cause irritation, gasping, and suffocation. Barium antimonyl tartrate is the best treatment used as an inhalant (powder).

Infectious Bronchitis caused by a virus is becoming important amongst broilers. A respiratory disorder primarily, affected laying stock lay soft-shelled eggs.

Infectious Laryngo Tracheitis (I.L.T.) is a specific, highly infectious, fatal disease affecting fowls. The causal virus first induces "colds," gasping, and the *coughing up of blood*; but numerous deaths follow. Recovered birds are often carriers. There is no treatment. Vaccines are being tried out.

Infectious Synovitis affects broilers aged 6–[illegible] weeks. It is characterised by swollen joints and breast blisters. Aureomycin is the best treatment.

Leg Weakness is a symptom and not a disease. It may be seen in Rickets (chicks); Fowl Paralysis; Layer's Cramp (hens); worms and Coccidiosis; dietetic errors, etc.

Lice (*see* **Parasites**).

Liver Disease is a term used to indicate those diseases characterised by a gross deformity of the liver, *e.g.*, Tuberculosis, Lymphomatosis, internal hæmorrhage from rupture, etc.

Marble Bone Disease affects chickens, revealing enlarged thickened bones, especially in the legs and wings. It is incurable, and there is probably a genetic aspect to the problem, also a virus.

Newcastle Disease (Fowl Pest) is a notifiable disease causing serious losses to the industry, with respiratory and nervous symptoms, nasal discharges, diarrhœa, gasping, twitching, paralysis, and death. One form in adult birds shows only as an infectious type of mild cold (without serious losses)—egg production falls dramatically. There is no cure. Report all suspect cases to the police immediately. Vaccines are being used successfully for preventing this disease in the U.S.A., India, Palestine, etc.

Parasites are divided into: (i) external and (ii) internal. The former comprise lice and mites (common) and fleas (uncommon). Some harm may be caused by their irritation. They can be controlled by the use of D.D.T. (lice), and "Lorexane", nicotine sulphate "Malamite", etc. for mites.

Internal parasites consist of coccidia (*see* Coccidiosis) and worms. The Large Round Worm (Ascaridia) may do harm, but the common cæca worm (½ in. long) rarely causes any trouble; hair-worms in the crop, gizzard, and small intestines are also important. Tapeworms require the presence of an intermediate host (slug, snail, etc.) and may be a serious cause of loss. Flukes are rare, but *Acuaria* may be found in waterfowl.

A new drug Piperazine, given in the feed or water, removes large round worms (Ascaridia) successfully; phenothiazine is used for cæca worms, and tetrachlorethylene for gizzard worm infestations.

Peritonitis refers to an inflammation of the membrane (peritoneum) which lines the abdominal cavity. The commonest form affects laying stock and follows an infection (ascending) of the oviduct. It is seen, too, in certain cases of blood poisoning and also following perforation of the gizzard or intestines. It is usually fatal and not detected before death.

Pneumonia is common as a terminal feature to congestion of the lungs following chilling. It is seen also in Aspergillosis in chicks (Brooder Pneumonia) and B.W.D.; antibiotics (*e.g.*, penicillin) or sulpha drugs can be used for valuable poultry suffering from pneumonia.

Prolapse of the intestines or oviduct results from an eversion of the cloaca and associated parts. The cause varies, but may be of digestive or reproductive origin. Some cases can be corrected if caught early, the parts being anointed and replaced; preferably being held in position for twenty-four hours by a suture. Feed sparingly for two to three days in a darkened room.

Tuberculosis is a specific disease of germ origin, fortunately rapidly becoming eliminated nowadays by the adoption of modern housing practices. It is never seen in young stock, but chiefly affects hens, which lose condition and die. Post-mortem findings are typical, revealing nodules in the liver, spleen, intestines, lungs, bone marrow, etc. There is no curative treatment, but many infected birds can be detected by a blood test (Tuberculin Test).

Tumours are growths of a cancerous nature. They are commonly found in pullets, involving the ovary, lungs, liver, intestines, and kidneys. Some are due to a virus; many show a familial tendency. Very few are capable of being treated, but *Blood Blisters* may respond to cautery, using a caustic pencil or a piece of bluestone rubbed well into the cutaneous cyst.

Vitamin and Mineral Deficiencies are less common to-day, due to the use of specially compounded poultry feeds which include synthetic vitamins A, B_2, D_3, E, K, B_{12}, choline, etc. Cases of Rickets, Curled Toe Paralysis, Dermatitis, and Nutritional Roup are, therefore, becoming rare, and "Slipped hock disease"—of manganese deficiency origin—is often recognised early and treated successfully The ratio between the calcium and phosphorus contents of the diet are important, otherwise leg and bone weaknesses may result.

CULLING POULTRY.

The object of "culling" poultry is to find those which are not paying their way—the duds, the "passengers"—those birds eating a full ration but giving nothing in return.

Culling should be a continuous process, right from hatching time, for there is obviously no sense in keeping even day-old chicks if they are going to be unproductive.

Culling can be considered as both an art and a science, and can be applied for either (*a*) general health, or (*b*) egg production.

Handling Poultry.

Before any accurate examination of birds is possible it is necessary to know how to handle them—how to pick them up so that they remain quiet, as well as the method by which each part is examined in turn. If the poultryman's hand is placed below the bird's breast (with its head turned towards the operator) with the fingers separated so that the little finger and thumb are controlling the bird's two hocks this will be found useful. The other hand is then free to raise the bird's head, to palpate the abdomen or move the feet, etc.

Health and Disease.

The following culling points are important:—

Comb covered by scabs occurs in Fowl Pox.

Eyes loose their colour in Iritis and blindness. The pupil may be "split" or even paralysed.

Face is covered by whitish, powdery scales in Favus.

Nostrils show thick mucus in "Colds."

Mouth contains yellow growths in canker ("Diphtheria") and following injury.

Wattles swell due to the presence of pus, and also in some cases of Fowl Cholera and Coryza.

Wings should be examined for loss of feathers in moulting, bruising, fractures, etc.

Skin shows the presence of blood blisters, wounds, etc.

Breast may be crooked, or affected by a blister, (cyst). *See also* **Infectious Synovitis.**

Vent reveals cases of prolapse, and in Vent Gleet it has a nasty smelling discharge. The vent fluff reveals the presence of lice or their eggs and mites, also diarrhœa and nephritis.

Shanks indicate age, and also the presence of Scaly Leg, and Marble Bone Disease.

Toes may be crooked, twisted or curled.

Toe Nails are short in birds from range (due to scratching) and long in birds from hen batteries.

Foot may be swollen due to Bumblefoot.

Back may reveal impaction of the preen gland at the root of the tail.

Abdomen may be swollen due to tumours, to impacted egg material, liver enlargements, or sometimes full of fluid (dropsy), etc.

Egg Production.

Pullets in production usually show combinations of the following points:—

Head.—Comb large and full blooded, silky Wattles close set—if widely separated this indicates the beefy type, and is due to fat beneath the skin. The eye is set high up in the skull, is prominent and visible from both the front and back of the head. The eyebrow is not overhanging, and the eye fills the socket. The neck is swan-like.

Abdomen shows four fingers' width between the point of the breastbone and the pelvic bones.

Pelvic bones are separated by three fingers' width when most birds are in lay.

In the case of birds out-of-lay the pelvic bones contract, and the breastbone more nearly approaches the vent.

PIGEONS.

Large numbers of pigeons are kept in this country as a hobby, and only a few are reared as table birds. Pigeon racing is a popular sport, but during war or emergency periods they are also used for message carrying, postal services, etc.

Although pigeons belong to the Order *Galliformes*, they are in a different sub-order from that of poultry, and *Columba livia*, the Asiatic Grey Rock Dove, is believed to be one of their main ancestors.

In all their are upwards of 200 breeds of pigeons, but of these the Fantails, Tumblers, and Pouters always attract most attention. The larger breeds for table purposes are Mondains, Runts, Dragoons, and various crossbreds.

Foods and Feeding.—A pigeon's diet should be mixed and consist of seeds, grains, greenfood, and grit. The chief foods used are: peas, especially Tasmanian maple peas; Tick beans; tares (vetches); millet; canary seed; lentils; linseed; and corn of all varieties. When no greenfood or maize is available, and during the winter months particularly, vitamins A and D should be supplied in synthetic form or alternatively as cod-liver oil. Short-beaked breeds are best given small or cracked peas, tares, canary seed, etc. Regular supplies of gravel, granite, or flint grit are necessary, as well as limestone grit, especially during the egg-laying season.

It is fallacious to supply pigeons with flowers of sulphur in the belief that this provides sulphur for the growth of feathers; nor is it necessary to give beans for supplying silica or oyster-shell for iodine. Charcoal is another unnecessary ingredient for pigeons.

The average pigeon eats about 1½–2 oz. of grain daily, the lesser quantity being given to racing pigeons, but during the brooding season a much larger appetite is to be expected when pigeon "milk" is being formed in the crop.

Breeding and Rearing.—Pigeons will breed in any month of the year, but mating naturally takes place in late February or March, and continues to August or September. A second clutch of eggs is often laid before the first brood is fully fledged. The average hen lays seven to eight days after mating—never earlier than the fifth day. Gliding is often a sign of courtship. The hen may sit on the nest three to four days before laying her first egg in the afternoon; the second egg follows about thirty-six hours later. The hen usually sits on them during the night-time, whilst the cock incubates them during the day. The incubation period is seventeen to eighteen days. For normal purposes pigeons can rear half a dozen broods each year, but in order to conserve their energy only one or two should be taken from racing pigeons; it is then also recommended that only one squab per brood is reared. Squabs usually hatch in the morning, never after 3 p.m.

The parent birds brood their young for a full week after hatching, thereafter they may be left uncovered without harm. It is during this first week that identification rings must be put on to the legs of young pigeons. By the end of the second week the young birds will leave their nest; during the whole of this time they live on food regurgitated from the parent's crop. This food is called "*Pigeon's Milk*"; it is the direct result of a hormone (produced by the brain), and is caused by an overgrowth of the lining membrane of the crop which sheds itself as "milk." It is a highly digestible, whitish, semi-solid, granular product passed direct (from either parent) to the mouth of the young squab. It is not a glandular secretion, and to the naked eye looks rather like soaked groats. Early during the brooding period the parent birds "vomit" part-digested grain to their offspring as well as "milk." Foster mothers may be required for Croppers, Pouters, and Short Faced Tumblers, etc. Weaning takes place after three to four weeks, in fact, as soon as the squabs can feed themselves and become independent of their parents. The growth rate and physical development of the young pigeon is quite dramatic from day-old onwards. It is then only covered by brightish yellow, hair-like down, and its skin is devoid of pigment matter. It is extremely weak at this stage, and its eyelids may remain closed for four to five days. By the end of the first week, however, its pigmented quills give it a porcupine-like appearance, and by fifteen days of age the whole bird is covered with feathers. For all practical purposes pigeons are mature by twenty-six days of age, being alert, fully feathered, and typical of the species.

An area devoid of feathers circumscribing the eyelids is known as the "cere"; some breeders pay great attention to this character, but it is really unimportant physiologically. The breast muscles are strongly developed and of deep red colour in contrast with those of poultry. The lining, horny membrane of the gizzard is often coloured green, due to bile; it should always contain insoluble grit for grinding the food. No gall bladder is present, and the cæcal tubes are diminutive. The small intestines are coiled in a spiral fashion. During the mating season the ovary will show only two well-developed egg yolks which, with the large oviduct, occupies almost half the abdominal cavity. Compared with other birds, the heart and lungs are large, especially in racing pigeons. The body temperature registers 107° F. Moulting usually begins in April or May, and it is at this time that the primary flight feathers are lost.

Aviaries and Lofts.—It is usual to build a special pigeon cote for their sleeping, feeding and breeding activities. Such lofts should be white-washed twice a year, and if D.D.T. is added it will help to control flies. A wire-mesh aviary attached to the loft for exercising purposes is common, a minimum of 3 sq. ft. of floor space per bird is recommended, and for fifty pigeons 15 ft. × 12 ft. is satisfactory. For the loft floors sand or sawdust make good litter, but it should be raked over and sifted frequently to remove the bulk of the droppings. Most lofts, nest-boxes, and perches are made of wood, and where space is restricted the nest-boxes can be attached to an outside wall with their entrance direct into the loft. A nesting-box of two compartments separated by a low partition allows the cock bird to take charge of the first brood whilst the hen sits on the second lot of eggs. Nest-boxes should be 14 in. × 14 in. × 28 in. If the front of the nest-box is protected by a 3-in. wooden board, hinged at the bottom, this will help to confine the squabs. An alighting board 4 in. wide in front of each nest is valuable.

Racing and Training.—Young pigeons are generally flying quite satisfactorily by their seventh week, and they should soon be given two exercise flights daily until able to fly for three-quarters of an hour. Before training begins, such young birds must be made to get used to their baskets, followed by "trapping" and learning to recognise their owner's particular call. Consistent light training is better than intensive methods, and should begin when the birds are about four months old, and flights should be extended gradually from three miles to 100 miles as progress is made. Quick trapping to avoid loss of time after races is gained by feeding only inside the loft and by calling the birds through the trap by a whistle or other standard noise. Feeding should always be carried out *after* exercising.

Homing.—Many birds, other than pigeons, have homing instincts, and these are not confined to the brooding season. Homing is an inherited quality of uncertain origin which can be developed by selective methods and directional training. It is now generally considered that the primary sense of orientation is not related to visual landmarks, but navigation as such may be related to the position of the sun. Homing is not affected by radar, and although it has been suggested as due to magnetic influences, the use of Faraday cages has disproved this point.

Homing pigeons may fly at heights up to 6,000 ft., but in poor visibility they will come down to within a few feet of the ground. In thick fog they soon appear to lose their sense of direction and descend until the weather improves, but large numbers of birds are lost annually from this and associated causes.

The method of handling a pigeon is important. It should be held in one hand with the thumb across the back, the fingers and the palm of the hand below the abdomen with the first and second fingers lightly gripping the feet.

Diseases of Pigeons.—Diseases of the digestive system account for more losses than any other. Thread-worm infestations (Capillariasis), coccidiosis, and Trichomoniasis are, however, all amenable to treatment using modern drugs. A veterinary surgeon should be consulted regarding the anthelmintics, sulpha, or nitro drugs to be used. For Salmonellosis (Paratyphoid) furazolidone may prove useful. *Salmonella* infections account for a very large number of deaths, especially in young pigeons, one form of the disease being termed "*Paratyphoid.*" Arthritis sometimes occurs in pigeons, and it too may be associated with *Salmonella* infections.

Many young birds suffer from *Coryza* (cold), and fanciers often associate the chronic form of this disease (Roup) with Pox. *Pigeon Pox* affects mainly the head and eyes, but unlike poultry, many cases do not respond to treatment with tincture of iodine or copper sulphate (1 per cent.). Sudden death (Apoplexy) is sometimes seen in pigeons, but the cause is seldom determined: internal hæmorrhage is associated with many cases. Pigeons can be affected by an important virus disease called *Psittacosis*. Although some cases are transmissable to man, fortunately very few pigeon fanciers suffer from this disease, which is characterised by fever, malaise, and an unusual form of pneumonia. *Aspergillosis* may also be contracted by man from infected pigeons.

Lice and feather *mites* are common external parasites of pigeons, but their control is easy, due to the use of specific remedies, *e.g.*, D.D.T.

Domestic Pets

Feeding, management and diseases of

Domestic Pets

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This section attempts to deal not with all the many hundreds of animals that may be kept as pets, but only with those that are best suited to average homes in Great Britain. The maintenance of monkeys, squirrels, bats, mongooses, and snakes, while quite feasible to those with experience and facilities, requires considerable time and—in some instances—expense. Those who contemplate such exotic pets should consult works of reference, study the methods adopted in zoological gardens, and discuss the matter with experts. Even in the case of the more common animals, the information provided in the following pages is to be regarded only as a beginning, to be supplemented so far as possible by practical experience, discussions with more knowledgeable owners, and the study of more detailed writings.

Certain considerations are basic. Never keep a pet unless you are really interested in it and are prepared to give it due—and regular—care and attention. Don't keep a pet you cannot afford to maintain in health and comfort. Scrupulous attention to cleanliness is essential, and wise feeding is one of the most important factors in avoiding illness and loss of condition.

Since the passing of the Veterinary Surgeons Act of 1948 it is illegal for anyone to practise the diagnosis and treatment of animal diseases unless he or she is: (1) a veterinary surgeon; or (2) a person whose name has been placed on the Supplementary Veterinary Register. (Certain employees of Animal Welfare Societies are specially licensed, but it is intended that in future all animal treatment shall be given by or under the direct supervision of members of the veterinary profession.) Not even a pharmacist may attempt to diagnose or treat an animal. Anyone may, of course, render "first aid," and an owner may—at his or her own risk—apply treatment. It is, of course, a wise precaution to seek veterinary advice for any ailing animal, and the sooner it is sought the more likely it is that good results will follow.

BREEDS AND VARIETIES OF DOGS.

Of recent years, dog-breeding and showing have become specialised occupations, which average people cannot be expected to take up without having adequate time or resources at their disposal. Any amateur who wishes to breed for profit from pedigree animals should most certainly seek expert advice before attempting to do so.

Dogs which are intended for show or for pedigree breeding must be registered with the Kennel Club, 84 Piccadilly, London, W.1. The requisite forms and regulations may be obtained on application to the Secretary.

The breeds of dogs recognised for the purpose of separate Registration and Stud Book entries by the Kennel Club are:—

SPORTING BREEDS.

Afghan Hounds
Besenjis
Basset Hounds
Beagles
Bloodhounds
Borzois
Dachshunds
Deerhounds
Elkhounds
Finnish Spitz
Foxhounds
Greyhounds
Harriers
Irish Wolfhounds
Otterhounds
Salukis
Whippets

Gun-dogs.

English Setters
Gordon Setters
Irish Setters
Pointers
Retrievers
Setters (Cross-bred)
Spaniels

Terriers.

Airedale Terriers
Australian Terriers
Bedlington Terriers
Border Terriers
Bull Terriers
Cairn Terriers
Dandie Dinmont Terriers
Fox Terriers
Irish Terriers
Kerry Blue Terriers
Lakeland Terriers
Manchester Terriers
Norwich Terriers
Scottish Terriers
Sealyham Terriers
Skye Terriers
Staffordshire Bull Terriers
Welsh Terriers
West Highland White Terriers

NON-SPORTING BREEDS.

Alsatians (German Shepherd Dogs)
Boston Terriers
Boxers
Bulldogs
Bull-mastiffs
Chow Chows
Collies
Dalmatians
Dobermann Pinschers
French Bulldogs
Great Danes
Keeshonds
Mastiffs
Newfoundlands
Old English Sheepdogs
Poodles
Pyrenean Mountain Dogs
St. Bernards
Samoyeds
Schipperkes
Schnauzers
Miniature Schnauzers
Shetland Sheepdogs
Shih Tzus
Tibetan Terriers
Welsh Corgis (Cardigan)
Welsh Corgis (Pembroke)

Toys.

Black-and-Tan Terriers (Miniature)
Griffons Bruxellois
Italian Greyhounds
Japanese
King Charles Spaniels
Maltese
Papillons
Pekingese
Pomeranians
Pugs
Yorkshire Terriers

A separate register, called the Breed Register, is kept by the Kennel Club for each breed, except in the cases of the following breeds, for which a separate register is kept for each of the varieties of the breed specified.

Dachshunds.

Long-haired
Smooth-haired
Wire-haired
Miniature (Smooth-haired) not exceeding 11 lb. for exhibition).
Miniature (Long-haired) (not exceeding 11 lb. for exhibition.)

Irish Setters.

Red
White and Red (A.O.V.)

Retrievers.

Curly-coated
Flat-coated
Golden
Labrador
Interbred
Crossbred

Collies.

Rough
Smooth

Spaniels.

Clumber
Cocker
Field
Irish Water
Springer, English
Springer, Welsh
Sussex
Interbred
Crossbred

Bull Terriers.

Bull Terriers
Bull Terriers (Miniature).

Fox Terriers.

Smooth
Wire

Poodles.

Not under 15 in.
Miniature, under 15 in.

Toy Spaniels.

Cavalier King Charles Spaniels.
King Charles Spaniels

The Committee of the Kennel Club has decided to classify those breeds which at present have no separate register, but are included under the heading "Any Other Variety." The classification is as follows:—

HOUNDS.

Dachsbracke
Dachshund Miniature (Wire-haired)
Rhodesian Ridgeback Lion Dog

GUN-DOGS.

Chesapeake Bay Retriever
Kleine Munsterlander
Pointer German Short-haired
Pointer German Long-haired
Pointer German Wire-haired
Pointing Griffon Wire-haired
Setter German Long-haired
Weimaraner

TERRIERS.

Soft-coated Wheaten Terrier
Sydney Silkie

NON-SPORTING.

Bearded Collies
Bouvier de Flandres
Groenendael
Hudky
Leonberger
Lhasa Apso
Maremma Italian Sheep-dog
Norwegian Buhund
Polish Sheepdog
Reisenschnauzer
Tibetan Mastiff
Tibetan Spaniel
Volpino
Wolf Spitz

TOYS.

Chihuahua
Penscher Miniature

In the limited space available it is impossible to describe the special characteristics of the different breeds. The breeds recognised in Great Britain are subject to constant review by the Kennel Club, and it is probable that the number will continue to be added to from time to time.

The dog was probably the first animal to be domesticated in the true sense of the word, and the uses to which he has been put by man are almost legion. Throughout the world dogs are employed to help protect herds and flocks, and indeed the dog trained for shepherding plays an integral part in sheep management. The names Foxhound, Deerhound, and Otterhound all indicate the specific uses to which dogs have been put in the Chase. Greyhounds and Whippets are used in coursing, and work singly or in pairs, rather than in packs. As their names indicate, the various Setters and Pointers are employed to indicate the exact whereabouts of game, and Spaniels also are widely used as gun-dogs. The other uses to which dogs have been put in field sports include hunting over rough and difficult country by small terriers, and going to earth to kill or hold badgers, foxes, and otters. Fox Terriers, Dachshunds, Dandie Dinmonts, and Scottish Terriers are among the types which have been so employed. Dogs have played their part also in entertainment: thus there are performing dogs, notably the Poodle, and racing Whippets and Greyhounds, while in former times various types of fighting, including the baiting of bulls by Bulldogs, were to be seen. The use of sledge-dogs is well known, while in Belgium and elsewhere dogs were at one time widely used as traction animals. In coaching days, the Dalmatian was a carriage dog, and modern scientists have recently suggested, as a result of experiments, that the position under or behind a coach which a Dalmatian automatically takes is determined by heredity! Perhaps the most exacting use to which man has ever put dog was in China, where the Chow-Chow was once maintained as a source of meat and fur! In Portugal, fishermen employ a race of dog to accompany their fleets. The dogs in question (Portuguese Water Dogs) will dive into the sea to retrieve a broken net or an escaped fish, and will even swim from one smack to another to convey messages! In New Guinea native dogs act as scavengers, while in various countries on the Continent of Europe "truffle dogs" are employed to locate the fungi known as truffles, relished as a table delicacy.

The above paragraph is far from exhaustive, and for those who wish to know more of the characteristics of the different varieties of dogs, reference should be made to such volumes as *Book of the Dog* by Brian Vesey-Fitzgerald (2 guineas) or *Working Dogs of the World* by C. L. B. Hubbard (16*s*.). For general guidance on dog management, see *The Right Way to Keep Dogs* by R. C. G. Hancock (5*s*.).

For present purposes it is, however, as a pet or companion that we are considering the dog, and it must be agreed that many of the most successful animals for this purpose are cross-breeds or "mongrels." There are many fallacies or unsubstantiated generalisations regarding the relative merits of pure-breds and mongrels. This is in fact an intricate scientific problem, and probably the simplest way of summarising the true position would be to say that, from the point of view of health and temperament, there are good, bad, and indifferent specimens among pure-bred and cross-bred animals. It is true that within a breed (or within a local community of mongrels for that matter) certain weaknesses or undesirable traits may arise from hereditary defects.

It may be noted that the word "dog" is applied to the whole species, although it is used also to denote the male as opposed to the female, for which the correct term is "bitch." Young animals are referred to as "dog puppies" or 'bitch puppies" respectively. A male animal employed regularly for breeding is known as a "stud dog," and the corresponding female as a "brood bitch." In hunting circles the Foxhound is referred to as a "hound," and the term dog and bitch are employed only as prefixes to denote the sex.

CHOICE OF DOG.

However attractive the idea of keeping a dog may be, it is unwise and unkind to purchase or to accept one without very careful consideration. Dogs require regular feeding, grooming, and exercise and, if they are to be allowed to show their full capabilities, constant companionship and attention. Nothing is more pathetic than the unwanted dog, which may have been purchased because of a passing whim, and with which no one appears to have the courage to part. If, on the other hand, one is prepared to give all the necessary time and trouble to the proper care of the dog, the reward will be ample.

The size of the choice is important. Many people keep dogs which are far too large for their houses and for their purses. The smaller the dog, the less food, exercise, and house-room will he need, and the many varieties of terrier provide a range from which suitable choices for most households may be made. In any event, a very large dog should not be chosen unless expert advice has been taken about his feeding and other requirements.

Household dogs of six months of age or over must be licensed. Licences may be obtained from any post office.

MANAGEMENT OF THE DOG.

Accommodation.—Up till comparatively recently most dogs were kennelled down out of doors. This practice has its advantages, but to-day the majority of pet dogs are allowed more or less the run of the house. A warm sleeping-place, such as a box or basket, should be provided, and should contain removable bedding. Newspaper is an excellent non-conductor of heat. It is a very useful material to place at the bottom of a dog's box; and on two or three thicknesses may be placed a rug or blanket on which the animal may lie. It is astonishing the amount of grit and dust a dog can bring into a house on his limbs and the lower part of his body. His bedding will require frequent shaking out and renewal, and paper is easily changed. The box or basket in which the dog lies should be allowed a place free from draughts, and requires airing daily when the dog leaves its bed in the morning. Wood-wool makes excellent bedding in outhouses or where a special structure is provided by way of dog-kennel, but is inclined to be messy about the house, as a dog will draw portions of it about the room as he leaves his bed. If straw is used, it is best stuffed into a sack and made into a kind of mattress. An odd piece of linoleum forms an excellent foundation to the dog's sleeping-box or kennel; it does not strike cold to the skin, is a slow conductor of heat, and has the advantage of being easily kept clean, particularly during illness, when there may be discharges and messes to be frequently cleaned up, until the animal can once more go out of doors.

Exercise.—Every dog should be exercised regularly, but there is no need to over-exercise,

and the practice of allowing a dog (other than a large and athletic animal) to run behind a bicycle for mile after mile cannot be too strongly deprecated. Two or three fairly short walks a day are sufficient for a small terrier, always provided that there is a garden in which he can play on fine days and some open space where he can run freely for a short time. While still in the puppyhood stages, a dog should be trained to walk to heel and to beware of traffic. Even so, it is usually safer to put him on a lead in busy thoroughfares. One point which, to the annoyance of the public, many dog-owners fail to realise, is that their animals would show much less tendency to fight if allowed to investigate one another off the lead. A dog naturally feels aggressive if put on the lead immediately a rival hails in sight. There are, of course, certain dogs which attack others at sight; these are a public nuisance, and should never be allowed loose on the streets.

The practice of allowing a dog to take his own exercise is to be deprecated, especially in towns and suburbs. The animal will be tempted to sniff into dustbins, and, if a male, will tend to follow a bitch in season or to take part in the unsavoury "dog parties" which are so often to be seen. Furthermore, such an animal is usually responsible for the disgusting habit of fouling the pavements and gateways. In this connection, it should be emphasised that dogs may quite easily be trained to defæcate in the gutter, or on the grass verge, and so avoid contamination of the pavement or carriage-way. In some districts owners are liable to a fine if their dogs foul the pavement.

Training.—Patience combined with the gift of putting yourself in the dog's place is the chief requisite for successful education. It is most important to encourage regularity of habit, as an animal will obviously learn very much more quickly if his daily walks, meals, and grooming take place at fairly constant times. A quiet firmness is the ideal method, and a puppy should learn early that a command *is* a command, and must be obeyed. There is no need to shout and make an exhibition of oneself, or to race in circles after a disobedient puppy; if these things are done, the animal will never become so well trained as it otherwise would. Again, it is rather ridiculous to chastise a puppy *after* he has somewhat belatedly decided to come to heel; quite obviously, he will then be liable to think that he has done wrong in actually coming to heel. Whatever happens, it must never be that the dog becomes master; there is no more unbecoming sight than that of a person with a frankly disobedient dog, and if the animal be large and powerful it may prove a menace to its owner and to the public.

Puppies should be house-trained at an early stage. If care and thought are given to the matter, the animal will soon learn not to make messes in the house. However, it is very stupid to forget all about a puppy or dog for many hours, and then, out of sheer vexation, chastise it for having made a mess. If puppies are let out every two hours or so at first, they will soon learn not to make a mess. Encourage them for performing in the right place rather than scold them for doing so in the wrong one. Physical punishment should be administered only where strictly necessary, and then in a sensible fashion. The most effective method is to grasp the dog or puppy by the skin of its neck and to shake it.

Grooming and Washing.—Whilst short-haired breeds need little or no attention to the coat, bar an occasional brisk rub down with a brush or rough towel (which incidentally puts a pleasant gloss on the smooth-haired breeds), yet with the long-haired breeds grooming should be carried out regularly, and if the habit is made a daily one it will not be forgotten so readily. Nearly all dogs love this procedure, and most dogs will actually ask for their daily groom by jumping on the table or bench on which it is carried out. Steel combs and brushes are sold by many shops, principally corn chandlers, though some store chemists also provide a suitable range of grooming kit for all breeds. There is a curious fetish current among many breeders that dogs should not be washed. There is no reason why, with a few simple precautions, a dog should not be washed whenever it is socially necessary. The first precaution is to use a soap that does not contain an excess of soda. The strong washing-up soaps, excellent as they are for certain purposes, are too irritant for a dog's skin. While some of the toilet soaps suitable for human use may be employed for dogs, the special dog soaps and shampoos are much better for the purpose. They are more suited to the dog's skin and coat, and have better detergent properties. It is important not to have water that is too hot—as with a baby's bath, it should be possible to dip the point of one's elbow into the water and find that it gives a pleasantly warm sensation but is easily bearable, *i.e.*, it should not be above 95–100° F. On emerging from a bath a dog will shake himself thoroughly, and then, if not curbed, will roll on the floor or ground and speedily cover himself with dust or dirt! It is therefore necessary to give him a brisk rub down with old (but clean) towelling, whereupon he may be allowed to dry off in a warm place free from draughts or, in good weather, put on a lead and taken for a brisk walk. In the case of many of the long-coated breeds it is customary to have them trimmed at the beginning of summer, and this is a sensible precaution that may avoid a good deal of distress during hot weather. The smaller long-haired dogs in particular, such as Scottish Terriers, suffer unduly from the heat if their coats are grown too long.

FEEDING OF THE DOG.

Meat, usually beef, is generally regarded as the staple article of the dog's diet. It must be pointed out, however, that although the dog is naturally a carnivore (flesh-eater), ordinary meat (muscle or "flesh") is not a completely adequate diet, and lacks certain factors which the wild dog would find in the blood, bones, liver, and other organs of his prey. Furthermore, it has been proved scientifically that dogs can thrive on a meatless diet. In spite of these reservations, however, meat must be regarded as an excellent article of food, and if properly supplemented will prove very satisfactory. In recommendations which have recently been made in America (Dr S. R. Speelman, of the U.S. Department of Agriculture) it is suggested that meat (beef, lamb, mutton, or horseflesh, providing that the last is fed regularly and not spasmodically) or meat substitutes (fish, milk, eggs, etc.) should constitute one-half of the daily ration, and that the remainder should comprise approximately equal parts of cereal substances (bread, biscuits) and of vegetables (carrots, spinach, onion, beet, etc.) It is pointed out that many dogs do not accept the vegetable material readily. On this basis, the approximate quantities of food required by adult dogs have been calculated as follows:—

Weight of dog.	*Total food per day.*
1 lb.	2 oz.
10 lb.	12 oz.
25 lb.	1½ lb.
50 lb.	2 lb.
75 lb.	3½ lb.
100 lb.	4¼ lb.
150 lb.	5¼ lb.
225 lb.	7 lb.

(Weights of up to 10 lb. would include the toy breeds, 25 lb. would correspond to a Fox Terrier, Airedale Terriers and Retrievers would fall into the 50–75-lb. class, and the larger weights would be those of the very big breeds, such as the St Bernard.) The quantities given are, of course, an *approximation* and no more. Dogs which lead a very active life will require more, while those which take little exercise, or which tend to put on fat easily, will require less. Common sense is necessary, and great care must be taken not to over-feed or to under-nourish.

Meat is probably best fed raw, or lightly cooked, but many animals appear to have a preference (probably through habit) for well-cooked meat. In any event, the meat should not be "overdone," as there is substantial evidence that prolonged heating destroys much of the food value of the meat protein. *Fish* is an excellent substitute. There need be no anxiety about the greed with which a dog swallows lumps of meat and also neglects to masticate them. The teeth of the dog are for tearing meat, he is not concerned

with biting his food up small; indeed, his salivary glands contain no digestive ferments, as is the case with some other animals.

Milk is almost essential during pregnancy and lactation (see below), and may well be included in normal dietaries. Whether or not *bones* should be fed is a matter which has been hotly debated, but for mature household dogs the evidence suggests that they are unnecessary. (The teeth of racing greyhounds, which receive a "sloppy" diet, are quite as good as those of the average household dog.) Bone-feeding is responsible for much trouble, including constipation, actual impaction of the rectum, and lodgement of pieces of bone in the mouth or throat. The value of bones is, of course, that they contain large quantities of essential mineral substances, and for this reason the inclusion in the diet of bone-meal, or of steamed *bone-flour*, or, preferably, a mineral supplement, is recommended. Only very small quantities of these substances are required.

Bread is an article of food which is often overlooked in the case of the dog, but there is no doubt that wholemeal bread is very suitable indeed, provided it is not fed to excess.

The answer to the question whether a dog requires vegetables is, in the main, no. From the Vitamin C standpoint they are quite unnecessary, since it has been shown that a dog manufactures this vitamin for itself, but the fact remains that many dogs, particularly of the toy variety, enjoy a few slices of banana or apple, and there is no harm in letting them pander to their taste. Vegetables do help, however, to provide roughage, and cooked (*not* raw) *potatoes* may be used in place of bread or biscuits. The dog—like many other animals—cannot digest raw starch properly. *Flaked maize* and *oatmeal* are other substitutes, but it must be remembered that the energy value of maize is high and that the dogs must never be overfed. *Dog biscuits* are an item that were long in disfavour with some professional people on account of their often having been made from agenised white flour (see section on Canine Hysteria), but now that this factor has been overcome, and the biscuits themselves are being improved in other ways, their use for the non-meat portion of the diet may be recommended.

Clean fresh *water* must be provided at all times.

In addition to the diets recommended above, there are on the market several tinned dog foods which claim to be complete, or almost complete, diets for the dog. It must be said that many dogs (including those of the writer) have remained in excellent health when receiving one of these foods as a large part of the diet over long periods. There is, therefore, little that may be said against the widespread use of the better varieties of such products. Again, it is a matter for common sense; if an owner finds that his animal is thriving on such a diet, he is wise to continue to use it.

It is customary to give dogs two meals a day. There is no need to give more than two to healthy adults, for the dog's stomach is exceedingly capacious and adapted to long gaps between meals. Many dogs thrive on only one meal in twenty-four hours. Whatever plan is decided on, regularity should be adhered to, and a meal or meals given at the same times every day. Dogs require vitamins A and D and B complex. There are several ways of administering these, but the special commercial preparations, including the modern form of condition-powder tablet, are the most convenient.

The *pregnant* and *lactating bitch* require special consideration. The food requirements are very much increased in a bitch which is carrying puppies, especially towards the end of the period. Normally, appetite is not a complete guide to a dog's food requirements, but in pregnancy and lactation the bitch must not be allowed to go hungry. It is quite normal for a heavily pregnant bitch to require over one and a half times her normal amount of food, and in lactation her requirements will increase still further. Milk is a most excellent article of diet at this time; indeed, there is no better way (apart from commercial preparations) of replacing the milk which the bitch is giving to her own puppies.

Up to the age of three weeks or so, *puppies* need have mother's milk only, but at any time after this it is a sound policy to give them additional food, and so spare the mother and also render weaning (at from six to eight weeks) a *gradual* process. At first a little cow's milk or one of the commercial "dog-milk" preparations may be given, and gradually the puppies should be encouraged to eat solid food. Eggs (if they can be spared), wholemeal bread in milk, or even finely minced meat may be given, at first in very small amounts but later in larger quantities. If this process is carefully carried out, there will be far less trouble at and after weaning time. After weaning, puppies should receive five or six meals a day, and this number may be cut down gradually until two or three only are given to the fully grown dog. (The smaller breeds are fully grown at about a year.) *More* meat or meat substitutes and milk, and *less* cereal or vegetable matter, should be fed to the growing dog as compared with the adult. This fact is important, as the substances present in meat and milk are required for laying down the growing tissues. Nevertheless, the energy portion of the ration is important, and the cereal or vegetable should be nutritious and not fibrous. It is possible to rear puppies by hand from birth if the bitch for any reason should die. It requires great patience for the first two or three weeks, as naturally the puppies will require feeding once or twice during the night. Special milks for puppies are to be recommended. Cow's milk requires enriching with fat and sugar to approximate to the composition of bitch's milk. Feeding will have to be done at every two or three hours, and a very useful gadget is a fountain-pen filler attached to cycle-valve tubing. Very small quantities are required for the first two or three days, and a level teaspoonful of milk is more than sufficient for the average terrier at first. Even with the best care in the world hand-fed puppies tend to be weaklings and do not grow as fast as those naturally fed. A foster bitch, if obtainable, is much to be preferred.

BREEDING OF DOGS.

It is natural for adult dogs of both sexes to wish to breed, and in the case of the female especially it is an excellent thing if one can arrange for a suitable mating to take place. Bitches come "into season" or "on heat" (lay terms for œstrus) at approximately six-monthly intervals, but it is not advisable to breed from the first season which occurs usually at about eight to nine months of age, but over a wide range of age according to breed and other factors. The periods of season often occur between January and March and in early Autumn, but there is no fixed rule. Each season lasts for three weeks. For the first seven days, approximately (pro-œstrus), a bitch does not permit mating, though during this time she is a source of strong attraction to all males in the neighbourhood. At about the seventh to the tenth day the blood-stained discharge, which ushers in the heat, stops; this is usually taken by the breeder as an indication that the bitch will stand to service. If possible, it is always better when puppies are wanted to allow mating to occur more than once. Under natural conditions a dog and bitch are usually strictly monogamous and mate for life, and during the period of œstrus will mate many times. A dog and bitch that are kept together all the time will probably behave naturally, but under domestication both dogs and bitches usually become promiscuous. Many bitches will in fact accept service from different males on different days, and the phenomenon of superfecundation, *i.e.*, the production of a litter that is fathered by *two* males, may occur. It is therefore wise to retain strict control of the bitch throughout the whole of the three weeks or so she is in season. At the end of season the bitch passes into a state of "metœstrus" if she has not conceived.

If a bitch conceives, she carries her puppies for a period of about nine weeks. There is, however, a normal variation of fifty-eight to seventy days, and puppies born before the fifty-eighth day sometimes live. The number of puppies born varies with breed; in the smaller terriers it is usually from four to six, but in Airedales and Alsatians the number may be eight to ten, and the larger breeds tend to have even more offspring at a time. Birth usually takes place fairly easily in the larger breeds, but there is often much

difficulty in the case of the short-legged breeds, such as Scottish and Sealyham Terriers, Pekingese and Dachshunds. In some breeds, in fact, the problem is one that is giving serious concern to veterinary surgeons and breeders.

A short while before her puppies are due, a bitch will "make her bed." Owners are often amazed at the destruction of soft furnishings, or even of wall-paper, that a previously well-behaved bitch may carry out at this time; it is therefore by far the best to provide a suitable box (if the animal has not one already). A smooth flooring such as a strip of linoleum serves for the bitch to give birth to her puppies. Her instinct to tear up everything given to her for bedding may lead to suffocation of the puppies by pieces of bedding. Provided labour occurs in a warm room, it is sometimes better—according to the temperament of the bitch—to remove each puppy as it is born, placing a warm bottle underneath, and bring it back to the mother when the last birth has occurred. At this time the bitch should be watched carefully for any discharge from the vulva or for any evidence of straining. If either of these occurs without results, it is advisable to send for help as early as possible, especially in the case of the smaller breeds. Many hundreds of bitches are lost through neglect at this time, and usually because it was not suspected that anything was wrong. If the discharge becomes bloody, or green, help should be obtained *at once* if no puppy is delivered. Similarly, any great delay between births is a matter for concern. The afterbirth usually follows the puppy within a few minutes, but puppies are sometimes delivered in their fœtal membranes, and in this case the latter should be gently but quickly removed. It is quite normal for the umbilical cord to remain attached to the puppy, but the bitch will normally break it by biting through it.

The mother will wash and attend to the new born puppies, and after the last is born it is a good idea to burn all the mess and to provide clean newspaper, but do not worry or frighten the bitch more than is necessary. For the care and feeding of the bitch and her puppies see the sections on Management and Feeding. Puppies, like kittens, are born with their eyes closed, but open them after about nine days—there again being considerable variation.

The phenomenon of pseudopregnancy is common in bitches, and indeed to a minor degree it is probably present in most bitches following an œstrus without conception. In some bitches, however, presumably those with strong maternal drives, the changes in the ovary may be accompanied by external signs of "phantom" or "ghost" pregnancy. These may include not only enlargement but actual functioning of the mammary glands, and the making of a "nest" by the bitch just as if her puppies were really due. The average duration of pseudopregnancy is usually given as about two months, and although variable, it is often sufficiently near to the correct time after œstrus that everyone suspects the bitch to be truly pregnant. The condition may be suppressed with the aid of modern drugs, but in some instances it is not realised that the condition is not real. In many cases only professional advice can solve the mystery, and radiographical examinations have often proved necessary to ascertain the truth, particularly in fat bitches of the heavier breeds. It might be well to note, at this point, that there is another condition of the older bitch that is known as *Pyometra*. This condition usually reveals itself at the same time as the ghost pregnancy (and is sometimes a pathological extension of it) but is accompanied by considerable disturbance of health, coupled in many instances with purulent discharge from the vagina. A bitch which is off-colour in the weeks following pregnancy, or which develops a discharge from the vulva (especially one which is dark in colour), may well be a pyometra subject. The disease is most serious, and often requires surgical intervention. As the best chance of success is to operate or otherwise deal with early, a veterinary surgeon should be consulted immediately.

DISEASES AND INJURIES OF THE DOG.

Canine Distemper and "Para-distemper" (Including so-called "Hard-pad").—It has long been recognised that the commonest and most serious disease of dogs throughout the world is canine distemper. Dogs of all ages and breeds are susceptible, and no dog is free from the risk of infection unless it has recovered from the disease or has acquired an immunity for other reasons. (For a definition of "immunity," see Medical Dictionary.) The disease is caused primarily by a minute agent known as a filterable virus (see definition of "viruses" in Medical Dictionary), which may be of varying type in that it will attack the body in different ways. Thus some strains of the virus are known as "neurotropic" because they show an affinity for the nervous system. Sometimes a dog will apparently recover from an attack of distemper, only to succumb later to "fits" or other nervous manifestations due to permanent damage to the central nervous system by the virus. Often, however, the virus is not fatal in itself, but will lower the dog's resistance and permit the entry or the activity of bacteria that may lead to pneumonia or other serious effects. These so-called "secondary invaders," as the bacteria are termed, may prove as harmful as the original virus. Indeed, once these bacteria have set to work it is too late to expect the best results from the use of serum, and whether or not the dog will live through will depend upon the severity of the attack, the dog's powers of resistance, and good nursing. It is therefore most important either to prevent the disease by vaccination or to be able to send for veterinary attention (and hence for an injection of serum) *immediately* an attack is suspected. Any puppy which is listless or off its food, or which may throw a fit, or which is obviously unwell with other symptoms (*e.g.*, cough or diarrhœa) may well be in the early stages of distemper, and it is *then* (not the next day) that help should be sought. Many thousands of puppies (and older dogs) that have been injected with serum in the early stages of the disease have become perfectly normal within forty-eight hours. On the other hand, the number of dogs that die in Great Britain alone from distemper and distemper-like infections must assume enormous proportions. Distemper is a highly infectious disease, and it is important that the owner of an infected animal should do his best to avoid contact with other dogs, ferrets, or mink. Ferrets and mink are very susceptible to canine distemper. On the other hand, human beings and cats are *not* susceptible to canine distemper, and the so-called distemper of cats is quite a distinct disease.

A highly satisfactory means of vaccinating puppies against distemper was worked out about 1926–30, and this—named the "Laidlaw–Dunkin" after its two inventors—has since afforded protection to thousands of animals. Vaccination consists either of the "vaccine-virus" method, in which a vaccine (see Medical Dictionary) is injected first, followed usually after about fourteen days by an injection of the virus, or of the "serum-simultaneous" or "serum-virus" method, in which a puppy receives two injections on the same day, one of virus and one of serum. Other means of conferring immunity have since been developed, including the injection of modified virus, *i.e.*, virus that has lost its power to produce disease but has not lost its power to call forth the antibodies that protect against the infection. A suitable modified virus is now grown on developing egg embryos.

There have, from time to time, been reports of "breakdowns" in dogs vaccinated against distemper. Sometimes these may have been due to the fact that the organisms that act as "secondary invaders" in distemper may sometimes set up disease on their own account should resistance be lowered from other causes. It has become increasingly realised, however, that many such breakdowns were due to an infection which, while closely similar to canine distemper—and in all probability a variant of it—was sufficiently different not to be controlled by the antibodies to ordinary canine distemper. From the fact that one of the features often seen in such cases was the presence of corn-like lesions on the pads of the feet, this infection has been termed "*hard-pad*." The term is not really very suitable, for hard pads are not a constant feature and do not appear until the disease has been active for some days. The earliest symptoms are often nervous in character.

"Hard-pad" can, of course, attack unvaccinated as well as vaccinated dogs of almost all ages and since the war it has probably been more common in Great Britain than "ordinary" forms of distemper. A suitable method of vaccinating puppies is now available for use against both the forms of distemper, *i.e.*, protection is afforded against the "hard-pad" as well as the other type. This vaccine, prepared from virus grown on the developing egg enbryo, is now widely employed in place of the "Laidlaw–Dunkin" methods described above.

Rubarth's Disease.—Another virus disease of dogs (and foxes) is known as Rubarth's disease, after one of its discoverers, or sometimes as infectious hepatitis. This disease has been recognised in Sweden ever since the 1930s, but in Great Britain only since the end of the war. The condition is extremely sudden in onset, and an affected dog may be found dead. Many cases are, however, mild, and in some instances only one or two out of a large group of dogs have been affected. The changes seen after death vary, but the findings in the liver cells are usually characteristic. Specific treatment is not yet established as in the case of the distemper-like conditions, although the administration of antibiotics (see Medical Dictionary) may prevent the effects of secondary infection.

Canine Hysteria (called "fright disease" or "running fits" in the U.S.A.) is an alarming but not necessarily serious condition (in that it can often be cured very readily) which appears to arise from a variety of exciting causes. The affected animal rushes around wildly, often screaming and howling, and obviously loses all sense of whereabouts or ability to recognise people. After a more severe attack (and there are all degrees up to a full epileptiform fit) the dog may appear quite exhausted, but returns to normal. Sometimes there are many attacks in one day. The dog will not wilfully attack people during a bout of hysteria—at least, that has been the experience of the writer—but is very difficult to control. Apart from ensuring that the dog does itself no grievous bodily harm, there is little that can be done until the attack has subsided. Then the animal should be kept as quiet as possible and given a sedative such as potassium bromide, of from 10 to 60 gm. (*i.e.*, from two to twelve 5-grain tablets), pending veterinary attention.

Hysteria may be an hereditary taint, derived from one or other parent. In certain circumstances, however, it may arise in apparently normal animals. There are several possible causes (including parasites), but a definite one is the bleaching agent—nitrogen trichloride or "agene"—employed for some years in the manufacture of flour, and hence present in white bread and certain dog biscuits. Indeed, the clear demonstration that agene could set up hysteria in dogs, and subsequent scientific work, has led to the introduction of regulations that have led to its abandonment as a bleaching agent in favour of other methods which have been found not to cause hysteria. There has already been a marked decline in the incidence of hysteria due to dietary factors.

Rabies is a fatal disease of dogs, and is also due to a "filterable virus." It is transmissible to the human being and to many other species, but has fortunately been absent from Great Britain for many years. Stringent precautions are taken to prevent its entry, and dogs which are brought into Great Britain must spend a long period in quarantine.

Tonsilitis appears quite frequently in dogs, and seems in many cases to be part of a more generalised infection. It demands expert treatment, but although it may persist for a long time, it usually yields to treatment.

Nephritis.—Inflammation of the kidneys is unfortunately all too common in dogs, and in adult males in particular there is a high incidence of chronic kidney damage. One of the symptoms is a marked thirst. Sometimes this condition is a sequel to an infection known as *leptospirosis*, which calls for prompt veterinary treatment if death or permanent damage is not to follow. It is always worth while seeking professional advice for a dog that drinks excessively or has a somewhat characteristic type of bad breath.

Anal Glands, which are found in the dog and in other carnivora, often give rise to trouble. Animals which "rub themselves along the ground" are not necessarily affected with "worms," but with impaction of these two little glands, which are situated one on each side of the anus. They secrete a peculiar dark-coloured, very offensive fluid, which sometimes is not discharged properly and causes the animal great discomfort. The glands in such cases should be relieved periodically. Those who do not mind this somewhat dirty task may perhaps learn how to do it themselves. Occasionally, segments of tapeworm are responsible for the impaction, but usually the trouble has nothing to do with worms. Whenever a dog pays considerable attention to his anus, this impaction should be suspected. Actual infection of the glands is also fairly common, and demands expert attention.

Diseases of the Ear, especially of the outer ear, are very common in dogs. The dog's outer ear is somewhat more complicated than is our own, and the drum is set more deeply. Hence it is easy for wax and dirt to accumulate, for various parasites to establish themselves, and for inflammatory conditions to result. The word "canker" (which has no precise scientific meaning) is sometimes applied by lay people to the more serious or chronic forms of inflammation of the outer ear canal. It is not difficult to diagnose "ear trouble," as the affected animal usually shakes its head or worries or scratches its ear and rubs it along the ground. The ears should be inspected regularly to see that there is no great accumulation of wax or dirt. Cotton-wool twisted on to the end of a match-stick or orange-stick is quite satisfactory for cleaning out the ear, providing care is taken. A dog which is continually worrying its ear, or which has ears which are obviously diseased, should not be neglected, as the sooner expert treatment is begun the more readily will the condition be cured. Even if the lining of the ear is greatly thickened through inflammatory reaction, and the lumen nearly occluded, it is still possible for a plastic operation to be performed. Many hundreds of such cases have been successfully treated in this way. A considerable percentage of inflammatory conditions of the outer ear is associated with ear mange mites. A considerable proportion—possibly 50 per cent—of cases in dogs in Great Britain has a parasitic origin. In such an event treatment with modern anti-mange preparations should be carried out.

Deafness in certain white dogs (*e.g.*, in some Bull Terriers) appears to be hereditary, and is quite incurable. Old dogs often become deaf, and deafness has been produced experimentally in young puppies by feeding them on a deficient diet.

Diseases of the Eye are very common in dogs, and are often the result of injury. Except for minor discharges from the corners of their eyes (and in younger dogs especially it must be ascertained that these are not a symptom of distemper or secondary infection) any eye disease is sufficiently serious to merit professional advice. Boracic lotion is not suitable for the eyes of dogs. It is slightly irritant, and dogs are apt to scratch and make the eyes raw after application. Colloidal silver eye lotions and ointments are far more suitable pending the advice of a veterinary surgeon. In eye inflammation avoid sunlight and wind. For some days in the early stages of inflamed eyes, the light in the room should be subdued. Pekingese seem to be especially prone to eye disease, but the remarkably unwholesome appearance of some affected eyes in this breed is not necessarily evidence that recovery is unlikely.

Steps should be taken to ensure that the dog does not inflict further injury on an already diseased eye. Cat scratches are a frequent source of inflammatory conditions of the dog's eye. Eyes must never be neglected, for the consequences are serious.

Skin Diseases are common in dogs, and may be contagious—as they are in the majority of instances—or non-contagious. Apart from the inflammation of the skin that occurs in spring and autumn, during the shedding of the winter and summer coats respectively, by far the commonest cause of diseases are the skin parasites: fleas, lice, and mange mites. Owners are often horrified to learn that their dogs are infested with these creatures, and in a few cases filthy home surroundings will lead to the dog being infested with the human kind of flea. Far more often he has his own particular variety of flea, and there need be no shame on the part of the owner. Moreover, many fleas, such as those of the rabbit, the rat, and the hedgehog, will transfer themselves to the domestic dog during his peregrinations. Treatment of these parasitic diseases has been revolutionised in these last few years by the use of D.D.T., benzene hexachloride (Gammexane) and other modern preparations. Apart from those obvious infestations of fleas and lice, skin complaints of a persistent nature, of which the cause is not obvious, should be placed in the hands of a veterinary surgeon.

Diseases of the Teeth and Gums are very common in household dogs. A serious systemic disease, such as distemper, may leave the enamel of the teeth permanently pitted, hence "distemper teeth." More serious than this, however, is a form of pyorrhœa, which is really a disease of the gums rather than a primary disease of the teeth themselves. The margins of the gums become red and swollen, and may bleed easily. As the condition progresses the teeth may become loosened. Particles of food become lodged between the teeth or between teeth and gums, and add to the inflammation and to the smell of the breath.

This disease may, if unchecked, become very serious. In many cases extraction of one or more teeth is indicated, but unfortunately it is not always possible to do this. The condition demands expert attention.

Another common condition of dogs' teeth is the deposition around them of "tartar." This should be removed by scaling or by special use of dental forceps. Some breeders and others may themselves have learnt how to carry out these operations with the requisite skill and care, but they are not easy to the amateur, and it is essential that no harm be done to the animal's soft tissues by injudicious use of the instruments. Ordinary dog-owners are strongly advised to take their dogs to a veterinary surgeon in order to have the "tartar" removed.

Most puppies lose their first or "milk" teeth quite regularly between the ages of three and five months, but sometimes there is difficulty and the primary teeth are not shed properly. These cases should be treated by a veterinary surgeon before the permanent teeth are thrown out of their proper alignment.

One hears very much about "teething fits" in puppies, and while these occur, owners should be *very* careful to ensure that a "teething fit" is not a sign of distemper, which often starts with a fit. As puppies of this age are so susceptible to distemper, it is advisable to seek professional advice should any form of fit occur. It may save much time, money, and trouble, and even the animal's life.

Internal Parasites: "Worms."—It is probable that more nonsense has been talked and written about "worms" in dogs than about any other canine subject. According to some people, "worms" are the root of nearly all doggy evil, and so long as a dog is regularly "wormed" all will go well with him. These beliefs are frankly absurd. The real facts are very different, and are stated in as brief a fashion as possible in the following sentences. In this country dogs are infested by a species of "roundworm" (a creature which is a dirty-white colour and in shape somewhat resembles the common earthworm) and by several species of "tapeworm," which are also whitish but which are flat and are made up of many small segments joined to a little "head" which is attached to the lining of the gut. In spite of all that is said, tapeworms as such are rarely responsible for much harm to the dog, although they can, of course, prove debilitating and should be removed. They are a nuisance, and attempts to remove them should be made by administration of the appropriate drug. Occasionally, segments of worm are responsible for impaction of the ducts of the *anal glands* (see above).

The roundworms may be extremely serious in young puppies, in which they cause stunting, "pot-belly," harshness of coat and dangerous or fatal illness. Fortunately, modern anti-roundworm preparations are available for animals of this age. Once over the age of 4–8 months, dogs rarely suffer serious illness from roundworms, although these may cause occasional vomiting, or even diarrhoea, and some loss of coat and bodily condition. It seems probable that puppies are sometimes infected before birth from their mother. It is therefore desirable to keep down the incidence of roundworms in the mother—and in dogs generally—and fortunately the modern preparations are—unlike some of the old-fashioned ones—safe in use and unlikely to cause digestive disturbances. From all that has been said above owners will realise the necessity of taking professional advice about young dogs which are ill, and any signs of "worms" in young puppies—either in the stools or by some obvious intestinal upset or bloated appearance of the belly—should be acted upon. One last word about this aspect of worms—do not assume that your adult dog has "tapeworms" unless you see some evidence in his stools. There are so many "signs of worms" that veterinary surgeons must at times get a little tired of being assured that "My dog has worms" because of some trivial habit connected with appetite.

There is, however, another side to the study of tapeworms, and one which is not generally realised. The tapeworm which is found in the dog represents one stage in the life-cycle. The eggs, which are present in the ripe segment passed by the dog, develop, not in the outside world, but in another animal altogether. Thus one of the commonest tapeworms in this country has an intermediate stage, as it is called, in the flea, and it is when the flea is eaten by the dog that this intermediate stage develops further to become a tapeworm. Another tapeworm has an intermediate stage which develops in the sheep, and a third has one which develops in the ox. There is a fourth tapeworm which has an intermediate stage which *may* develop in man, to set up serious diseases in certain cases. Children may become infected through handling the dog, and so picking up the eggs, which may then be eaten through putting the hands in the mouth. The dogs which are most likely to be infested are those which have the opportunity to eat freshly killed sheep and other food-animals. An ordinary household dog is not likely to be infested, and people should not worry unduly in this connection, provided they do not allow their dogs to stray into the wrong places. It is illegal to allow dogs to enter a slaughter-house, but unfortunately one often sees dogs in such places. The routine worming of dogs is justified if evidence of infection exists, and certainly in country areas where opportunities of tapeworm re-infection may be plentiful.

Tumours, including malignant tumours ("cancers") are relatively very common in the dog—probably as common as in the human subject. Space does not permit of a detailed account, but the following examples of growths may be mentioned: a proliferation of warts on the skin of puppies (usually disappear spontaneously); a true cancer of the tonsil in middle-aged and older dogs of both sexes; cancer of the mammary glands in bitches (both incurable); fatty growths of the vagina of bitches (amenable to operation).

Space does not allow of the discussion of other diseases, but it should be pointed out that dogs are susceptible to human and bovine forms of *tuberculosis*, especially the former. In a household which contains a tubercular person, the dog should be watched for any signs of illness, and the thought entertained that he might be responsible for the further spread of the disease. For a discussion on ringworm see the appropriate heading in the section on the cat (F9).

Accidents and Injuries.—In these days of swiftly moving motor transport, street accidents to dogs are extremely common. Many could be prevented by training the animal to walk to heel, by the use of a lead in busy thoroughfares, and by not allowing dogs to roam the streets unaccompanied—a thoroughly bad habit. Sometimes the victim escapes with a scare and a few bruises, and at others death is mercifully swift. In the vast majority of accidents, however, a more or less serious injury is incurred, and if the animal is unable to move, the police should be notified immediately. The dog is best left quiet, and it is not recommended that attempts be made to administer brandy or other supposed "stimulants" unless help is markedly delayed. Excessive hæmorrhage may in some instances be prevented by common-sense application of principles learnt in first-aid courses.

One of the commonest accidents to dogs, especially to young dogs, is a fracture involving the head of the femur, or thigh-bone. Inability to put one of the hind legs to the ground, or to bear any weight on this limb, is an indication of such an injury. (This injury may occur also from falling off a chair or wall.) Professional help is, of course, required in such cases.

Cuts and Bruises, if not serious, may be treated at home as in the case of human beings. The indiscriminate use of tincture of iodine is not to be recommended, and spirit alone makes a more satisfactory dressing in most cases. Simple washing and removal of dirt are usually sufficient, combined, perhaps, with modern antiseptic ointments or other preparations. The dog (and also the cat) are very liable to sepsis, and it is best in such cases to send for proper assistance early, or there may be grave trouble. It is probable that in nature many of the flesh-eating animals end their lives as victims of the sepsis following wounds.

Injuries from cat-scratches are exceedingly common, as are bites from other dogs. These are serious, as they more readily result in septic places. The scratch or bite sometimes penetrates quite deeply, leaving a pocket which fills up with pus. This pus may spread under the skin to form sinuses. Never neglect such places.

There are a few concluding remarks on the treatment of the diseases of the dog:—

(1) It is not correct that "water should be withheld from a sick dog." It is true that an animal which is using water only to vomit, or which is drinking excessively, should have its water intake restricted, but it is wrong to deprive a dog altogether.

(2) There have been such wonderful advances in the field of veterinary anæsthetics that there is nowadays little to fear in this connection from operations to dogs and cats. The records over the past years at the Royal Veterinary College, London, and at other centres have been most encouraging, and the anæsthetic risk is now small indeed.

(3) When a dog's life is a burden to him, it is unfair to keep him alive, and he should be put to sleep. It must be realised, however, that putting a dog to sleep is a very skilled task. It is made much easier if an owner will allow his veterinary surgeon to administer an anæsthetic and not allow the animal "to come round," and shooting is also straightforward and painless if *skilfully* carried out. There are no "magical ways" of destroying human or animal life, and an owner must not expect his veterinary surgeon to be able to bring about death merely by holding a pad to the dog's face. It is far better that the task be carried out at a veterinary surgeon's own premises, where there is skilled assistance.

CATS.

Many of the general remarks in the preceding section apply equally to cats, and will not be repeated unnecessarily in the following paragraphs.

BREEDS AND VARIETIES OF CAT.

The following breeds and varieties are recognised for registration purposes by the Governing Council of the Cat Fancy:—

Long-haired Cats.

Black	Tortoiseshell
White (Blue-eyed)	Tortoiseshell-and-White
White (Orange-eyed)	Blue Cream
Blue	Brown Tabby
Red Tabby	Chinchilla
Red Self	Smoke
Cream	Silver Tabby

Short-haired Cats.

Black	Spotted
White	Russian Blue
British Blue	Manx
Cream	Abyssinian
Tortoiseshell	Siamese (Seal-pointed)
Tortoiseshell-and-White	Siamese (Blue-pointed)
Silver Tabby	Siamese (Chocolate-pointed)
Brown Tabby	Burmese
Red Tabby	
Mackerel-striped Tabby	

Pedigree breeding and showing are practised with a very small fraction of the total cat population of Great Britain, and the majority of these remarks will be concerned with the ordinary household cat. Nevertheless, in recent years there appears to have been a considerable increase in pedigree cat breeding. Registration—which is essential for showing and pedigree purposes—is controlled by the Governing Council of the Cat Fancy, of which the secretary (1958) is W. A. Hazeldine, 1 Roundwood Way, Banstead, Surrey. Many of the breeds listed above have their own societies, which are affiliated to the Governing Council. The addresses and particulars of these and other cat societies and clubs may be had on application to the secretary of the Governing Council. The two most popular varieties of cat are the Blue Persian and the Siamese, and an exclusive show is held for each of them. In addition to these shows there are five big Championship Shows open to every variety of long- and short-haired cat, while there are classes for cats and kittens at some of the Agricultural Shows.

CHOICE OF CAT.

Although there are, as noted above, many varieties of cat, most people are content to accept an ordinary kitten, and for them the chief points to consider will be: (*a*) whether to have a long-haired or a short-haired animal, (*b*) whether to have a male or female, (*c*) whether or not to have the kitten "doctored" (*i.e.*, castrated or spayed). As a general rule, short-haired cats are probably more suitable for the average household, since their fur does not become shed so noticeably and they probably suffer less from "fur-balling." Nevertheless, many long-haired cats are so attractive that they will obviously be preferred, and there is no reason why they should not be chosen. Sex is a rather more important question, although, as may be seen in the section on management, it is possible to have both males and females "doctored." Male cats which are kept as entires are often a nuisance in that they make abominable smells in the house and spend much of their time in fighting. These characteristics are by no means invariable; but they are so common as to justify the castration of the majority of males. Siamese males in particular may be a liability. Females are generally credited with a greater attachment to the home (although they wander when "in season") and with being better mousers. The principal objection to females is that they seem to be bearing kittens almost continuously. In normal circumstances it is, of course, quite impossible to prevent cats from mating by keeping the female in confinement

during her season, a practice which is frequently adopted in the case of the dog. For one thing, most people are never aware when their female cats are in season.

Whatever animal is chosen, it is essential to pick a healthy and preferably a fairly young—but *not* too young—kitten. It is best not to accept a kitten under about eight weeks of age.

For those who wish for something a little out of the ordinary, Siamese cats make excellent and highly intelligent pets. Siamese kittens are born white, but gradually develop their even pale fawn colour, with cream on belly and chest and with "seal brown" mask, ears, legs, feet, and tail. The coat is very short, and the eyes are blue. There has long been a popular belief that Siamese cats are delicate creatures, but the present writer has seen healthy specimens, kept under ordinary household conditions, living to a mature age. It is not wise to keep a male Siamese as a household pet. The male is a fierce fighter, and is generally a worse offender in the house than the males of other breeds, and should therefore be castrated if it is to be kept as a pet.

Many people find Manx cats attractive. Instead of the normal large number of tail bones, they have but three, and hence appear almost tailless. One should beware against fraudulent amputation of the tail of ordinary cats, which are then described as "Manx."

MANAGEMENT OF THE CAT.

The cat is an independent creature, so much so that one may say that to a large extent it manages its own affairs. This, however, is not true of all cats, and every reasonable attempt should be made to provide the cat with a comfortable and friendly home. Cats are highly intelligent, and if sufficient patience is exercised they will respond to a very great degree to human attention. Kittens should not be neglected, but should be talked to and played with just as are puppies. Many cats, especially young cats, make excellent playmates for children.

In order to prevent to a large extent their nocturnal wanderings, many cats of both sexes are castrated or spayed (the popular lay expression for this is "doctored"). In the male cat the testicles are removed by an operation which is almost always safe and simple if carried out skilfully. From three to four months is a good age at which to have this done. Female cats may also be "doctored." As the female glands or ovaries lie within the body cavity, this operation is a major one, but it is nevertheless quite a straightforward, though a more expensive, procedure if conducted at the right age (about five months). Many thousands of female cats have been so operated upon at the Royal Veterinary College, London, and the subsequent health of these cats is believed to have been excellent. Indeed, it has been said that a spayed female makes one of the best of all household cats.

Cats may choose to sleep in a variety of places, and will often lie on beds, chairs, mats, and other warm places. It is a sound policy to provide them with a box or basket, and to encourage them to use newspaper as a bedding. Most cats will take well to newspaper. The bed should be placed in a warm site—it is of little use putting it in a cold corner of a room and expecting the cat to lie in it.

Owing to the fact that, even in play, a cat's claws may inflict serious injury, dogs and cats do not always make the best of house companions. Nevertheless, the traditional enmity of cat and dog is often overcome, and if the two are brought up together they often make firm friends, sharing the same basket or hearth-rug and feeding together without serious consequences.

A cat normally attends to its own toilet, and everyone must be aware that a cat devotes long periods each day to cleaning and washing itself. Except in special cases, therefore, bathing is quite unnecessary, while in short-haired cats especially, grooming, too, is superfluous (this does not apply to show-cats). For some reason (and sometimes, apparently, because an owner attempts to assist in the daily grooming) an occasional cat may cease to wash or care for itself. Such an animal is a dejected sight, and should be taken to a veterinary surgeon to have its matted fur cut or combed, and its dirt removed. Such animals (unless they completely re-acquire their self-respect) must be groomed regularly if they are to be kept at all.

All household cats are accustomed to take their own exercise, and it is advisable (except in any special circumstances) to allow them free access to and from the outer world. Do not shut your cat in the house for a long period and then blame it for making a mess. Cats are clean creatures; they normally dig small holes in which to defæcate or urinate, and subsequently cover the deposit with earth. If, therefore, they are for some reason debarred temporarily or permanently from access to a garden, they should be provided with a box or tray containing soil or cinders. Indeed, in many types of houses it is a good plan to encourage kittens to use such a device. (Note the corresponding remarks about puppies.)

It is generally stated that "cats never forget a blow," and for that reason it is recommended that cats are not chastised. It may be said that, if a cat (or dog) be brought up conscientiously and well, it should never, or very rarely, require such punishment. An animal which has been brought up properly seems to develop a fair sense of what is right and what is wrong.

For pedigree cats, or those kept in confinement for other reasons, see the relevent remarks in the section on breeding.

FEEDING THE CAT.

Although most cats are capable of supplementing their diet by catching small rodents or birds, it is unwise to rely on this as a regular source of food. The idea that hungry cats make the best mousers is by no means always correct. Indeed, animals that are in poor condition are less likely to be successful hunters. Moreover, while the riddance of pests is an excellent matter from the human point of view—and one of the reasons why the keeping of cats is economically justified—the "cruel" fashion in which most cats tackle their prey is repulsive to most of us.

It is therefore necessary and desirable to provide regular daily feeding. Kittens should receive several meals a day, but by the time they are six months old the number of daily feeds should be reduced to one, or at most two. Most cats (many Siamese are exceptions) are extremely fond of *milk*, especially if it is creamy, and the cat's love of *fish* is well known. Many *meats*, especially *rabbit meat*, are relished, and a diet high in "animal protein" is indeed the aim, always provided that it contains sufficient "dietary energy." It is significant that cat's milk has a higher content of fat and sugar than cow's milk, *i.e.*, it is a richer source of energy. Some of the proprietary bitch-milk substitutes are nearer to cat's milk in composition than is cow's milk.

Many hundreds of cats have been reared and bred successfully in experimental laboratories on a diet consisting, in the main, of one part of fish or meat and two parts of *cooked potatoes*. This is relatively inexpensive, and may be supplemented by milk and by some of the proprietary cat foods.

Cats are also extremely fond of liver. Some of the proprietary cat foods—the better ones of which are excellent—and vitamin tablets contain liver, which is a rich source of the vitamin B complex.

Within reason a healthy kitten should be fed to appetite, always provided good-quality foods are available. The amount should be restricted when they are adult, however, except for pregnant and lactating cats, which are sometimes referred to as "queens" as opposed to the male "toms." An average daily allowance of solid food for a healthy non-pregnant adult cat should be of the order of ½ oz. per 1 lb. body-weight.

Cats are fastidious eaters; they usually sniff and examine carefully any strange or doubtful food. At the same time they are often greedy, especially with relished food to which they are accustomed, but fortunately they can, like dogs, vomit very readily. Here, incidentally, is one very good tip—an excellent emetic for both cat and dog is a small crystal of washing-soda, given as a pill. People are usually amazed at the way this simple device results in a dog's or a cat's bringing up undesirable food.

It is important not to overfeed cats, and it is

almost equally important to prepare all food in a clean manner, and to make it as attractive as possible. Cats will greatly appreciate this care. While milk is an excellent food for kittens (see under breeding), and is relished by most adult cats, it must be supplemented by solid food.

Clean fresh water should be provided at all times, even if the cat appears to drink it but little.

BREEDING OF CATS.

Pedigree animals are normally confined, and their breeding is strictly controlled. Ordinary household cats are at the opposite extreme, and there is little that can be done to prevent their mating. The length and scope of this article does not permit of a discussion of controlled mating.

Scientifically, there is as yet a good deal to learn about the reproductive behaviour of the cat. As an American physiologist has succinctly put it in a description of the reproductive cycle of the female cat, "No two authors agree." In Northern Europe there are two main heat periods a year, in spring and early autumn, but some animals may appear in heat at any time from January to July, and those who keep female cats in confinement describe their charges as "calling" quite frequently if not mated. A cat which is "in season" or "on heat" is often observed to be behaving in a quite characteristic fashion, rolling about on the floor and making peculiar sounds. The periods of heat, which commence usually at about eight months of age, may last for several days, and during this time the female will make every attempt to find a mate.

Gestation lasts about nine weeks, as in the case of the bitch, but here again there is a considerable variation. As most owners are quite unaware of the time at which their cats were mated, it is difficult to talk of "going overtime," but if there is any evidence of trouble during pregnancy, or at birth, veterinary advice should be obtained. As soon as a cat is obviously pregnant, her food allowance should be increased, and she should be allowed plenty of milk. It is highly important to increase her food and milk ration still further after the kittens are born, as lactation is a great drain on the mother.

Cats sometimes choose strange, out-of-the-way places in which to litter, and many healthy litters are born and reared out of doors. Rats are a source of danger, and will often destroy very young kittens during the mother's absence. For this and other reasons it is better in town and suburban areas to have the litter comfortably housed indoors. A wooden box containing newspaper is ideal, provided it is kept in a fairly warm place and out of the way of draughts. An average litter consists of three to six kittens, which are born blind, but which normally open their eyes after eight or nine days. There is no need to be alarmed if the eyes remain closed for a few days longer. Kittens which are born dead should be removed and buried or burnt. If the whole litter is born dead, the mother's food supply should be cut down considerably, and little milk given for a few days. If the mamary glands become inflamed, they may be bathed in a cold solution of alum. The glands normally return to their former size within a short space of time if they are not milked, but if there is persistent trouble veterinary advice should be sought.

While many pedigree owners wean kittens at four to five weeks of age, it is strongly advised that the household cat be allowed to continue to feed her family for a longer period, and eight weeks is not too long if the mother is still in good bodily condition. She *must*, however, be well fed and be allowed plenty of milk. As in the case of puppies, it is an excellent idea to provide the kittens with a little solid food as from a few weeks of age. It is very wrong to remove a kitten from its mother too early, and such an animal is often weakly, develops an intestinal infection, and dies as a miserable bedraggled creature. Moreover, during the period following weaning the mother educates her offspring in the art of living, particularly ratting and mousing.

As many litters are unwanted, some people get rid of all the kittens as soon as possible after birth. Drowning is frequently practised, but it is not recommended as a merciful death. Indeed, a hard blow on the back of the head is more humane if given accurately. It is much better to take the kittens to a veterinary surgeon or clinic.

DISEASES AND INJURIES OF THE CAT.

The principal infectious diseases of cats are still in need of much scientific study. It is now clear, however, that there are at least two major cat plagues. Both have been given many names, and there is much confusion between them.

Feline Enteritis or Panleucopenia.—This is a highly infectious disease, due to a filterable virus. The symptoms include loss of appetite, sometimes accompanied by a rise in body temperature, followed by listlessness, usually diarrhœa, sometimes vomiting, and a marked tendency to show tenderness or pain on being handled. This tenderness or pain is due to a developing peritonitis. The poor animal may become seriously ill, with loss of water from the tissues or dehydration, prostrate and dead within 48 hours or less from the time of the first symptoms. The incubation period of the disease is believed to be from 4 to 8 days, or sometimes longer. There is a fall in the white-cell count of the blood, hence the term "panleucopenia." Some cats recover, the recovery rate in different outbreaks that have been studied ranging from 30 to 80 per cent., and recovered animals are probably immune to further attacks. Cats that are able to take a little food during the early stages of recovery have the best chance of recovery, but require careful nursing. There may be complications during the convalescent stage due to secondary bacterial infections or to vitamin deficiency, and a light nourishing diet, combined with vitamin preparations, is recommended. Fleas may transmit the disease to other cats, as may contact with infected materials. It has been shown that bedding and dirt trays from sick cats were infectious for other cats for up to 16 days. The disease is not transmissible, to dogs or to human beings. There is nowadays a protective vaccine, and it is a wise precaution to have your pet vaccinated.

Feline Pneumonitis.—This disease is sometimes called "cat distemper"—as indeed is feline enteritis—but it has no connection with dog distemper, and is not transmissible to dogs or to human beings. Both mild and severe forms occur, and the incubation period varies from 5 to 8 days. The mild form may seem like a cold, and there is a weeping from the eyes and a varying degree of conjunctivitis. There is a thin, clear discharge from the nose, with a characteristic sneezing. Provided that the animals can be made to continue eating, and are kept in warm and dry but ventilated conditions, recovery may be rapid and not entail serious loss of condition. The eyes should be treated with a suitable preparation, such as silver vitellin. There may be secondary bacterial infection in cases that are neglected.

The severe form of the disease has similar, although more severe, commencing symptoms, but the nasal discharge becomes purulent and there is often profuse salivation, with much spreading of the long ropes of saliva. The cat is listless, dislikes strong light, and seems to resent being disturbed. It loses its appetite, and rapidly becomes thinner over a period of from 2 to 5 days or so. Breathing becomes laboured, and a bronchopneumonia develops. There may be a high death rate in young kittens, and pregnant females may abort. Recovery tends to be slow, and is often complicated by bacterial infection. Some of the modern antibiotics appear to be highly effective in the treatment of many cases of this disease, but they must, of course, be given under veterinary supervision.

Tuberculosis.—The cat, like the dog, can contract tuberculosis, but so far as is known only the bovine form has been known to infect it. The infections usually comes, of course, from milk, and the increase in pasteurisation will tend to reduce the incidence of the disease in cats. The

disease commences in the abdomen, but may spread to the lungs. There is general wasting.

Skin Diseases.—As in the case of the dog, skin disease in the cat is usually of parasitic origin, and fleas and mange mites are again the chief source of trouble in Great Britain. Cats do so much of their own toilet that the average household cat has probably a cleaner skin than its canine counterpart. When skin disease does develop, it is strongly advised that the animal be taken to a veterinary surgeon for appropriate treatment. As a rule cats greatly resent the interference which must accompany any attempt to bathe or dress an affected place, and for this reason it is usually unwise for an owner to attempt to do other than make an inspection. Very small patches of skin eruption may clear satisfactorily if the surrounding hair is clipped away with curved scissors, but generally speaking skin disease calls for professional attention.

Diseases of the Ear.—The outer ear of the cat is frequently affected, and in a great many cases a form of mange mite is responsible. The animal provides evidence of the trouble by scratching and shaking its ear and generally showing its discomfort. It will not always be possible for an owner to make a thorough examination, as in many cases the cat objects, but if it is possible to look inside the ear it will be seen that there is a dirty and usually brownish mess of tissue, sometimes mixed with dried blood or pus. Not all cases are as bad as this, of course, but if a cat persistently worries its ear it should be taken to a veterinary surgeon. There are satisfactory dressings for this condition, and owners will be able to dress their cats if the latter are docile. Otherwise it is necessary to have the ears dressed by a veterinary surgeon or by one of his staff.

A cat's ear is frequently the site of a blood blister, or hæmatoma. This is usually the sequel to a blow, such as a slamming door, and shows itself as a large, tense swelling, which when opened by the surgeon proves to be an accumulation of serum usually tinged with blood. Some cases become infected at the time of injury, some after with the patient's rubbing. With the greatest surgical skill in the world one must expect a slight deformity, and the cat develops a puckered ear, much the same as the human boxer.

Disease of the Bladder.—The bladder is a common seat of disease in cats, and is frequently affected through the blocking of the natural water-passage by small sand-like calculi. Naturally, male cats are more often affected, as the terminal end of the urinary tracts is wider and more dilatable in females. The urine is unable to escape, and the bladder becomes filled with a mixture of urine and the sandy calcular matter. The condition may be diagnosed quite readily, as the cat usually collapses, or partially collapses, and one may easily feel the distended bladder through the walls of the abdomen (belly). It is necessary to send for professional help immediately, and, while no relief can be guaranteed, it is often possible to relieve the condition by judicious manipulation. Owners should not attempt to do this themselves (unless help cannot be obtained), as they may easily burst the bladder. As the animal is usually in a state of collapse when the condition is discovered, it makes a bad risk for actual operation, and relief by *skilled* pressure is usually to be recommended.

Ringworm.—There are two common kinds of ringworm in the cat (a third, which may also infect the dog, is more rare; it is the trichophyton which is usually found on cattle). The first kind is acquired from rats and mice, and is most commonly to be found at the bases of the claws, from where it may spread to the ears and face. The individual lesions are circular and yellow in colour, and consist largely of a scabby material. This kind of ringworm is known as "favus."

The second type of ringworm (microsporon) is more important, because it is more readily transmissible to human beings. Whereas this form usually sets up circular scaly lesions in the dog, it often infects cats without there being much naked-eye evidence of its presence. Indeed, in the cat the condition is often unsuspected until the owner himself becomes infected and consults his doctor.

Ringworm should be treated or dealt with by a veterinary surgeon, who will also confirm or refute by special methods the presence of microsporon in cats

Intestinal Parasites—" Worms."—The cat also is subject to both roundworms and tapeworms. The roundworm which parasitises cats in this country is similar to that of the dog (although a different species) and is also much more harmful to the young than to the adult animal. In kittens the symptoms are a general unthriftiness, staring coat, and in some cases diarrhœa and a "pot-bellied" appearance.

The commonest cat tapeworm in this country is one which passes its intermediate stage in the rat or mouse, or sometimes in other rodents. The tapeworm, which, as mentioned under the section on dogs, is dangerous to man, is sometimes found in the cat also.

Accidents and Injuries.—Despite their sagacity and alertness in many ways, cats seem curiously unable, in many instances, to acquire road-sense. They are dazed by a car's head-lights, while if a motorist sounds his horn they tend to stop still in their tracks.

Injuries from traps, *e.g.*, gin-traps, are very common, and it is probable that many thousands of cats annually are maimed in this fashion. Cats suffer injury from shooting, from stoning, and from blows with sticks. Since they are predatory animals, they have often to pay the penalty inflicted on them by wrathful people. Needless to say, cats which survive to return home usually require expert treatment.

Poisoning may be included under this heading. Although there are doubtless many deliberate attempts to poison marauding cats, alleged "poisoning" is often no more than a case of feline enteritis, and owners should not claim glibly that their cats have been poisoned until they have expert evidence to back their judgment.

Fur-balling, as it has been termed, may be mentioned here. Cats, especially the long-haired varieties, must often ingest hair during their toilet, and occasionally serious trouble (a stoppage of the bowels) is brought about by a mass of such hair which has collected in a part of the bowel. There is constipation, loss of condition, and often evidence of considerable pain. Such cats should be taken to a veterinary surgeon.

Bites and scratches are even more common in the cat than they are in the dog, and subsequent sepsis is equally likely.

FERRETS.

Description.—The ferret is probably a domesticated form of the pole-cat (*Mustela putorius*), and is known sometimes by that name and sometimes as *Mustela furo*. Most tame ferrets have pink eyes and yellowish-white fur, but there are darker forms believed to have resulted from crossing in previous generations with wild pole-cats. Indeed, these darker forms are popularly termed "pole-cat ferrets." They are of two main kinds, the first having creamy under fur and black guard hairs, and the second being a chocolate-brown colour, with brown upper parts and black under parts, and a few scattered light hairs on the face.

Ferrets are long creatures in relation to their body weight, and when fully-grown may have a body 14 in. long or more and a tail of 5 in. Some strains grow appreciably larger. The main use of the ferret is, of course, in rabbiting, for which purpose they have been employed for many centuries. Although they can become fierce if not accustomed to regular handling or kind treatment, and are capable of inflicting a nasty bite, they may nevertheless be made into docile and highly intelligent pets. It is most important to win their confidence from the beginning and to accustom them to regular handling from the time they are young "kittens."

Accommodation.—Ferrets must have dry, clean accommodation in a room free from draughts but well ventilated. Wood is warmer than metal, but more difficult to clean, and is best lined with hard asbestos sheeting, which is resistant to water. The most suitable accommodation comprises a sleeping compartment of similar proportions to a small kennel, leading by a small doorway or "pop-hole" to a wire-netting exercising run, which should be as large as possible compatible with cleanliness. It is a good idea to have a means of closing the doorway so that the ferret or ferrets may be confined within the sleeping-compartment if necessary. Wood-wool makes an excellent bedding, but if difficult to obtain newspaper may be provided for the ferret to lie on. The floor of the run may have a false bottom or may be sprinkled with sawdust. It is imperative to keep the whole of the accommodation clean and dry, not only to avoid smell but also to prevent the ferrets from developing a very serious necrotic infection of the feet known as "foot-rot."

Feeding.—Many ferrets are unfortunately not fed adequately. It must be appreciated that basically they are carnivorous animals, and that their food requirements are more similar to those of the dog and cat than those of rodents. Indeed, many of the general remarks made about the principles of feeding dogs and cats apply to ferrets also.

Most ferrets like bread-and-milk, and while this is an excellent article of diet, it is in itself inadequate. Up to about 4 oz. of raw meat (minced for younger animals) daily is an excellent basis, and this may be replaced by fish. Liver, especially raw liver, is an excellent source of many factors, and there is good reason to provide some at least weekly if it can be obtained. Failing this, it is advisable to add 1–2 per cent. of whole dry liver to the diet. Once ferrets are grown, one feeding daily—at a fixed time—is sufficient. The female (jill) should have ample supplies of milk just prior to the birth of her young and while she is suckling them.

Breeding.—In the northern hemisphere the female ferret usually comes into œstrus (season) in early March of the year following that in which it is born. If the jill does not conceive during this œstrus she will have a further œstral period in July or August The desire of the jill to mate is very strong, and if not allowed to do so, some animals sometimes have been found to waste and pine. The act of mating is prefaced by very vigorous behaviour on the part of the male (hob), and anyone not appreciating the performance might think that he was out to kill his mate! The mating act itself is usually prolonged, and may take up to three hours. If left together the hob and jill will probably mate from two to four times during the course of a couple of days. As in the cat and rabbit, ovulation or the shedding of the egg from the ovary takes place as a result of mating, and not spontaneously. The period of gestation is forty-two days, and the numbers of young born usually varies from five to thirteen, the average litter being six to eight. Pseudopregancy occurs if the jill is not mated, and may become outwardly obvious as in the case of certain bitches.

Males also have a seasonal rhythm, their capacity to fertilise being greatest from early March to August. Young hobs seem to be active about a month earlier than older ones. The length of daylight or, rather, the incrementation in light from day to day, has an important bearing on breeding capacity in both sexes, and by the use of artificial light it has proved possible to induce either œstrus or male activity at different times of the year.

The young are hairless and blind, and weigh on the average under ½ oz. at birth. Their eyes open at about four weeks, and they can then commence to eat small pieces of solid food to supplement their mother's milk. They may be weaned at from six to eight weeks.

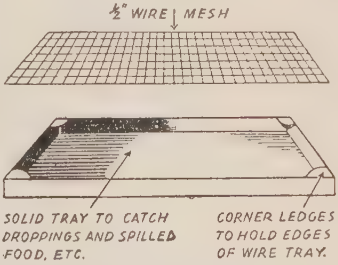
Diseases.—The most serious disease of ferrets is *canine distemper*, and the variant known as "hard pad" (see under dog) is equally capable of infecting ferrets. Such infections can wipe out entire stocks, and every care should be taken to prevent their spread from dogs to ferrets—and vice versa. A veterinary surgeon should be consulted immediately when a ferret becomes ill or out of sorts. Ferrets are also susceptible to some strains of *human* influenza, and should not be tended by persons with colds or with any indications of "flu." The feeding of infected milk may give rise to *tuberculosis*, and as a safety measure it is better to give only tuberculin-tested or pasteurised milk, or milk that has been boiled to destroy infection. *Foot-rot* has already been mentioned, and must on no account be neglected. *Mange* or "scabies" of the back and tail region should be dealt with promptly, employing modern preparations. Abscesses of the neck region are often encountered, and should receive professional treatment if they do not clear up rapidly, for they may spread with dire consequences.

RATS.

Description.—Tame rats are domesticated varieties of the wild Norway or "brown" rat (*Rattus norvegicus*). Such rats are usually albinos or black-and-white, although other colours have been bred. The hooded varieties are those in which the head and foreparts are mainly black or chocolate and the remainder of the body, apart from small patches the same colours as the hood, is white. Tame rats differ materially from wild ones in disposition, and properly managed are extremely tractable. Healthy specimens accustomed to handling bite only when frightened, *e.g.*, when a sudden movement is made in front of them. Males appear to live longer than females, but three years is a good age.

"Black" rats, *i.e.*, the species (*Rattus rattus*) sometimes known as the ship or Alexandrine rat, have been bred in captivity, but tame strains are not generally available.

Housing.—Tame rats require a warm, even temperature—65–70° F. all the year round—and draughts or lowered temperature may precipitate lung diseas eor other disorders. It is best to have a complete spare set of boxes or cages, and to change to fresh quarters weekly except when the females have unweaned young with them. Empty cages should be cleaned and disinfected thoroughly before being used again. Provided the temperature conditions are suitable—and this is essential—metal cages of the types employed in scientific laboratories are best, with wire-mesh false bottoms and trays containing sawdust to catch the droppings. Accommodation should be



ample, and even for a pair of pet rats the cage should measure about 30 in. × 18 in. × 18 in. If wooden boxes are employed it may be desirable to line them with hard asbestos sheeting or galvanised metal to prevent damage from gnawing.

Small, dark "shelters" and exercising devices, *e.g.*, wheels or ladders, are appreciated by the rats, but must be kept clean. Wood-wool makes the best bedding.

Feeding.—Rats may take a wide variety of foods, including many of our own, and there are

several successful ways of feeding them, including the provision of specially formulated "rat-cubes," of the same type as that described below for mice. A good daily diet is wholemeal bread, mixed cereals (*e.g.*, oats, wheat, hempseed), with about

WATER BULB SUITABLE FOR USE WITH PET RODENTS

5 per cent. dried brewers' yeast and milk either fed separately or mixed with the rest of the food. Twice weekly each rat should be given up to ½ oz. or more of meat, liver, fish, or other "animal protein." A little fresh greenfood (even grass) is appreciated, and in winter especially some supplement containing vitamins A and D is desirable. Expectant and nursing mothers should have as much milk as they require. Never overfeed or allow uneaten food residues to remain in the cage. Fresh water (preferably in bulbs or bottles) should be available at all times. Far cleaner than open dishes are the special but simple type of water bulbs suspended on or in front of the cage or box so that the rat can drink from the rounded end of the spout. A simple substitute is a medicine "flat" bottle—or even a ¼- or ½-pint milk-type bottle. This should be fitted with a cork—or, better, a rubber bung—pierced for a piece of bent glass tubing. Provided that the free end of the glass tubing is not sharp, and is chosen so that the aperture is considerably smaller than that of the tube itself, the water will not run out unless sucked out by the rat. The spout should, of course, be within easy access of the rat, which will soon learn to drink from it.

Breeding.—Rats can breed at quite a young age (usually being capable of mating when fifty to sixty days old), but it is better to separate the sexes within a fortnight or so of weaning (weaning being usually at twenty-one days of age) and to mate at about 100 to 120 days of age onwards. the female rat has an œstrous cycle lasting just over four days. One male (buck) may be mated to one female (doe)—this is probably best in the case of pet rats—or with two or three females if preferred, but it is unwise to keep more than one adult male in the presence of females. The gestation period is twenty-one to twenty-two days or occasionally a few days longer. The number born varies considerably, but often it is best to try to rear only six to eight young. The young have their ears open at 2½ to 3½ days, cut their incisor teeth at eight to ten days, can find their way to their mother at about the same time, open their eyes at fourteen to seventeen days, and may leave the nest at twenty-one days. In the case of pet rats it is probably best to leave the young with the mother for up to a week or so longer. Breeding can occur all the year round, but takes place less readily in winter.

Handling.—Rats should not be "tailed," or the skin may slough off. Regular handling after weaning is excellent and promotes docility. The weight of the body should be supported.

Diseases.—On the whole rats are much less liable to disease than mice, provided temperature conditions are suitable. The commonest infection is *broncho-pneumonia*, often precipitated through draughts or cold. *Mange* (especially of the ear) and infestation with *lice* may occur, and should be dealt with promptly by means of modern insecticides. Avoid contact with wild rodents, or the use of food or bedding that may have been contaminated by wild rats and mice.

MICE.

Description.—Tame mice are descended from the common house mouse (*Mus musculus*), and it is believed that mice have been domesticated for over 3,000 years. Apart from albino or "white mice," there are many varieties that have been bred by the extensive "mouse fancy," and there is a wide range of coat colour and also different types of coat, *e.g.*, long-haired, short-haired, and rex. "Waltzing mice" have an abnormality of that part of the inner ear concerned with balance. Mice may live up to thirty months, and in exceptional cases attain the age of three years or more.

Housing.—Although strains vary, most tame mice require a warm even temperature and the same general remarks concerning temperature range, bedding, and wooden or metal cages apply as in the case of rats. If a solid floor is used, this should be covered with clean sawdust. It is a good plan to change to a clean cage regularly, except when the female (doe) is nursing her young. If the cage is large (as in the case of pet mice it should be, with a floor space of say 24 in. × 12 in. × 12 in. for a group of mice), inner nest-boxes should be provided—one for each doe if breeding is taking place, although two does will often share the same nest-box. (In changing to fresh cages the nest-box, with mother and young inside, may, of course, be moved over.) A "two-storey" cage, with a ladder or "staircase" to the upper part, is an attractive variation, although difficult to keep clean. Mice should be kept well out of reach of wild rodents, from which they may all too readily contract disease.

Feeding.—Mice have not quite such a wide dietary range as rats, but there are several different ways of feeding them, including the provision of special "mouse cubes." These mouse cubes are of varying composition. One of the most successful, devised by workers in the Medical Research Council's laboratories, is known as "Diet 41," and is made up of the following parts by weight: wholemeal flour, 45; Sussex ground oats, 40; fish meal, 8; dried yeast, 1; dried skimmed milk, 3; cod-liver oil, 1; and common salt, 1. Diet 41 has also been employed for rats and monkeys, although for the latter particularly it requires supplementing. It is perhaps worth emphasising that cod-liver oil must not be fed in excess (½% of the diet is quite sufficient, and should not be exceeded), or it may prevent breeding and possibly have other harmful effects. Cubed diets are best fed from a wire basket through which the mice enjoy gnawing and eventually pulling out the pieces. Wholemeal bread is excellent if not allowed to become stale, but it should not form the sole article of diet, and it is a good idea to feed it alternately with a grain mixture (made up of rolled oats, wheat and other cereal grains, or mixed bird seed). Up to about 5 per cent. dried brewers' yeast is excellent, and so is fresh or dried milk, especially for mothers that are carrying or nursing young. Cheese is relished, but may smell if not fed carefully. Mice sometimes like an occasional pinch of marmalade, and it is a good idea to provide lettuce or other greenfood every week or so. There should be a constant supply of fresh water, preferably from bulbs or bottles as described for rats.

Breeding.—Young mice may be weaned at twenty-one days, although it is usually preferable to leave them with their mother for a further week. The age at which mice are capable of mating varies considerably from one strain or individual to another, and while the average is six to eight weeks, it may be much younger. It is therefore desirable to separate the males from the females at or shortly after weaning.

Mice may be mated up at two to three months of age, and the best arrangements are one male (buck) to one or two females. A pair of mice or a "bigynous trio" makes a successful combination. The œstrus cycle is similar to that of the rat, but its length appears to vary with coat colour, being longest in the brown mice and shortest in blacks and albinos. The gestation period is usually from eighteen to twenty days, but may be prolonged if the female was still suckling her previous litter when she conceived. There may be up to twelve or more young in a litter, but the average litter size is from five to seven. The second litter is usually the largest, and subsequent litters tend to decrease in numbers, so that the sixth is usually smaller than the first. Breeding may take place all the year round, although, as with rats, fertility is higher during the summer months.

Handling.—Any rapid or rough movement may frighten mice and cause them to bite through fear. Mice should be lifted by the tail—not too near the tip—and may be held in the palm of the hand, where they may be suitably restrained by keeping the tail between two fingers.

Diseases.—Mice are unfortunately prone to many diseases, although the risks will be much lower if they are kept in suitable surroundings, great care is taken to avoid infection, scrupulous cleanliness is observed, and the standard of feeding is good. One common source of infection is the presence of the excreta of wild rodents on bedding or foodstuffs. A common disease is that sometimes called "*mouse typhoid*," caused by organisms of the Salmonella group. Although some mice recover, they may remain carriers of infection, and once this disease is diagnosed it is best to destroy the affected mice and those in contact with them, and not to employ any of the cages or utensils for fresh mice without adequate sterilisation. There are other septicæmia diseases of mice, and also virus diseases, including certain types of *pneumonia* and a condition known as *infectious ectromelia*. The accurate diagnosis of these calls for expert opinion and often for special bacteriological or other examinations. The mouse-owner should, however, be able to recognise signs of ill-health or departure from normal, one of the commonest being loss of appetite. In young mice the coat should be smooth and glossy. As mice get older there may be loss of pigmentation (in coloured mice) or even loss of fur. A sick mouse usually sits hunched up and has a ruffled coat, while the eyes may be partially closed or have some discharge. A healthy mouse will usually catch on to suitable objects when held by its tail and is capable of pulling quite hard, whereas the pull of a sick mouse is much weaker. If one or more mice die it is best to destroy at once any cage-mates that appear seedy. As in the case of rats, external parasites should be dealt with promptly with the aid of modern insecticidal preparations.

GOLDEN HAMSTERS.

Description.—There are many species of hamsters in the world, and more than one kind can now be bred in captivity. The one referred to, however, is the Golden Hamster (*Mesocricetus auratus*), a delightful little creature of which a full-grown female (females are larger than males) rarely exceeds 7 in. in length. This history of the domestication of the golden hamster is quite remarkable, for prior to 1930 only museum specimens were known. In that year a mother and her twelve young were dug up in a field near Aleppo and were taken to the Hebrew University, Jerusalem, and from that one family have been bred the hundreds of thousands of golden hamsters now employed as pets or as laboratory animals in many parts of the world. The species has taken well to captivity and, although capable of inflicting a nasty little bite if frightened or handled roughly, becomes docile and friendly when properly cared for. Characteristic features are the soft, smooth fur, the large black eyes, the "cheek pouches" in which food is stored and which may become enormously distended after a meal, the short, stumpy tail, and the extremely loose skin, inside which the hamster can turn round to a considerable degree.

Housing.—The same remarks about accommodation, environmental temperature, freedom from draughts, fittings, and other general considerations (including cleanliness) apply as in the case of rats and mice. For breeding purposes a dark inner chamber or nest-box is desirable. Several hamsters may be kept together, but the introduction of a stranger (or even the re-introduction of a former cage-mate that has been removed for some time) may lead to fighting.

Feeding.—Satisfactory diets include the following: (1) rat cubes (*e.g.*, "Diet 41"), carrots, greenfood, and milk; (2) cereal grains and/or wholemeal bread, carrots, greenfood, and milk; (3) steamed Rangoon beans, wheat, maize meal bread, a little Marmite, and milk. Care must be taken not to allow storage of excess food, which will deteriorate and cause a smell. Grass is a suitable source of greenfood during its growing season. Apples and other fruits are often relished. Water, preferably in bulbs or bottles as described for rats, should always be available.

Breeding.—Golden Hamsters attain puberty at from ten to fifteen weeks of age, or even younger, males being usually earlier. Generally speaking, it is best to defer breeding until after fifteen weeks of age. There is an œstrus cycle of about four days, and the gestation period is very short, averaging sixteen days, although sometimes up to nineteen days. Mating not followed by conception results in phantom or pseudopregnancy. Litter size varies from one to fifteen, but the average is six to seven. Not many females have more than four litters and although both sexes may live up to two years, breeding by the female is rare after nine months. The young are naked and blind at birth. Hair first appears at five days, and covers the whole body at eight days. The eyes open at about eleven days, and soon after this the young begin to take food for themselves and may be weaned at three to four weeks. Care must be taken that the female does not injure the male, and for safety's sake it is probably better to keep only one female and one male together and to remove the male before the young are born.

Handling.—Gentleness is essential, and sudden movements should be avoided. The tail is much too short to use, and the easiest way is to lift them by the loose skin over the back and shoulders. As already noted, they can twist easily within their skins, unless a substantial amount is taken in the hand. After picking up they may be allowed to sit on the palm of the hand.

Diseases.—Several diseases of hamsters are now known, and, like most rodents, they are susceptible to *Salmonellosis* (see notes under "mouse typhoid" and "paratyphoid" in guinea-pigs). One of the most prevalent conditions is *ear mange*, in severe cases of which the condition spreads from the ears to other parts of the body. Modern anti-mange preparations are highly effective.

CAVIES (GUINEA-PIGS).

Description.—Cavies or guinea-pigs (*Cavia porcellus*) are rodents, and are descended from one or more of the several kinds of wild cavy found in South America. They are believed to have been domesticated by the Incas long before Europeans "discovered" that part of the world. They make excellent pets, but are easily frightened, and should be treated gently and quietly. They usually behave quietly, although there may be fighting between adult males ("boars"), while the arrival of food—or the entry of a person into a room, which fact is obviously connected with feeding-time—usually sets up a chorus of chirrup-

ing squeaks. There is to-day a considerable cavy "fancy" in Great Britain and other countries, and many varieties are recognised, including rough-coated and smooth-coated types. Among recognised colours are the agouti (banded hairs), brindle, cinnamon, tortoiseshell (tricoloured), and Himalayan (white with attractive black points). The long-haired Peruvian and rosette-haired Abyssinian breeds are popular. Guinea-pigs may live up to two to three years. There is a small tail (composed of from five to seven caudal vertebræ), but usually this is so short that it does not project outside the body. There are four toes on each of the fore-feet and three on each hind foot. An adult guinea-pig may measure up to 10 in. or more in length, and sometimes its weight is well over 2 lb.

Housing.—Guinea-pigs may be kept outside or inside. If outside conditions are favoured, great care must be taken to protect them from dogs, cats, and rats. The last-named may be a danger also in conveying disease. The run should be in a sheltered position away from wind and direct summer sunlight. Tent-shaped waterproof shelters, with wooden floors covered by cleaning trays, have been found satisfactory. Another method is to keep them in hutches of the same type employed for rabbits and when conditions are suitable to let them out into a temporary run on the lawn surrounded by ½ in.-mesh wire-netting that is at least 12 in. high. (N.B. This will keep dogs or cats out.) Guinea-pigs will crop the grass and help to keep the lawn smooth. Great care should be taken not to allow the ground or floor to become so contaminated by guinea-pig excreta that it conveys disease from one animal to another.

If indoor methods are selected, an even, preferably warm temperature is desirable, and there should be freedom from draughts. Guinea-pigs have been found to thrive best at about 65° F. with a humidity range of 45–55 per cent. Provided warm conditions are available, metal cages are easier to keep clean than wooden ones, while a false bottom of wire mesh, above the cleaning tray, is helpful. Wood-wool is again the best bedding. Cages must not be too small, and a pair of pet guinea-pigs should have about 14 sq. ft. of floor space. It is a sound principle, as with rats and mice, to change frequently to a clean cage, the used one being cleaned and disinfected thoroughly before being used again.

Feeding.—Guinea-pigs, like human beings, apes, and monkeys, require a source of vitamin C (ascorbic acid). Normally they obtain this from greenfood, but in winter especially they may not secure enough in this way. The daily requirement of an adult guinea-pig is about 2 milligrammes, and supplies can be obtained from a chemist's shop.

There are many different methods of feeding guinea-pigs. Among cubed or pelleted diets is that known as "Diet 18," which is employed also for rabbits. It contains the following parts by weight: wheat feed, 15; grass meal, 30; decorticated groundnut meal, 15; linseed cake, 10; barley meal, 20; common salt, 1; and chalk, 1. This is fed together with fresh greenfood to supply vitamin C. For feeding without the use of compressed diets a good plan is to provide a daily "concentrate ration" of about 1 oz. per head of a mixture of 2 parts bran and 1 part crushed oats, and to feed in addition ample amounts of cabbage, lettuce or other greenfood, meadow hay of good quality, grass, and raw vegetables. Although guinea-pigs normally derive moisture from fresh greenfood, and may appear to take little or no water for long periods, it is a mistake not to provide a fresh supply, preferably from water bulbs, or from inverted bottles fitted with a stopper and drinking-spout. A little dried brewers' yeast makes an excellent addition to the diet, while for females ("sows") when pregnant or lactating milk is excellent. Dead foliage should be removed from greenfood, and soil and dirt cleaned off. Frosted greenfood should be soaked in warm water before it is given to guinea-pigs. Unfortunately, hay may be contaminated by wild rodents, but it forms an excellent article of diet. Never allow food residues to remain in the cage.

Breeding.—The lactation period of the guinea-pig is a short one. The gestation period averages sixty-three to seventy-five days, although variations of fifty-eight to seventy-two days are known, and the young are born in an advanced state, with their eyes already open. They can run freely with their mother shortly after birth. They are able to nibble a little food as early as the second day, and by the time they are two to three weeks old they are completely independent and are neglected by their mother. A sow will often mate again the day the young are born, or shortly after, so that a rapid succession of litters often occurs.

Guinea-pigs are capable of mating from about fifty-five to seventy days of age, or even younger in certain circumstances, which include the provision of a high plane of nutrition. The œstrous cycle averages fifteen to seventeen days, although it may vary from thirteen to twenty-five days. The actual period during which mating may occur usually lasts only from about six to eleven hours. One boar may run with as many as twenty sows if so desired, but in the case of pets it is much more interesting to run a boar with only one sow, in which case she need not usually be removed to a separate cage before the young are born. The young guinea-pigs should be separated from the older ones shortly after weaning, and the sexes separated at four to five weeks of age if they are not to breed prematurely. It is better to wait until the animals are approaching six months of age or so before they are mated, for they do not become fully grown and "filled out" until they are between six and nine months.

Handling.—Guinea-pigs are timid creatures, and should be handled gently. They are best picked up with both hands. If a guinea-pig is to be held in order to examine it for any purpose, a good method is to place one hand over the animal's shoulders, with the fingers and thumb around its neck, and to extend its hind limbs with the other hand.

Diseases.—The most important infectious disease of guinea-pigs is, like "mouse typhoid," caused by organisms of the Salmonella group, and it may be contracted from wild rodents or from food or bedding contaminated by them. In guinea-pigs the disease is known usually as "*paratyphoid*" (or sometimes as "*salmonellosis*") and it may take an acute form, causing death within a few days, or a more chronic form in which many animals recover to become symptomless carriers of disease. Outwardly healthy, they may infect susceptible guinea-pigs with which they are placed. Cold or other environmental variations, and faulty feeding, can help to set off an outbreak, for there are few stocks in which the organisms are not lurking in some "latent carriers." *Coccidiosis* is common, but is a much less serious threat than in the case of rabbits. It has been set up in infected stocks by feeding inadequate diets, and provided that nutrition and hygiene are adequate there is rarely serious trouble from this disease. *Infections of the respiratory tract* may occur, but are uncommon except when there is overcrowding, high humidity, or damp bedding. Sometimes organisms of the Pneumococcus group cause not only disease of the respiratory tract but also a generalised infection of the serious membranes of the body. When this disease occurs it may produce death without much warning. It is possible that the infection sometimes comes from human beings. The disease known as *pseudotuberculosis*, and described under rabbits, occurs in guinea-pigs also. Again, environmental conditions and faulty feeding may predispose towards active infection.

With good fortune and sound management, trouble from these serious infections may never occur. *External parasites* should be dealt with promptly by modern methods. Sometimes *non-parasitic skin disorders* occur when the diet is faulty, *e.g.*, too dry or lacking in sufficient fresh greenfood of good quality.

RABBITS.

Description.—Domesticated varieties of the wild European rabbit (*Oryctolagus cuniculus*) are now kept in many countries of the world. The wild rabbit is believed to have been introduced into Great Britain about the twelfth century A.D., and to-day it is a serious pest of agricultural land and forestry schemes. Tame rabbits have been bred for centuries, and some of the breeds and strains that have been produced differ appreciably in size, colour, and habits from the common wild form. Some breeds have been specially bred for table purposes, while others (*e.g.*, the Angora, Sitka, and Argente de Champagne) have been developed for their fur. In addition, many varieties are produced for show purposes by the extensive rabbit "fancy." The small hardy Dutch rabbit (usually black and white) is one of the kinds suitable for beginners. Among well-known categories are the English, Japanese, Himalayan, Belgian Hare (really a rabbit), Flemish Giant, Beveren, Blue Imperial, Polish, Havana, Lop, Half-Lop, Chinchilla, and New Zealand White. The Copenhagen rabbit appears to be identical with the New Zealand White. The smaller breeds weigh only 4–6 lb. when fully grown, whereas some specimens of some of the giant breeds attain a weight of 20 lb. or more.

Rabbits and hares were formerly classified with the rodents, but to-day they are placed in a separate Order of mammals, known as the Lagomorphs. Young rabbits (in contrast to leverets or young hares) are blind and helpless for some time after birth. Tame specimens may live for four to five years, and individuals have lived for up to thirteen years.

Since rabbits are employed for commercial purposes, various systems of management have been devised, including the use of movable ark-huts, with covered runs, that can be moved regularly to fresh ground. If kept indoors rabbits do not need special heating, but freedom from draughts, damp, excessive cold, and access by wild rodents is most desirable. A garage is regarded as an unsuitable place, owing to the susceptibility of rabbits to exhaust or engine fumes. One of the great difficulties of rabbit-keeping is coccidiosis, which is a serious disease in rabbits and hares. (European hares could never be bred successfully in captivity until means of overcoming coccidiosis were discovered.) With young rabbits especially (*i.e.*, those that have left the nest and are able to run about freely) it is a sound principle to move them to a clean floor or fresh ground every two days, so as to "break" the life-cycle of the coccidial parasite. One way of doing this is to have "back-to-back" cages or hutches, from one to the other of which the rabbits may be transferred easily. The empty cage or hutch may then be cleaned and disinfected thoroughly and allowed to dry out before the rabbits are returned to it. Wood-wool makes a suitable bedding material, although the female (doe) will pluck her own fur to line the nest when her litter is due to be born. Wire-mesh floors with a tray beneath are convenient, but if solid floors are used these should be sprinkled with fresh sawdust daily or every other day. Provided the standard of hygiene can be maintained, cages or hutches and their runs should be large. The absolute minimum is "1 sq. ft. of floor space for each 1 lb. weight of adult rabbit," *i.e.*, if there are two rabbits totalling 12 lb. in weight there must be at least 12 sq. ft. of floor space. If cages or hutches are stacked one on top of the other the lowest should be well clear of the ground, and if there is only one hutch this, for convenience and safety from wild rodents, should be 2–3 ft. off the floor.

Feeding.—The wild rabbit grazes at dusk and dawn, and it is preferable to feed tame rabbits twice daily, while pregnant or lactating does and young rabbits benefit from three meals a day. As in the case of guinea-pigs, the ration may be thought of as consisting of two parts, a concentrate portion and a portion consisting of greenfood and other succulent material. The concentrate portion consists usually of a mixture of cereal grains or of some other form of mash. Successful mashes, of which there are many, include: (1) a mixture of 4 parts cereal grains and 1 part dairy cake; (2) equal parts of bran, weatings, flaked maize—or barley meal—and fish meal. This second is useful for breeding. If materials for the mash are in short supply they may in part be replaced by cooked potatoes. An average daily food allowance for a resting (non-breeding) adult of medium size would be: greenfood (grass, clover, weeds, lettuce, etc.) and/or roots, 12–16 oz.; hay (good quality), 2–3 oz.; and concentrates (cereal grain or meal mash), 2 oz. If cooked potatoes are used they should be fed at the rate of 4 parts to each 1 part of cereal that they replace. For a doe nursing her litter a suitable diet would comprise: greenfood to appetite, hay (good quality and preferably containing clover or other legume), 2–4 oz.; concentrates (preferably with fish meal or some other suitable source of "animal protein"), 4–6 oz.; and common salt at the level of up to 1 per cent. of the ration. A mineral mixture is preferable to salt alone. Excessive greenfood, especially in the form of cabbage and other Brassica plants, may cause polyuria, *i.e.*, the passage of excessive quantities of urine. No matter how much fresh greenfood rabbits may have available, a supply of fresh water should always be provided. The daily water requirement of the rabbit is quite high, and certain bad habits such as urine drinking or even cannibalism may result from an inadequate intake of water. Pots that cannot be overturned or, preferably, water bulbs or bottles as described for guinea-pigs, are the most suitable means of providing water.

"Diet 18," described under guinea-pigs, is one of several types of compressed diet successfully employed for rabbits. Fresh greenfood is preferably fed in addition, while the water requirement with diets of this kind is considerable.

Breeding.—The age of puberty varies with the breed, and also with the time of year at which the individual rabbit was born. Rabbits born in spring are usually capable of breeding at a younger age than those born in the autumn. In Great Britain the wild rabbit has a fairly sharply defined main breeding season, lasting from January to June, but some degree of "out-of-season" breeding may take place at almost all other times. Tame rabbits may not breed freely during the winter months, especially if environmental conditions are cold. Mating may take place as early as four months of age, and although this does not often result in pregnancy, it is accompanied by competition and fighting between individuals of the same sex. Males (bucks) and females should therefore be separated at weaning, or at least before they are four months old. Fertile matings may occur at from about 5½ months of age onwards, but it is wise to defer breeding until later—say seven to eight months for most breeds. The female does not ovulate or shed her eggs from the ovary spontaneously as do most domestic mammals, but, like the cat and ferret, does so in response to the act of mating or some other strong stimulus. Even playing between two does may precipitate ovulation, in which case a so-called "phantom pregnancy" (pseudopregnancy) may result, the doe that has ovulated appearing pregnant and even developing lactating mammary glands. There is not therefore an obvious regularly recurring œstrus cycle as in the domestic rat, mouse, and guinea-pig, and in summer at least the doe may be ready to mate at almost any time. Observation suggests, however, that there are fluctuations in the desire to mate. The act of mating in rabbits sometimes causes alarm that all is not well to those that have not hitherto witnessed it, for the buck usually emits a peculiar cry and loses his balance to fall over sideways. It is usually best to separate the buck from the doe before the young are born. The gestation period is usually thirty to thirty-two days. In wild rabbits a high percentage of embryos die and are "resorbed," and are therefore never born. In some populations it appears that about two-thirds of all rabbits conceived (including about 60 per cent. of total litters) are lost before birth in this way. Losses from this cause are probably much less common in domesticated rabbits, especially when the standards of feeding and management are high. Litter size is variable, and depends in part on the breed or strain. In some strains mean litter sizes up to eight or nine have

been obtained, but a mean of four or so is more common. Does that do not prepare the nest or rear their young properly should not be selected for further breeding. The doe with her new-born litter should not be disturbed unduly, or she may desert her young, which are blind and helpless at birth and are entirely dependent on her for at least three weeks, after which they begin to nibble food to supplement the milk that they receive from her. The eyes open at about fourteen days. Weaning should be carried out at between six and eight weeks of age, by which time the young should be able to fend for themselves completely.

Handling.—Rabbits should never be lifted by the ears alone. One good way of lifting them is to grip the ears firmly but gently with one hand and to place the other hand under the rump to take the weight of the rabbit's body. Alternatively, one hand may be placed flat under the rabbit's belly, but this requires more care, and may be a risky procedure with pregnant does. Another convenient way to handle rabbits, especially young ones, is to lift them by the loose skin over the shoulders. Rabbits can inflict quite nasty scratches with the nails of the hind feet. It is incidentally a good plan to examine the nails of all four feet and to trim them if they are too long. A stout pair of scissors, or preferably a pair of clippers, is used, and care should be taken not to cut back as far as the "quick," *i.e.*, the bluish portion at the base of the nail that contains blood vessels and will bleed freely if damaged.

Diseases.—As already indicated, *coccidiosis* is a highly important disease of young rabbits. It may be either of the "hepatic type," affecting principally the liver, or the "intestinal type," affecting principally the gut. Even in the case of the hepatic type, however, the coccidial parasites are picked up by mouth and after penetrating the intestinal walls make their way via the blood-stream to the liver. Hygienic measures are the best means of preventing the disease (see under Housing), but should it break out, prompt treatment with certain sulphonamides or other anti-coccidial drugs may prove effective. In certain rabbitries in which coccidiosis is a constant problem, protection has been obtained by feeding a dilute solution of one of the soluble sulphonamides in place of drinking-water. There are certain types of digestive disturbance that may resemble coccidiosis, and one of these, the cause of which has not yet been established with certainty, is known as *mucoid enteritis*. Some such cases are probably variations of "*bloat*" ("the blows") a condition the cause of which is again not fully established, although there may in fact be several factors. A rabbit may, of course, "blow" after eating fermentative food, but cases of "bloat" can occur independently of this, and some may be due to a virus. "*Snuffles*" is characterised by a nasal discharge, and is not always associated with the same organism. In its milder forms it is not a severe disease, but with the more chronic forms the nasal discharge becomes marked and gives rise to a typical snuffling noise. Severe chronic cases become progressively worse and die of a terminal pneumonia. There is also a severe acute form, in which the rabbit dies so rapidly that the condition is sometimes not recognised. Acute cases that are treated in time with certain sulphonamides may respond well, but chronic snufflers are difficult to treat and go on spreading the infection, and hence are better destroyed. Correct environmental conditions are a great help in preventing this disease. A chronic type of infection is known as *pseudotuberculosis*, which is usually acquired from eating material contaminated by wild rodents or by other infected rabbits. It is caused by quite a different organism from that of true tuberculosis, which is much rarer in rabbits. Clinical cases should be killed, and prevention lies in hygienic measures. Infected wounds or skin abscesses may lead to a disease caused by the "necrosis bacillus" (*Fusiformis necrophorus*) and known sometimes as *necrobacillosis*. It is usually characterised by subcutaneous swellings distributed irregularly over the head and body. Although in the early stages the affected rabbit may remain in apparently good health, the spread of the disease is insidious and usually fatal, and in most instances it is kinder and safer to destroy a case before it progresses too far. There are unfortunately several other infectious conditions occurring in rabbits, but all call for expert help in diagnosis and treatment. Generally speaking, it is a bad policy not to cull an ailing rabbit immediately, and one that is ill should certainly be isolated at once and not fed or tended before the person looking after it touches the healthy rabbits.

Among non-infectious conditions *pregnancy toxæmia* is not uncommon in does during the very late pregnancy, and usually proves fatal within two to three days. It is a "metabolic disorder," *i.e.*, it is associated with some functional derangement of the endocrine or ductless glands or with the inability to control properly the utilisation of its food. Faulty feeding is probably a contributory cause. Diseases of the *heart and blood* may arise occasionally, and can be aggravated by faulty feeding.

Among external parasites, *ringworm* is not common, but may be acquired from rodents. Affected rabbits that are to be treated must be isolated. *Ear mange* (known usually as *ear canker*) is common, and may be treated by strict attention to hygiene, with thorough disinfection of the hut or cage, and by dressing with a modern anti-mange preparation. *Body mange* is much less common but far more difficult to treat.

Among internal parasites, so-called "*bladder worms*," *i.e.*, the larval stages of two dog tapeworms (*Taenia pisiformis* and *Taenia serialis*) are quite common, although rarely fatal. The feeding of grass or other greenstuff to which dogs have had access should be avoided, as well as the contamination of the drinking-water with dog fæces.

Domestic rabbits are susceptible to myxomatosis (*See* "General Information"), and it is a wise precaution to have them vaccinated. The vaccine is inexpensive, and may be obtained through veterinary surgeons and pharmacists.

HEDGEHOGS.

Description.—The European hedgehog (*Erinaceus europaceus*), found throughout Great Britain, belongs to the Order Insectivora, of which moles and shrews are also members. Its diet is, however, by no means restricted to insects, although in nature a considerable portion is probably made up of small invertebrates. There is a good deal of prejudice against them as pets, owing to the fact that freshly caught specimens are usually infested with fleas or other external parasites. The spines of the hedgehog, being well-spaced, make the presence of external parasites more obvious than is the case in animals with a coat of close fur. The hedgehog's spines form its defence, and its capacity to roll up into a prickly ball at the threat of danger is well known. This defence reaction is unfortunately of no avail to it when the danger is an oncoming car or lorry, and thousands of hedgehogs die every years as a result of being killed by vehicles on the roads. Many other species of mammals wander on to the roads, but most attempt to flee when they sense the approach of a vehicle. The capacity to roll up is not secure defence even against animal enemies. There are some foxes, dogs, and cats that have learned to "uncurl" a hedgehog, and subsequently eat it.

Provided that care is taken, a hedgehog makes an excellent pet, especially if given a suitable enclosure in the garden. For a variable time during winter hedgehogs hibernate, and during this time they must not be disturbed. Should they emerge at any time however, food must be provided. Some specimens have lived for five years or more in captivity.

Accommodation.—The most satisfactory way to maintain a pet hedgehog is to provide it with a large "run" in part of the garden. If wire-netting is employed it should be sunk under the ground to a depth of several inches, or the hedgehog will burrow underneath and escape. The

top of the run must be wired in, or alternatively there must be a "baffle board" or wire-frame (at least 9 in. wide) near the tope of the sides to prevent escape that way, for hedgehogs can scale wire-netting—and some other types of fence—with ease. There should be a warm, dry box for shelter, containing wood-wool or other bedding material. A simple but suitable shelter may be made out of a soap-box, preferably lined with asbestos sheeting or some other material impervious to water. A shallow sunken bath in the enclosure may be of interest, for hedgehogs take well to water, but the edges should be such that the hedgehog can get out easily.

If it is decided to keep a hedgehog indoors, then the best accommodation is probably similar to that described for ferrets.

Feeding.—The simplest diet consists of milk, some bread, and minced lean meat. Cooked meat is preferred to raw, but raw liver should be given occasionally. Another satisfactory diet comprises meat offals, "root" vegetables (*e.g.*, carrot, potato, and swede), and wheaten wholemeal biscuit, steamed together until cooked, and then mixed and minced with a small proportion of raw liver. A small quantity (say 1–2 per cent.) of mineral mixture is also desirable, and milk should be given freely. Although hedgehogs appear to drink but little water, a fresh supply should always be provided.

Breeding.—During the breeding season marked changes occur in both males and females, and the structures associated with reproduction increase enormously in size from about March onwards. The female is capable of having two litters a year, the first in May or June and the second in August or September. The period of gestation has not been determined exactly, but is believed to be thirty-five days, possibly with variations of up to well over forty days. During the breeding season the males are very pugnacious towards each other if females are with them, and may do each other considerable damage. (The mixing of strange hedgehogs is often a difficult procedure anyway, for they often fight and inflict nasty bites on one another's feet.)

The litter size is usually four to six, and the young, which have "soft" spines, are suckled by their mother for nearly six weeks. The young can partake of some solid food at about three weeks, and there is some evidence that if left with their mother for longer than six weeks she may compete unfairly with them for food!

Diseases.—Hedgehogs in captivity are susceptible to *respiratory infections*, and can sometimes contract certain strains of *human influenza*. They are susceptible also to *Salmonellosis* (see under mice and guinea-pigs). Fleas and other external parasites have been mentioned; these often disappear spontaneously as the hedgehog begins to thrive in captivity, but if not they should be dealt with by modern methods.

LAND TORTOISES.

Tortoises are popular pets, but although many are kept with great success in Great Britain, the majority of those that are imported each year are never looked after adequately, or fail to thrive for other reasons.

Most land tortoises that are imported into Great Britain for sale through dealers are: (1) the Spur-thighed Mediterranean Land Tortoise (*Testudo graeca*), commonly known as the "Moroccan tortoise" and sometimes as the "Iberian" or "Algerian"; or (2) Hermann's Tortoise (*Testudo hermanni*). The second is distributed in Southern France, Southern Italy, the larger islands of the Western Mediterranean, and parts of Yugoslavia, Albania, and Greece. There is a species found in Greece, the Margined Tortoise (*Testudo marginata*), but while adaptable to life in Great Britain, it is more difficult to acquire. The two common species differ in several ways, the "Moroccan tortoise" having a small bony spur on the back of the thigh. (The upper part of the shell is termed the carapace and the ventral portion the plastron.)

In selecting a tortoise one should ensure that the animal appears healthy. It should be active and withdraw quickly into its shell on being disturbed. Its legs should be firm and not limp, and there should be no abnormal discharge from the eyes or nostrils. The shell and limbs should be uninjured. Females are generally larger and have a shorter tail than the male. The shield above the tail is flat in the former and curved in the male. It is a good idea to obtain a pair or more of tortoises, but not more than can be looked after with care. On being purchased they should be washed in tepid water.

Many tortoises are given free range in gardens, but this is not advised with all, as they eat a wide variety of vegetables and young plants, and being wandering animals are liable to get lost if the garden is not completely fenced or walled. They should be provided with as large a "pen" or "run" as possible, the walls or wire netting of which should be high enough to prevent their climbing over. The practice of tethering tortoises by a hole in the shell should be discouraged. They should always be provided with a box or shelter, the cheapest form being a wooden soap box turned on one side and with a sufficiently wide entrance, the wood being creosoted and covered with roofing felt. It can be lined with asbestos sheeting if desired, and have its floor covered with dry leaves or other bedding material. Some other shelter should also be provided in the run. The tortoises should be bathed during the hot weather. The occasional application of olive oil will keep the shell polished.

Land tortoises must be fed daily, and it is important to allow them to build up good reserves to enable them to hibernate through the winter successfully. Suitable foods include lettuce, young cabbage, peas, clover, dandelions, and a wide variety of green plants and ripe, sweet fruits. Generally bread and milk should be avoided. For young tortoises especially, it is recommended that once weekly or so the food should be sprinkled with powdered cuttlefish bone, or better still a small quantity of powered calcium gluconate or cod-liver oil. Fresh water in a shallow tray, or even a saucer, should always be provided.

One of the most difficult problems in tortoise keeping is hibernation. Some persons avoid allowing their pets to hibernate by transferring them to a warm place, such as a heated greenhouse; if this is done they must be kept well fed and their place maintained at a summer temperature. It is imperative to do one thing or the other—the half-torpid tortoise that is neither hibernating nor kept at summer temperature will die. Moreover, a tortoise that is allowed to hibernate must not be disturbed.

Signs of pending hibernation, including sluggishness and lowered appetite, are usually evident late in September or early in October. Tortoises living in the garden may commence to bury themselves. If this is allowed they must be well covered, else they may be killed by the ensuing frost. It is, though, more convenient and perhaps provides a greater chance of survival, due to the changeable winter conditions in Britain, to place the animal in a large box, which should be packed with straw, leaves, or hay. The box should be stored in a cool but frostproof place, such as out-building, cellar, or attic. It is important not to create conditions that will awaken the tortoise or tempt it to emerge before the following spring. Rats have been known to attack hibernating tortoises, and so due precautions should be taken.

On emerging from hibernation the eyes and nostrils are somewhat sealed, and should be released by bathing with a 4 per cent. boric acid solution and warm water.

Recently imported female tortoises frequently lay eggs, but it is not a common occurrence for pairs to breed freely in Britain. During the early part of the summer the male is sometimes seen butting the shell of the female, this being a courtship action. If eggs are laid it is unlikely that they will be fertile, and less likely that they can be hatched. They have been hatched by placing them on damp sand and storing them in a warm place—a heated greenhouse or airing cupboard. The eggs should not be disturbed or "turned" once incubation has commenced.

Tortoise ticks are often present on freshly imported specimens, and may best be removed by damping the tick with paraffin or methylated spirits and then removing it gently with tweezers. Round worms are very numerous in tortoises, and should they be seen in the faecal matter the remainder may be eliminated by sprinkling up to one grain of powdered santonin on the food once a week for six weeks. Possibly, some of the newer, safe anthelmintic preparations containing piperazine derivatives may be equally effective. Eye infections are common, and are usually remedied by bathing the eye well with a 4 per cent. boric acid solution or warm cod-liver oil. Continuous discharge from the nose indicates lung infection, and as a primary measure the animal should be kept warm. Bleeding can be stopped by using Friar's Balsam, and care should be taken to prevent insects settling on open wounds.

WATER TORTOISES (TERRAPINS).

In Great Britain the tortoises that have become adapted to life in ponds and rivers are usually termed "terrapins," the name turtle being applied to marine forms. In the U.S.A. and Canada, however, not only the marine species but also terrapins and tortoises are all termed "turtles."

Several kinds of terrapin are available and capable of thriving in Great Britain. These include several American species, the European Pond Tortoise (*Emys orbicularis*), the Spanish Terrapin (*Clemmys leprosa*), the Caspian Terrapin (*Clemmys caspica*), and the Reeves' Terrapin (*Chinemys reevesii*), which hails from China and Japan.

The ideal place in which to keep terrapins is a garden pond within an enclosure. The pond should contain an "island" of dry ground on to which the animals can climb easily. The water should vary in depth, and at one point be at least 2 ft. deep. Provided that there is a suitable "island" the boundary walls of the pond can be upright to prevent escape. The final coat of cement should be smooth and mixed with a waterproofing agent. Shade should be available, not only on the island but also in some parts of the water. This may be provided by suitable plants.

Terrapins are almost entirely carnivorous, although the young of some species may take a little lettuce or other vegetable food. Suitable foods include *small* pieces of raw meat, raw liver (this should certainly be given from time to time), fish, and earthworms. Terrapins prefer to take their food in the water, and it is best to feed them individually if there are several, to ensure that each receives his proper share.

Water tortoises also hibernate. Some bury themselves in mud or sand at the bottom of their ponds, others will dig themselves into the earth in the island or banks of their pond, while others again may go to sleep in the box that, as in the case of land tortoises, should preferably be provided for them on part of ther "land." Should they sleep at the bottom of the pond, it is as well to prevent freezing of the water. One means of doing this is to leave a log or logs floating on the surface. Moving these logs on cold mornings will help to break any ice formed and to prevent total freezing.

AQUARIUM FISH.

There are two types of aquaria—the cold-water, for fish from this and other temperate countries, and the heated, for tropical varieties of fish. Apart from the fact that a suitable heating mechanism—usually electric, with thermostatic control—has to be maintained for tropical aquaria, the general principles governing the two types are much the same. There is a certain amount of additional initial expense in setting up a heated aquarium—the running costs are not high—but in some respects tropical fish are easier to maintain than many of the cold-water varieties.

It should be emphasised at the outset that those who want to keep fish should invest in a proper aquarium and not in a "goldfish bowl," unless the latter be very large in relation to the fish to be kept. Far too many fish suffer from overcrowding or from lack of sufficient water surface. In the case of cold-water fish, it has been calculated that every "1 in. of body" requires 1 sq. ft. of water surface in order to obtain sufficient oxygen for respiration. Thus a fish the body of which (*i.e.*, the length minus the tail fins) is 4 in. will require at least 4 sq. ft. of water surface, *i.e.*, an area of 2 ft. × 2 ft. Two such fish will require twice this area, and so on. In *The Right Way to Keep Pet Fish* by R. Dutta (6s.), it is pointed out that a goldfish should normally live for twenty-five years in a suitable pond, and grow to its full length of over 14 in. There are few indoor aquaria capable of supporting many full-grown goldfish in adequate conditions, and indeed it is recommended that fish such as shubunkins, fantails, veiltails, and orandas, which grow more slowly, are far better adapted to cold-water aquaria than goldfish. Tropical fish of the varieties kept in aquaria are usually much smaller. Many have an average body length of only about 1¼ in., and eighteen such fish may be maintained in a suitably heated tank with an area of water surface of 18 in. × 12 in.

A beginner should not only read good books on the subject (including *Water Life* publications) but also consult experts and his local aquarist or dealer. Whatever aquarium is chosen, the conditions should be correct *before* any fish are introduced. Should fish be suddenly acquired, before a proper aquarium has been fitted up for them they should be kept in some temporary (but sufficiently capacious) quarters until the aquarium is ready.

The instructions for installing and fitting up an aquarium are usually supplied, and should be followed carefully. The sand that is usually placed on the bottom should be thoroughly washed, and is best put in a little at a time. Make sure that the inside of the aquarium is thoroughly clean before anything at all is put into it. Ornamental rocks may next be introduced, and great care should be taken to ensure that these are of the correct type, unlikely to harm the fish physically or chemically. Water is then added very gently indeed, and suitable plants set. In the case of large tanks the planting is best done when the tank is only partly filled with water, but in any event the plants themselves should be kept wet all the time, or they may quickly shrivel up. In the case of cold-water aquaria everything may now be left for a few days—preferably a week or more—to ensure that all is well, and to allow certain micro-organisms that help form the food of the fish to develop. In the case of heated aquaria it is necessary also to ensure that the thermostat is working correctly and that the temperature is remaining constant or within very narrow limits. Here again it is advisable to wait at least a week before introducing any fish. Should conditions "go wrong" before or after the fish are introduced, it is best to start filling the tank all over again.

Fish should not be overfed, although regular feeding is essential. Attention must be paid to the feeding instructions issued with prepared fish foods, and to details given by the supplier of "live" foods. Provided fish are neither overcrowded not overfed, the amount of sediment that accumulates in the tank will not be excessive, but it should be siphoned away gently every month, or more often if necessary. Water lost by evaporation should be replaced, and in the case of heated tanks especially, it is most desirable that the added water be of the same temperature as that already in the tanks.

Certain species of water snail are often placed in aquaria to act as scavengers. It is necessary to ensure that, if snails are kept, they are of the right type, and it is important to consult experts on this matter.

Breeding is an interesting topic, there being both egg-laying and viviparous or "live-bearing" fish. The beginner is well advised to learn first how to keep fish in healthy condition in his aquarium before indulging in any planned breeding, and he should study the relevant information in books on the subject.

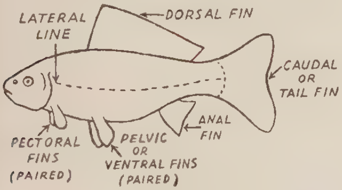
An aeration plant is often recommended on the grounds that it will increase the fish-carrying

capacity of the aquarium. This is true up to a point, but overcrowding may bring other troubles besides those connected with lack of sufficient oxygen, and the golden rule is never to keep too many fish for the size of aquarium in question. Another factor to be remembered is that should the aerator break down it may leave the fish with less oxygen than their proper requirement. It has been recommended that an aerator is best thought of as a stand-by, to be employed only in emergencies, *e.g.*, when for some reason extra fish have to be added to a tank already holding all or almost all its proper capacity.

There are unfortunately many diseases of fish, and as yet scientific knowledge concerning many of them is far less detailed than it should be. It is clear, however, that environmental factors are responsible for many deaths or cases of unthriftiness, and among the factors concerned may be listed: overcrowding, overfeeding, the provision of a diet that is qualitatively inadequate, lack of " balance " in the aquarium leading to unsuitable conditions, dirt, too strong light, lead paint and noxious substances, that may somehow have come into contact with the water (*e.g.*, from the hands of the person tending them) or been absorbed from the atmosphere. One must be careful of such things as disinfectants, soaps, petrol, etc. In the case of tropical fish the temperature of the water may be incorrect. Should fish troubles occur, therefore, it is as well to consider these various possibilities, although one should not hesitate to seek professional advice where there appears to be a case of infectious disease. An ailing fish should certainly be removed from the tank (assuming that there are other fish present) and given separate quarters of its own if such a course is feasible.

It is not intended to provide a description of the separate diseases, although it may be mentioned that such signs as the appearance of material resembling cotton-wool (actual fungal growths) and " rotting " of the tail or fins, are among those that should lead the owner to isolate affected fish and to seek help immediately.

No attempt is made here to describe any of the many different species and varieties of fish suitable for private aquaria. Some of the " points "



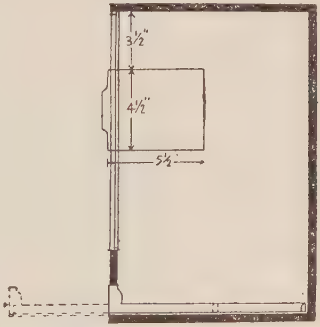
of a fish are shown in the accompanying illustration. Great care must be taken in mixing species, *e.g.*, " hard mouthed " and " soft mouthed " kinds should not be kept together. The temptation to put other species (*e.g.*, newts) with aquarium fish must likewise be avoided.

CAGE BIRDS.

Very many species and varieties of birds are now maintained successfully in captivity, and there exists in Great Britain a large and expanding " cage-bird fancy," that caters for a considerable proportion of the smaller birds adapted to cage or aviary life. The increase in the numbers of budgerigars since the end of the Second World War has been phenomenal, and it was estimated during 1957 that the numbers of the species alone in the United Kingdom exceeded 6 millions, the corresponding figure for the U.S.A.—where the popular name is " parakeets "—being over 18 millions.

The different types and sizes of birds have different requirements, and in the space available it is not possible to do more than cover the general principles and to deal briefly with the special characteristics of the management of the more easily maintained species. The beginner is advised to restrict his attention to one of the better-known species, *e.g.*, canaries or budgerigars, and not to attempt to maintain exotic varieties until he has acquired considerable experience.

Most species thrive best in aviaries, which may be indoor, outdoor, or of the combined " outdoor–indoor " type. An indoor aviary is usually all-wire and portable. The criticism of many such aviaries is that they tend to be high and narrow, whereas a fairly large floor-space is desirable. They should not be placed in cold or draughty places, nor too near a fire. If sited so as to receive much direct sunlight they must have adequate shelter. The wires must be close together, especially if smaller species are kept, a distance between them of about ⅜ in. being generally suitable. An outdoor aviary—suitable only for some species or at certain times in the case of others—should occupy a sunny position, although it too must include shade, and must be protected from winds. There ought in fact to be a sheltered portion, dry and well protected from the elements. The aviary must be strongly made and safe from all predators, including rats and mice. While it is often considered desirable to allow herbage to protrude through the wire-mesh floor, it is essential that the birds are never in close contact with wild rodents or their droppings. Most birds are highly susceptible to some forms of *salmonellosis* (see under mice and guinea-pigs), and can contract them in this way. It is advisable also that the roof of the aviary is solid: corrugated asbestos sheeting, projecting well clear of the edges of the uprights so as to prevent water and other matter from entering the interior, is excellent. The droppings of wild birds may be a potent source of bacterial infection or of internal parasites. To prevent close contact otherwise with wild birds, the wire or wire-netting " walls " of the aviary may be double. If an " outdoor–indoor " aviary is employed, there is usually an indoor flight cage, separated from the external portion either by a very light hanging door of suitable size, through which the birds can easily push their way, or by a sliding partition that the owner can operate as required.

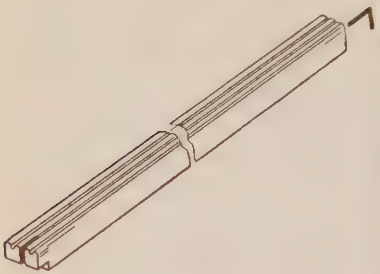


SECTION THROUGH CAGE.

If an aviary is out of the question, then a suitable cage should be purchased or constructed. The cage need not be ornate—indeed simplicity of design usually facilitates the highly important task of keeping everything clean—but it must be large enough. A cross-section through a breeding-cage suitable for canaries, and for many other species, is shown in the accompanying illustration. Such a cage should measure about 40 in. in length × 12 in. wide × 18 in. high. It is constructed of wood or some suitable sheeting except for the front, which consists of vertical wires with horizontal stays, and can be divided into two parts by means of a suitable partition containing a removable section made of wire. By this means the cock and hen canaries can be introduced into the separate sections and develop a courtship before being allowed to be together for actual mating. The cross-section indicates the site and size of the removable portion of the partition, and it shows also the removable tray that is such an

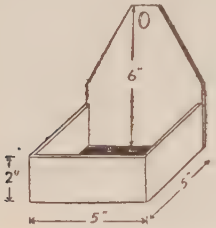
excellent fitting for almost any type of cage, and which greatly facilitates cleaning.

Whether an aviary or a cage is employed, it is essential to have proper fittings, including con-



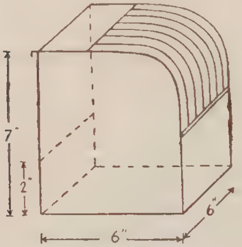
PERCH.

veniently placed drinking-troughs, feeding-trays and bird-baths, and good perches. Much unnecessary discomfort is brought about through the use of unsuitable perches, or ones that are incorrectly situated or not sufficiently "firm."



NESTING-BOX WITH PLAIN WOOD BOTTOM.

A suitable type of perch, of which there should be several in the cage or aviary, is shown in the accompanying illustration, and it should be of the appropriate dimensions for the size of bird. In the case of the larger canaries (Norwich and

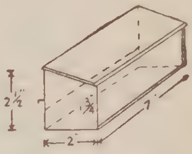


BIRD BATH.

Yorkshire), *e.g.*, the sectional measurements should be $\frac{5}{8}$ in. × $\frac{3}{4}$ in., whereas for a smaller canary (Border) they should be $\frac{1}{2}$ in. × $\frac{3}{4}$ in. The type of perch shown is easy to clean and does not possess awkward corners in which parasites may be harboured. The dimensions of a nesting box a bird-bath, and a feeding-tray suitable for canaries are also given in the accompanying illustrations.

While wood is a convenient material for aviary and cage construction, it has, of course, several disadvantages. Out of doors it is best creosoted (lead paint must never be used for places in which birds or other small animals are kept), and indoors it is better lined with hard asbestos sheeting. Metal is suitable—provided that it does not rust or corrode and that the environmental conditions are warm enough.

In all cases a supply of clean, fresh water should be available. Strict cleanliness should be observed, and professional advice taken immediately if a bird is not thriving.



SEED TROUGH.

CANARIES (*Serinus canarius*).—These are domesticated forms of the race of wild serin found in the Canary Islands, and may live up to twenty-five years. Many varieties are known, and although most individuals are "canary yellow," other colours have been developed by fanciers. Many books have been written about the canary, although there is still much to be learned concerning its feeding and diseases—as is indeed the case with almost all cage-birds. The system of feeding generally recommended is based upon a mixture of 2 or 3 parts of canary seed (which is rich in energy, and which is sometimes mixed with a little millet seed) to 1 part of summer rape seed, which is high in fat and protein. There seems to have been some difficulty in obtaining suitable rape seed in some areas since the war. The best is German summer rape or Rübsen rape. Other seeds are employed as substitutes, or for special purposes, *e.g.*, niger is usually added at breeding time, and linseed if there is any indication of premature or soft (out-of-season) moult. Good proprietary seed mixtures are available. A little greenfood should be provided twice weekly, and a piece of cuttlefish bone placed between the wires is a suitable source of calcium. Soft-bill food (containing boiled egg, dried egg yolk, dried flies, and ants' pupæ) is also recommended by many breeders, while others give chopped egg alone. Others again favour milk, especially for young birds.

Breeding is usually started late in March or early in April, but not unless the daily shade temperature is at least 50° F. The pairs should be selected earlier than this and transferred to breeding-cages, with the partition in position. By the middle of February the wire partition may be installed so that the two birds can see one another. A little niger seed is usually added to the diet, while finely ground oystershell or eggshell may be sprinkled on the floor. (Otherwise the floor may be covered with washed sand that is not too fine and is free from dust.) When the birds begin to feed one another through the wire they are ready for mating, and the partition may be removed. The nest-box can then be inserted and suitable nesting materials, *e.g.*, cow hair and moss, placed in the cage. The incubation period is thirteen to fourteen days. After the eggs are laid some owners prefer to separate the cock and the hen, but allow him to rejoin her after the young are all about eight to nine days old and have opened their eyes. If it is desired that all the chicks be hatched together, then one can remove the first three eggs that are laid—usually one egg is laid daily—and keep them in a box at room temperature, substituting dummy eggs for them in the nest-box. On the afternoon of the third day of laying they are returned to the nest-box in place of the dummies.

When the young chicks are able to feed for themselves they should be provided with special food, such as egg and bread crumbs and a little cracked canary seed. If the cock bird interferes with them, or causes the hen to neglect them, he must be returned to his own section. Usually, however, all goes well, and the hen will go to the nest again when the first chicks are almost sixteen days old. Some three or four broods may be raised in a season.

WAXBILLS, FINCHES, AND OTHER SEED-EATERS.—The canary is of course a finch, but most of the other "foreign finches" are considered by dealers and writers together with other types of seed-eating birds. Well over 30 species of *Avadavats*, *Buntings*, *Mannikins*, *Cardinals*, *Whydahs*, *Weavers*, and *Finches* of various descriptions have been maintained successfully in capitivity in Great Britain. One of the most popular is the *Zebra finch* (*Taeniopygia castanotis*), from Australia, which has bred so successfully in this country that supplies no longer depend upon fresh importations, and which is already appearing in several varieties. The native bird, and many of its descendants, are grey and white, with red beaks. The male bird has orange cheek-patches, and orange flanks with white markings. The throat has black barring on a white background, and indeed the characteristic markings of the male have been the subject of interesting behaviour studies. The female lacks these special markings. The species is hardy, and is capable of living in outdoor aviaries all the year round, so long as it has shelter from draughts or strong winds and adequate facilities for roosting. If provided with nest-boxes, the birds will attempt—often successfully—to breed all the year round, so to avoid overbreeding it is better to remove these boxes in winter. A mixture of millet and canary seed forms the basis of their diet, which should be supplemented with fresh greenfood, millet sprays, fine grit, and cuttlebone—and, of course, fresh water should be available. Another bird suitable for the relatively uninitiated bird-keeper is the *Bengalese* (a domestic variety of *Munia striata*). It seems that these birds are the result of careful breeding by the Japanese, and may be regarded as fertile hybrids. Three main forms, the Chocolate-and-White, the Fawn-and-White, and the White, have been developed. These birds will thrive in cages or in aviaries. As in the case of Zebra Finches, they will attempt to breed all the year round if provided with nest-boxes. Bengalese are sociable birds, sometimes known in the U.S.A. as Society Finches. They appear to require less additional food than most species, thriving on a mixture of canary and millet seed, together with grit, cuttlebone, and an occasional millet spray or item of greenstuff.

For details of these birds, and of the many others from which a selection may be made, works of reference should be consulted. Three very useful books, all published by Cage Birds, London, are *Foreign Bird Keeping*, by Edward J. Boosey (63*s*.), *Foreign Birds for Beginners*, by D. H. S. Risdon (10*s*. 6*d*.), and *Foreign Birds for Garden Aviaries*, by Alec Brooksbank (10*s*. 6*d*.).

BUDGERIGARS.—The increase in the popularity of this bird has been phenomenal, although to those who have experience of other birds as pets the reasons are soon fairly obvious. Apart from the capacity to talk, shown by many birds—especially males—kept alone and trained, there is a liveliness, almost a "cheekiness," and an apparent like of human companionship. The wild green budgerigar (*Melopsittacus undulatus*) exists in large numbers in the grassland and desert shrub regions of Australia. The usual colour is grass green—it is frequently known as the Grass Parakeet—with a yellow mask, with three black spots on either side. As a result of intensive breeding, a considerable number of colour varieties has been produced, and the genetics of colour are a constant source of interest to budgerigar breeders. A vast budgerigar "fancy" has been built up in the United Kingdom, the U.S.A., and other countries, and World Budgerigar Congresses are held every few years. Budgerigars will thrive in outdoor aviaries all the year round, but the vast majority are kept as indoor pets in cages or small aviaries. The cages can be similar to those used for canaries, and care should be taken that the perches are of the correct diameter. If nest-boxes are put up, and the environmental conditions are suitable, budgerigars suitably paired will breed at almost any time of the year. It is customary, however, to restrict breeding to the spring, summer, and early autumn. Overbreeding may lead to difficulties, including the production of "runners" or "French moult." The sexes may normally be distinguished, at any rate in mature individuals, by the colour of the cere at the base of the beak, which is blue in males and brown in females. Males may lose their colour if not in good condition and for other reasons.

There are now many proprietary seeds mixtures, but some owners prefer to make up their own mixtures of millet (usually mixing small yellow and large white varieties) and canary seed. Millet sprays, fresh greenfood, good grit, and cuttlebone are all desirable, and it is important that the correct size and consistency of grit be chosen. Variety in "extras" to the basal seeds diet is probably important, for the captive bird has not the same opportunities as its wild ancestors for ranging widely for, possibly, important trace items of food. Breeding birds secrete a "milk," comparable with the crop milk of pigeons and some other birds, and this is of importance in the early feeding of the young.

Most healthy budgerigars seem to live to the age of 5–7 years or more, and considerably greater ages have been attained in captivity.

Such is the development of the budgerigar fancy that most equipment as well as food can be obtained ready for use. The playful habits of budgerigars have led to their being given table-tennis balls or a variety of small toys to play with, while some forms of food are supplied as budgerigar bells or otherwise in special shapes that seem to amuse the birds as they take the constituent seed from them.

The study of budgerigar diseases is in its infancy, but already some important facts have become realised. *French moult* is certainly reproducible by overbreeding, and may be linked with deficiencies in the ability of the parent birds to feed their young—or to hand over to them at the time of laying sufficient nutritional reserves to carry them through hatching and parental feeding until the time that they can fend for themselves. A deficiency in the "milk" has been shown in some cases, and may be generally true. Large chicks can be produced by killing off or removing all but a single member of the clutch, and allowing the parents to deal with it alone.

A mite infestation, due to *Cnemidocoptes pilae*, may give rise to *Scaly face*, *Scaly beak*, or *Scaly leg*, for which veterinary treatment is now available. Another condition, known as *Brown hypertrophy of the cere*, is characterised by thickening and darkening of the surface of the cere. In the early stages it is sometimes thought that the bird is changing its sex. There is no known successful treatment at the time of writing, and if the overgrowth is cut away it will only reform. There are various disturbances of the *digestive tract*, and some of these may be associated with inability to stand properly.

There are many treatises on the budgerigar. A useful little work is *Budgerigar Guide*, by Cessa Feyerbrand (Fond du Lac, Wisconsin: All-Pets Magazine).

LOVEBIRDS AND PARROTLETS are also members of the parrot family, and while they are unlikely to equal the budgerigar in popularity, they are nevertheless interesting birds that are being kept in increasing numbers as pets. Lovebirds, of the genus *Agapornis*, are African in origin, and some six species are commonly kept in captivity. Parrotlets derive from South America, the commonest species being the Guiana Parrotlet, *Forpus passerinus*. Both types of bird are relatively simple to maintain in aviaries or large cages, and their basal diet (which should be supplemented widely) is a mixture of millet and canary seed. They are hardy and vigorous creatures, many details of which are to be found in condensed form in *Lovebirds and Parrotlets*, by C. P. Luke (London: Cage Birds, 8*s*. 6*d*.).

CALENDAR FOR 1959.

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CALENDAR FOR 1960.

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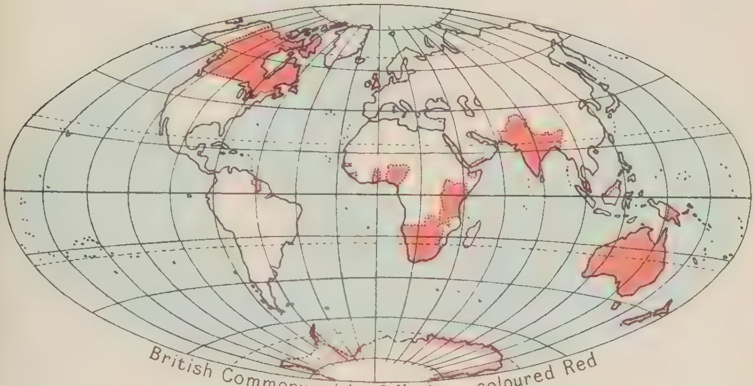
ATLAS OF THE WORLD



CONTENTS

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1954

POLITICAL DIVISIONS OF THE WORLD


EUROPE
English Miles
0 100 200 300 400 500
Railways thus
ATLANTIC OCEAN
NORTH SEA
BRITISH ISLES
IRELAND
SCOTLAND
ENGLAND
Wales
London
Edinburgh
Dublin
Iceland
Hekla
The Faeroes
Shetland Is.
Orkney Is.
Rockall.
St Kilda
C. Wrath
Bay of Biscay
FRANCE
Paris
Lyons
Bordeaux
Nantes
Brest
SPAIN
Madrid
Barcelona
Seville
Granada
Valencia
Zaragoza
Burgos
Corunna
PORTUGAL
Lisbon
Oporto
C. Finisterre
C. Ortegal
C. St. Vincent
Cadiz
Str. of Gibraltar
Gibraltar
Oran
Algiers
AFRICA
Tunis
MEDITERRANEAN SEA
Balearic Is.
Sardinia
Corsica
Sicily
Palermo
Naples
ITALY
Rome
Adriatic Sea
Trieste
AUSTRIA
Vienna
SWITZERLAND
GERMANY
Berlin
Hamburg
Munich
Frankfurt
Cologne
DENMARK
Copenhagen
BELGIUM
Brussels
Amsterdam
Helgoland
Skagerrak
Kattegat
NORWAY
Oslo
Bergen
Trondheim
SWEDEN
Stockholm
Goteborg
Lofoten Is.
Hammerfest
Arctic Circle
Lapland
FINLAND
Helsinki
Gulf of Bothnia
BALTIC SEA
POLAND
Warsaw
Danzig
Cracow
CZECHOSLOVAKIA
Prague
Brno
HUNGARY
Budapest
ROMANIA
Bucharest
Moldavia
Carpathian Mts.
YUGOSLAVIA
Belgrade
ALBANIA
BULGARIA
Sofia
Istanbul
GREECE
Athens
Thessaloniki (Salonica)
Sea of Marmara
LITHUANIA
ESTONIA
LATVIA
Riga
Tallinn
Vilnius
Minsk
White Russia
Leningrad
Moscow
Kiev
UKRAINE
Odessa
Kharkov
Stalingrad
Astrakhan
Rostov
Crimea
Sevastopol
Sea of Azov
BLACK SEA
Sinope
Trabzon
Ankara
Izmir
TURKEY
Erzurum
Caucasus Mts.
Georgia
Tbilisi
Batumi
Baku
Azerbaijan
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Aral Sea
Tehran
PERSIA (IRAN)
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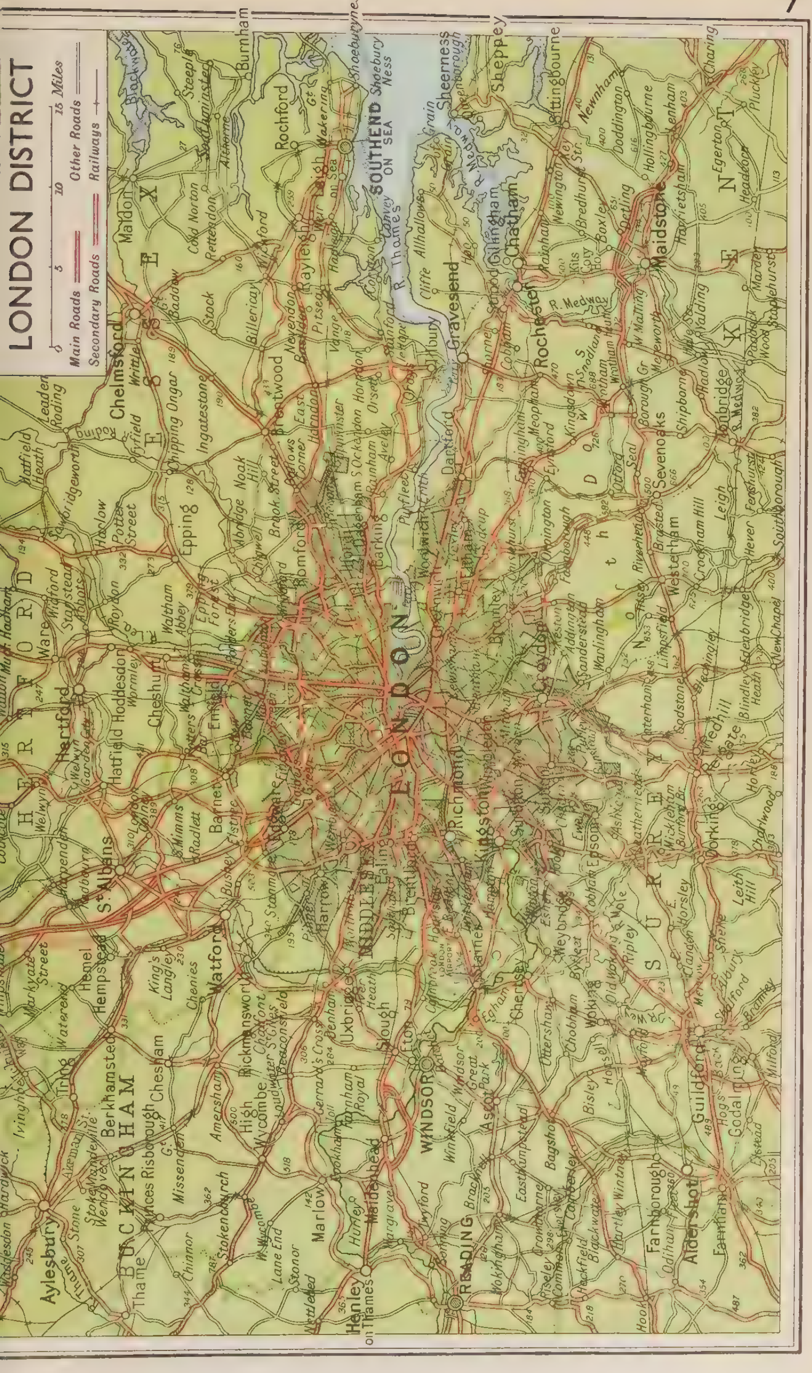
Mosul
SYRIA
Aleppo
R. Volga
R. Don
R. Dnieper
R. Ural
Kazan
Kuibyshev
Gorki
Saratov
Vologda
Archangel
White Sea
Murmansk
L. Onega
L. Ladoga
Ural Mounts
R. Pechora
Timan Hills
Sverdlovsk
Perm
Orsk
Tobolsk
Omsk
R. Ob
Kolguev
U. S. S. R.
ASIA
Lands End
English Channel

ENGLAND AND WALES
English Miles
0 20 40 60 80 100
Railways thus
N O R T H S E A
I R I S H S E A
S C O T L A N D
I R E L A N D
North Channel
Firth of Clyde
Arran
Kintyre
Edinburgh
Leith
Glasgow
Greenock
Ayr
Dumfries
Hawick
Coldstream
R. Tweed
Berwick
Holy I.
Farne Is.
Coquet I.
Alnmouth
Alnwick
Wooler
Flodden
NORTHUMBERLAND
Morpeth
Newcastle
Hexham
Blyth
Whitley Bay
Tynemouth
N. Shields
S. Shields
Sunderland
Gateshead
DURHAM
Durham
Hartlepool
W. Hartlepool
Stockton
Darlington
Saltburn
Whitby
Scarborough
Filey
Flamborough Hd.
Bridlington & Bay
Hornsea
Withernsea
Spurn Head
R. Humber
Hull
Beverley
EAST RIDING
NORTH RIDING
WEST RIDING
Y O R K
York
Leeds
Bradford
Halifax
Huddersfield
Selby
Barnsley
Sheffield
Thirsk
Malton
Pickering
Northallerton
Richmond
Ripon
Harrogate
Wakefield
Pontefract
Goole
Doncaster
Rotherham
Grimsby
Scunthorpe
Gainsborough
Louth
LINDSEY
LINCOLN
Sutton on Sea
CUMBERLAND
Carlisle
Silloth
Maryport
Workington
Whitehaven
St. Bees Hd.
Cockermouth
Penrith
Keswick
Solway Firth
WESTMORLAND
Appleby
Kendal
Windermere
Barrow
Walney I.
R. Duddon
Ulverston
Lancaster
Morecambe Bay
Fleetwood
Blackpool
Preston
Lytham
Southport
Formby Pt.
LANCASHIRE
Blackburn
Burnley
Bolton
Bury
Rochdale
Oldham
Wigan
Manchester
Salford
Stockport
Liverpool
Birkenhead
Wallasey
ANGLESEY
Holyhead
Amlwch
Menai Strait
Llandudno
Pt. of Ayre
Ramsey
ISLE OF MAN
Douglas
Peel
Castletown
Calf of Man
Belfast
Donaghadee
Port Patrick
Dundrum B.
Dublin
Kingstown

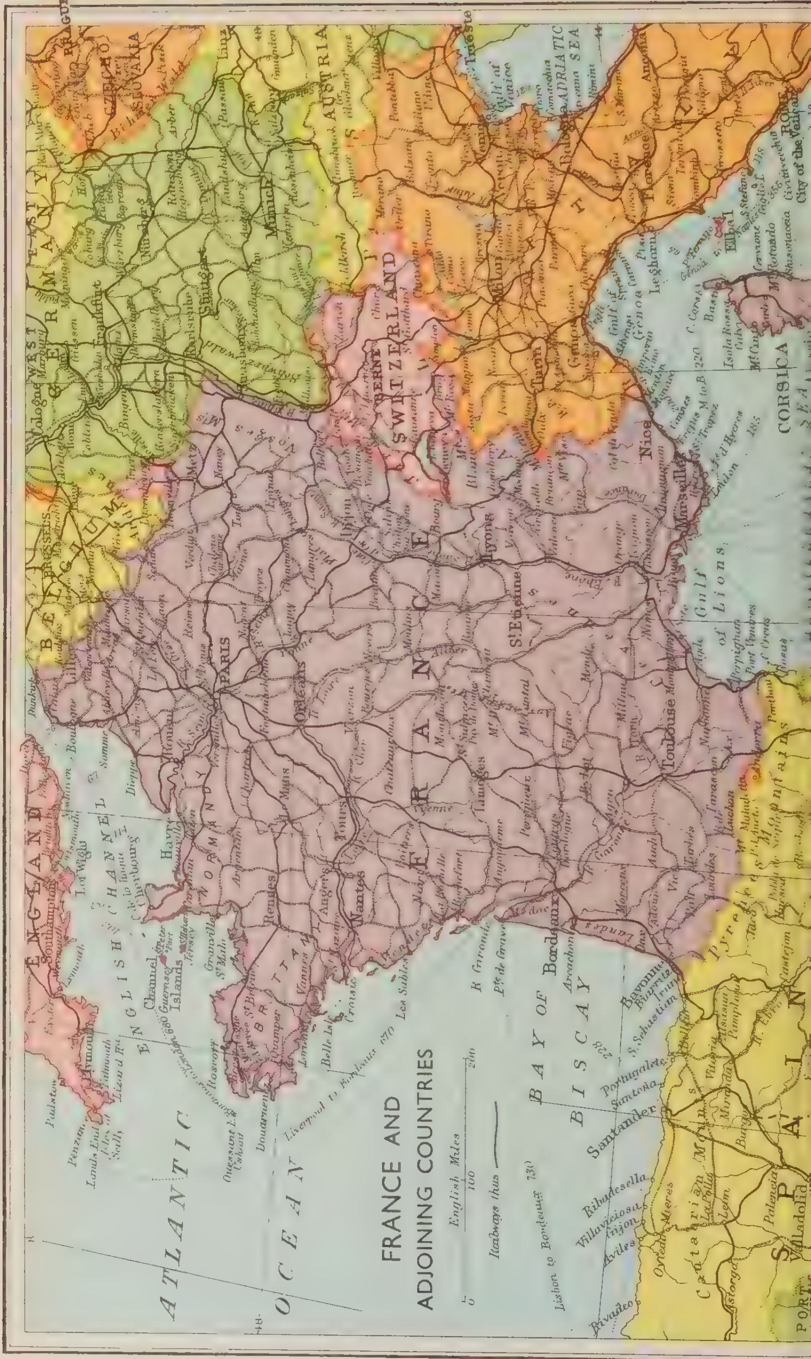

ENGLISH CHANNEL
Bristol Channel
Cardigan Bay
St. George's Channel
Straits of Dover
FRANCE
NORFOLK
SUFFOLK
ESSEX
KENT
SUSSEX
SURREY
HAMPSHIRE
DORSET
DEVON
CORNWALL
SOMERSET
WILTSHIRE
BERKSHIRE
OXFORD
GLOUCESTER
HEREFORD
MONMOUTH
GLAMORGAN
CARMARTHEN
PEMBROKE
CARDIGAN
BRECKNOCK
RADNOR
MONTGOMERY
MERIONETH
SHROPSHIRE
STAFFORD
WORCESTER
WARWICK
LEICESTER
NORTHAMPTON
BEDFORD
HERTFORD
CAMBRIDGE
HUNTINGDON
Isle of Wight
London
Bristol
Plymouth
Portsmouth
Brighton
Dover
Calais
Boulogne
Dieppe
Land's End
The Lizard


LONDON
SHOWING RAILWAYS AND PLACES OF INTEREST
UNDERGROUND
OTHER RAILWAYS
HAMPSTEAD
HOLLOWAY
ISLINGTON
CAMDEN TOWN
KILBURN
ST JOHNS WOOD
MARYLEBONE
PADDINGTON
BAYSWATER
NOTTING HILL
KENSINGTON
CHELSEA
FULHAM
HAMMERSMITH
ACTON
CHISWICK
WILLESDEN
HARLESDEN
CRICKLEWOOD
STEPNEY
HACKNEY
WALWORTH
KENNINGTON
CAMBERWELL
PECKHAM
BATTERSEA
Hyde Park
Regents Park
Hampstead Heath
Victoria Park


LONDON DISTRICT
0 5 10 15 Miles
Main Roads
Other Roads
Secondary Roads
Railways
LONDON
ESSEX
HERTFORD
BUCKINGHAM
MIDDLESEX
SURREY
KENT
North Downs
Aylesbury
Thame
Henley on Thames
READING
WINDSOR
Maidenhead
Marlow
High Wycombe
Amersham
Chesham
Berkhamsted
Hemel Hempstead
St Albans
Watford
Hatfield
Hertford
Ware
Epping
Chelmsford
Maldon
Burnham
Brentwood
Billericay
Rochford
SOUTHEND ON SEA
Shoeburyness
Sheerness
Sheppey
Gravesend
Rochester
Chatham
Maidstone
Sevenoaks
Tonbridge
Croydon
Richmond
Kingston
Guildford
Dorking
Reigate
Redhill
Farnborough
Aldershot
Farnham
Godalming
R. Thames
R. Medway

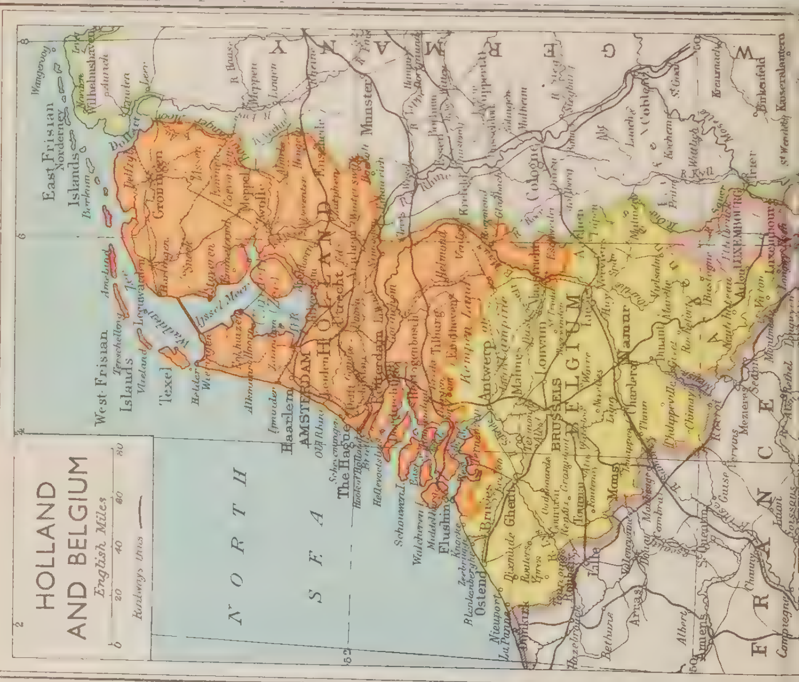

SCOTLAND
English Miles
0 10 20 30 40
Railways thus
Same Scale
Unst
Yell
Fetlar
SHETLAND
Lerwick
Sumburgh Hd
ORKNEY
Westray
Sanday
Stronsay
Rousay
Shapinsay
Stromness
Kirkwall
Hoy
Sth Ronaldsay
Pentland Firth
Dunnet Hd
Duncansby Hd
Noss Hd
Wick
CAITHNESS
Thurso
Morven
C. Wrath
L. Eriboll
SUTHERLAND
L. Shin
Helmsdale
Brora
Golspie
Dornoch Firth
Tarbat Ness
Moray Firth
NORTH SEA
Butt of Lewis
Stornoway
Lewis
Harris
OUTER HEBRIDES
The Minch
Little Minch
N. Uist
Benbecula
South Uist
Barra
Barra Hd
L. Broom
L. Maree
ROSS & CROMARTY
Inverness
Portree
Skye
Cuillin Hills
Canna
Rum
Eigg
Muck
Coll
Tiree
Tobermory
Staffa
Iona
Mull
INVERNESS
Fort William
Ben Nevis
Kingussie
Grampian Mountains
NAIRN
MORAY
BANFF
Banff
Keith
Huntly
Portsoy
ABERDEEN
Aberdeen
Ballater
KINCARDINE
Inverbervie
ANGUS
Brechin
Forfar
Arbroath
Dundee
PERTH
Perth
Crieff
Blair Atholl
Dunkeld
St Andrews
FIFE
Fife Ness
Firth of Forth
ARGYLL
Oban
Firth of Lorne
ATLANTIC OCEAN
Colonsay
Oronsay
Jura
Islay
Mull of Oa
INNER HEBRIDES
Kintyre
Campbeltown
Mull of Kintyre
North Channel
Arran
Bute
Firth of Clyde
DUNBARTON
STIRLING
Stirling
Glasgow
RENFREW
LANARK
Lanark
Edinburgh
MIDLOTHIAN
E. LOTHIAN
Dunbar
BERWICK
PEEBLES
Peebles
SELKIRK
ROXBURGH
Hawick
Kelso
Jedburgh
Cheviot Hills
AYR
Ayr
Kilmarnock
Girvan
Moffat
DUMFRIES
Dumfries
Annan
Langholm
KIRKCUDBRIGHT
Castle Douglas
WIGTOWN
Wigtown
Stranraer
Portpatrick
Luce Bay
Mull of Galloway
Solway Firth
Carlisle
ENGLAND
IRELAND
Londonderry
Belfast


IRELAND
English Miles
0 10 20 30 40 50
Railways thus
ATLANTIC
OCEAN
IRISH
SEA
North Channel
St. George's Channel
NORTHERN
IRELAND
ULSTER
IRISH
REPUBLIC
CONNACHT
LEINSTER
MUNSTER
DONEGAL
LONDONDERRY
ANTRIM
TYRONE
FERMANAGH
ARMAGH
DOWN
MONAGHAN
CAVAN
LOUTH
SLIGO
LEITRIM
MAYO
ROSCOMMON
LONGFORD
WEST MEATH
MEATH
DUBLIN
GALWAY
KILDARE
WICKLOW
LAOIGHIS
CARLOW
CLARE
TIPPERARY
KILKENNY
WEXFORD
LIMERICK
WATERFORD
KERRY
CORK
Malin Hd.
Inishtrahull
Lough Swilly
Sheep Haven
Bloody Foreland
Aran I.
Rathlin I.
Fair Hd.
Londonderry
Ballymena
Belfast
Larne
Carrickfergus
Newry
Dundalk
Armagh
Enniskillen
Monaghan
Donegal Bay
Sligo Bay
Sligo
Ballina
L. Conn
Achill I.
Clew Bay
Castlebar
Westport
Boyle
Carrick on Shannon
Longford
Drogheda
Navan
Mullingar
Athlone
Tuam
L. Mask
L. Corrib
Connemara
Galway
Galway Bay
Aran Is.
Ballinasloe
Dublin
Howth Hd.
Dublin Bay
Bray
Kildare
Wicklow
Arklow
Carlow
Kilkenny
Thurles
Cashel
Clonmel
Wexford
Rosslare
Carnsore Pt.
Waterford
Dungarvan
Limerick
Ennis
Kilrush
R. Shannon
Loop Hd.
Tralee
Killarney
Kenmare
Bantry
Bantry Bay
Skibbereen
Mizen Hd.
Cape Clear
Kinsale
Cork Harbour
Cobh
(Queenstown)
Cork
Youghal
Macroom
Bandon
Mallow
Fermoy
Kanturk
Listowel
Newcastle


FRANCE AND
ADJOINING COUNTRIES
English Miles
Railways thus
F R A N C E
PARIS
ATLANTIC
OCEAN
BAY OF BISCAY
ENGLISH CHANNEL
Gulf of Lions
SWITZERLAND
BELGIUM
GERMANY
AUSTRIA
ITALY
SPAIN
CORSICA
ENGLAND
ADRIATIC SEA
Channel Islands
NORMANDY
BRITTANY
Bordeaux
Lyons
Marseilles
Toulouse
Nantes
Orleans
Rennes
St Etienne
Nice
Havre
Cherbourg
Brest
Southampton
Plymouth
Santander
Bayonne
BRUSSELS
BERNE
Munich
Stuttgart
Frankfurt
Cologne
Turin
Milan
Genoa
Florence
Leghorn
Elba
Trieste
Linz
Valladolid

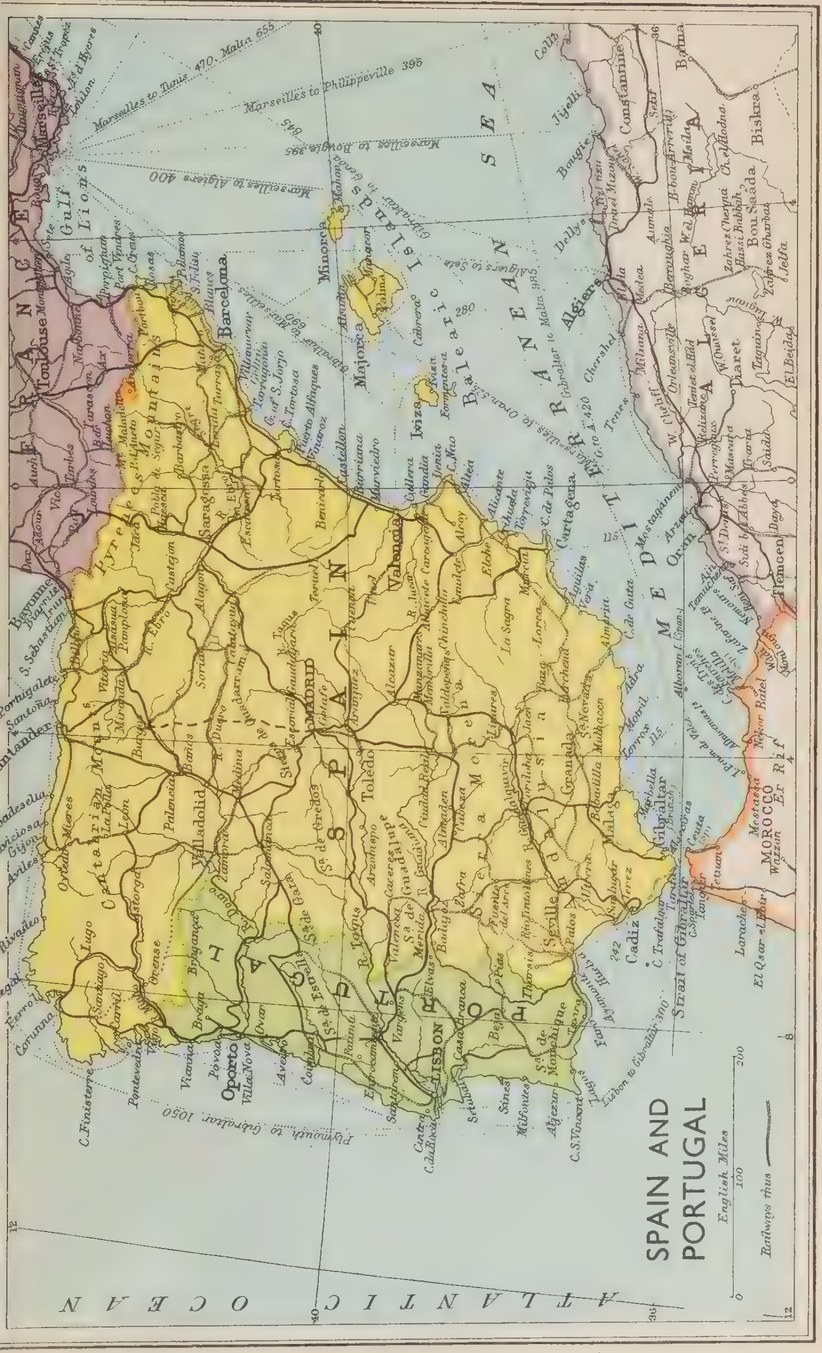

GERMANY, POLAND
AND CENTRAL EUROPE
English Miles
0
100
200
Zones of Occupation
NORTH SEA
BALTIC SEA
DENMARK
SWEDEN
COPENHAGEN
LITHUANIA
WHITE RUSSIA
U. S. S. R.
UKRAINE
POLAND
WARSAW
EAST
BERLIN
WEST
GERMANY
CZECHOSLOVAKIA
PRAGUE
AUSTRIA
VIENNA
HUNGARY
BUDAPEST
ROMANIA
SWITZERLAND
BERNE
ITALY
FRANCE
BELGIUM
BRUSSELS
AMSTERDAM
The Hague
Rotterdam
Hamburg
Bremen
Hanover
Cologne
Frankfurt
Munich
Stuttgart
Leipzig
Dresden
Wrocław (Breslau)
Poznań
Gdańsk (Danzig)
Kaliningrad (Königsberg)
Szczecin (Stettin)
Łódź
Cracow
Lvov (Lemberg)
Brest (Brest Litovsk)
Minsk
Vilnius (Vilna)
Kaunas (Kovno)
Brno
Bratislava
Linz
Graz
Chernovtsy (Czernowitz)
Debrecen
Oradea
Railways thus


DENMARK
English Miles
Railways thus
BORNHOLM (to Denmark)
Same Scale
SKAGERRAK
KATTEGAT
NORTH SEA
BALTIC SEA
JUTLAND
The Skaw
Gr^t Belt
Lit^e Belt
N^th Frisian Islands
Heligoland
Copenhagen
Kiel
Flensburg
Schleswig
Rendsburg
Lübeck B.
Rostock
Göteborg
Halmstad
Anholt
Læso
Fehmarn
Falster
Lolland
Möen
Sylt
Blaavands Huk
Ringkobing
Kiel Bay
Fehmarn Belt


HOLLAND AND BELGIUM
English Miles
Railways thus
NORTH SEA
West Frisian Islands
East Frisian Islands
HOLLAND
BELGIUM
AMSTERDAM
The Hague
Haarlem
Rotterdam
Utrecht
Groningen
Zwolle
Texel
Flushing
Antwerp
BRUSSELS
Ghent
Bruges
Ostend
Louvain
Namur
Liége
Charleroi
Mons
Cologne
Aachen
Munster
Coblenz
Trier
Luxembourg
Lille
Amiens
Sedan
FRANCE


SWITZERLAND
English Miles
0
10
20
30
Railways thus
GERMANY
AUSTRIA
FRANCE
ITALY
Basle
Zürich
Constance
Lake of Constance
Lindau
St Gallen
Appenzell
Lucerne
Berne
Fribourg
Thun
Lausanne
Lake of Geneva
Geneva
Besançon
Pontarlier
Glarus
Chur
Schwyz
Altdorf
Sion
Pennine Alps
Bernese Alps
Lepontine Alps
Bergamasque Alps
Matterhorn
Monte Rosa
Jungfrau
Finsteraarh.
St Gotthard
Chablais
Faucigny
Sondrio
Annecy
Liechtenstein
Lugano
Bellinzona
Thonon

SCANDINAVIA AND BALTIC LANDS
English Miles
0 50 100 200 300
Railways thus
On the same scale
ICELAND
REYKJAVIK
Horn (North C.)
Isafjordur
Siglufjordur
Akureyri
Langanes
Seydisfjordur
Djupivogur
Breidha Fd.
Faxafloi
Hafnarfjordur
Vatna Jokull
Hekla
Vestmannaeyjar
North Cape
Hammerfest
Nordkyn
Vardö
Varanger Fd.
Vadso
Kirkenes
Pechenga
Polyarnyy
Kola
Lake Inari
Tromso
Lofoten Islands
Narvik
Harstad
Vest Fd.
Bodo
Saltdal
Arctic Circle
Mosjoen
Kiruna
Gallivare
Lapland
Kandalaksha
Imandra L.
Kemi
Tornio
Oulu
Lulea
Pitea
Boden
Skelleftea
Raahe
Umea
Vannas
Ornskoldsvik
Gulf of Bothnia
Kokkola
Iisalmi
Kuopio
Vaasa
FINLAND
Tampere
Pori
Rauma
Turku
HELSINKI
Hanko
Porkkala
G. of Finland
Mikkeli
L. Saimaa
Viborg
Kotka
Kronstadt
Lahti
Riihimaki
NORWAY
SWEDEN
Trondheim
Trondheim Fd.
Kristiansund
Molde
Alesund
Dovre Fd.
Roros
Dombas
Jostedals Brae
Galdhopiggen
Sogn Fd.
Bergen
Stord
Haugesund
Stavanger
Arendal
Kristiansand
Flekkefjord
The Naze
Skagerrak
Hamar
Honefoss
Drammen
Tonsberg
Larvik
Uddevalla
Ostersund
Storsjon
Hede
Bracke
Solleftea
Harnosand
Sundsvall
Hudiksvall
Soderhamn
Gavle
Falun
Avesta
Uppsala
Aland Is.
Kongsvinger
Arvika
Karlstad
Vasteras
Orebro
STOCKHOLM
L. Vaner
L. Vatter
Norrkoping
Linkoping
Boras
Goteborg
Jonkoping
Varberg
Vaxjo
Kalmar
Halmstad
Oland
Gotland
Visby
Vastervik
Oskarshamn
Helsingborg
Lund
Malmo
Karlskrona
Kristianstad
Trelleborg
Bornholm (Den.)
BALTIC SEA
Hiiumaa
Saaremaa
TALLINN
Paldiski
Narva
ESTONIA
Tartu
Parnu
Lake Peipus
Pskov
Ostrov
Valga
Gulf of Riga
Cesis
RIGA
LATVIA
Madona
Rezekne
Jelgava
R. W. Dvina
Daugavpils
Ventspils
Liepaja (Libau)
Klaipeda (Memel)
Telsiai
Siauliai
LITHUANIA
Sovetsk
KAUNAS
Vilnius (Vilna)
Polotsk
Lepel
Lida
Minsk
WHITE RUSSIA
Pinsk
Pripet Marshes
Brest (Brest Litovsk)
NORTH SEA
Frederikshavn
The Skaw
Thisted
Kattegat
Viborg
Aarhus
Randers
Ringkobing
DENMARK
Helsingor
Horn Reef
Esbjerg
Fredericia
COPENHAGEN
Fyn
Zealand
Sylt
Schleswig
Lolland
Falster
Heligoland
Cuxhaven
Kiel
Lubeck
Rostock
Hamburg
Altona
Emden
Bremen
Sassnitz
Rugen
Kolobrzeg
Swinoujscie (Swinemunde)
Szczecin (Stettin)
Gdynia
Gdansk (Danzig)
Elblag (Elbing)
Kaliningrad (Konigsberg)
Suwalki
Grodno
Lomza
Bialystok
HOLL.
Zwolle
WEST GERMANY
EAST GERMANY
Hanover
Brunswick
Munster
BERLIN
Frankfurt
Bydgoszcz
Torun
R. Warta
Poznan
Plock
POLAND
WARSAW
R. Vistula
R. Oder
R. Elbe
R. Ems



SPAIN AND PORTUGAL
English Miles
0
100
200
Railways thus
SPAIN
PORTUGAL
FRANCE
ALGERIA
MOROCCO
ATLANTIC OCEAN
MEDITERRANEAN SEA
Gulf of Lions
Balearic Islands
Pyrenees Mountains
Cantabrian Mountains
Sierra Morena
Strait of Gibraltar
MADRID
LISBON
Barcelona
Valencia
Saragossa
Cartagena
Seville
Granada
Malaga
Cadiz
Toledo
Valladolid
Oporto
Gibraltar
Majorca
Minorca
Iviza
Algiers
Oran
Marseilles
Toulouse
Bayonne
Tlemcen
Constantine
Biskra
Marseilles to Algiers 400
Marseilles to Bougie 395
Marseilles to Philippeville 395
Marseilles to Tunis 470, Malta 655
Plymouth to Gibraltar 1050
Lisbon to Gibraltar 300

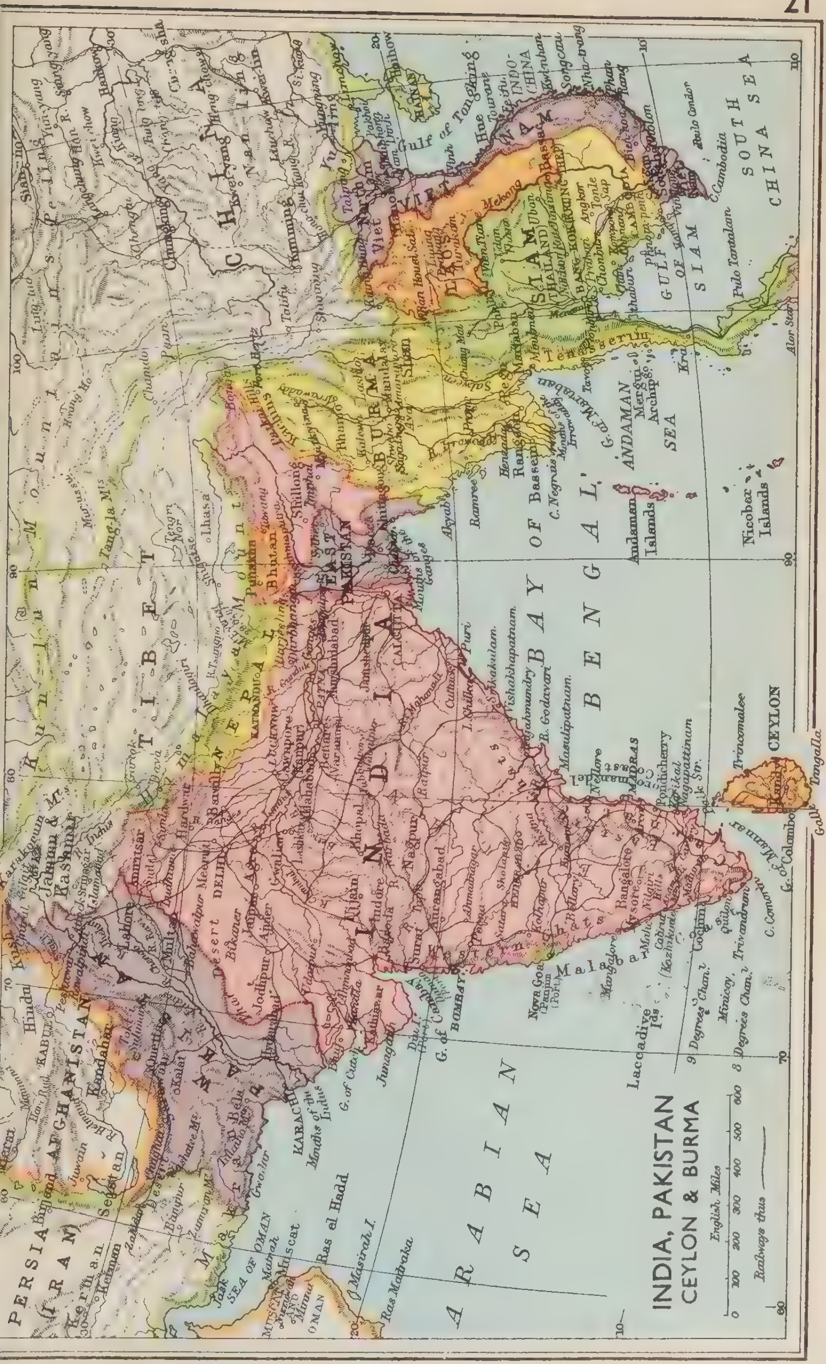

GERMANY
Frankfurt
Karlsruhe
Stuttgart
Strasbourg
Munich
Augsburg
Nürnberg
Regensburg
Passau
Linz
VIENNA
AUSTRIA
Graz
Sopron
PRAGUE
Tabor
Jihlava
Brno
Budějovice
Salzburg
SWITZERLAND
BERNE
Geneva
Zürich
FRANCE
Dijon
Lyons
Besançon
Belfort
Verdun
Metz
Nancy
Troyes
Langres
Grenoble
Valence
Briançon
Avignon
Orange
Marseilles
Nice
Toulon
Milan
Turin
Genoa
Verona
Venice
Trento
Bolzano
Udine
Belluno
Trieste
Ljubljana
Zagreb
Celje
Varaždin
Karlovac
Rijeka
Pula
Zadar
Šibenik
Split
Bologna
Parma
Piacenza
Modena
Ravenna
Rimini
Florence
Leghorn (Livorno)
Siena
Pisa
Lucca
Ancona
Perugia
Grosseto
Elba I.
Gulf of Genoa
Gulf of Venice
ITALY
ADRIATIC
ROME
City of the Vatican
Frascati
Aquila
Gran Sasso
Pescara
Campobasso
Foggia
Manfredonia
Barletta
Bari
Brindisi
Taranto
Gulf of Taranto
Naples
Gulf of Naples
Gulf of Salerno
Salerno
Potenza
Metaponto
Cosenza
Paola
Pizzo
Catanzaro
Reggio
Messina
Str. of Messina
Palermo
SICILY
Catania
Syracuse
Agrigento
Trapani
Marsala
Aegadean Is.
Lipari Islands
Stromboli
Ustica I.
TYRRHENIAN
SEA
CORSICA
Ajaccio
Bastia
Strait of Bonifacio
Bonifacio
SARDINIA
Sassari
Oristano
Cagliari
G. of Cagliari
Asinara I.
MEDITERRANEAN
Malta
Valletta
Gozo
Comino
Pantelleria
TUNISIA
Tunis
Bizerta
Carthage
Bay of Tunis
Gulf of Hammamet
Sousse (Susa)
Monastir
Mahedia
Kairouan
ALGERIA
Bone
Philippeville
Guelma
Souk Ahras
Tebessa
Marseilles to Tunis
Marseilles to Philippeville 396
IONIAN


ITALY, CENTRAL EUROPE
AND THE BALKANS
English Miles
0
100
200
Railways thus
U. S. S. R.
UKRAINE
MOLDAVIA
ROMANIA
BULGARIA
GREECE
TURKEY
BLACK SEA
Aegean Sea
Grecian Archipelago
Sporades
Dodecanese
Cyclades
PELOPONNESE
Transylvanian Alps
Balkan Mounts
Rhodope Mts
Carpathian Mountains
SEA OF MARMARA
Odessa
Kishinev (Chisinau)
Iasi (Jassy)
Oradea
Cluj
Sibiu
Brasov
Ploesti
BUCHAREST
Constanta
Galati
Braila
Timisoara
Arad
Szeged
Debrecen
Kosice
Miskolc
Lvov (Lemberg)
Tarnow
Przemysl
Cernauti (Czernowitz)
BELGRADE
Nis
Pristina
Skopje
Titograd
Scutari (Shkoder)
Tirana
Durres
Elbasan
Korce (Koritsa)
Vlone (Valona)
Bitola (Monastir)
Vidin
Ruse (Rustchuk)
Varna
Burgas
SOFIA
Plovdiv (Philippopolis)
Edirne (Adrianople)
Istanbul (Constantinople)
Uskudar
Izmit
Bursa
Thessaloniki (Salonica)
Kavalla
Larisa
Volos
Joannina
Corfu
Patrai (Patras)
ATHENS
Thebes
Sparta
Pirgos
Kalamata
Lemnos
Lesvos (Lesbos)
Chios
Samos
Izmir (Smyrna)
Manisa
Aydin
Kutahya
Afyon
Rhodes (Rodhos)
Karpathos
CRETE (KRITI)
Candia (Iraklion)
Canea (Khania)
Kithira
Euboea
Zakinthos (Zante)
Cephalonia
Levkas
Mt Olympus
Dardanelles
Bosporus
Gallipoli
Izmir to Beirut 625
Istanbul to Odessa 345


U.S.S.R.
English Miles
0 200 400 600 800
Railways thus
ARCTIC OCEAN
BARENTS SEA
KARA SEA
Laptev Sea
East Siberian Sea
SEA OF OKHOTSK
Novaya Zemlya
New Siberian Islands
North I.
Taimyr Penin.
Arctic Circle
RUSSIAN SOVIET FEDERATED SOCIALIST REPUBLIC
KRASNOYARSK
YAKUTSK
IRKUTSK
KHABAROVSK
TYUMEN
KOMI
KARELIA
FINLAND
SWEDEN
Baltic Sea
EST.
LAT.
LITH.
WHITE RUSSIA
UKRAINE
MOLDAVIA
BLACK SEA
CASPIAN SEA
KAZAKH
TURKMEN
KIRGHIZ
GEORGIA
ARMENIA
AZERBAIJAN
DAGESTAN
MONGOLIA
INNER MONGOLIA
Manchuria
KOREA
CHINA
SINKIANG
Chinese Turkistan
IRAN
IRAQ
TURKEY
SYRIA
ARABIA
AFGHANISTAN
MOSCOW
Leningrad
Kiev
Kharkov
Odessa
Stalingrad
Gorki
Sverdlovsk
Omsk
Novosibirsk
Irkutsk
Tashkent
Alma Ata
Frunze
Semipalatinsk
Karaganda
Tabriz
Shanghai
Seoul


ASIA
English Miles
0
500
1000
Railways thus
UNION OF SOVIET SOCIALIST REPUBLICS
E U R O P E
A F R I C A
P A C I F I C O C E A N
MONGOLIA
INNER MONGOLIA
SINKIANG
TIBET
CHINA
INDIA
PAKISTAN
AFGHANISTAN
BALUCHISTAN
PERSIA
TURKEY
SAUDI ARABIA
IRAQ
SYRIA
JORDAN
YEMEN
ADEN PROT.
MUSCAT & OMAN
BURMA
SIAM
LAOS
VIET NAM
KOREA
JAPAN
Philippines
EGYPT
Bering Sea
Sea of Okhotsk
Sea of Japan
Yellow Sea
China Sea
Bay of Bengal
Arabian Sea
Persian Gulf
Red Sea
Mediterranean Sea
Black Sea
Caspian Sea
Kara Sea
Baltic Sea
North Sea
Tropic of Cancer
Arctic Circle
Kirghiz Steppes
L. Baikal
L. Balkhash
R. Lena
R. Yenisei
R. Ob
R. Irtysh
R. Volga
R. Ural
R. Nile
Himalaya Mts.
Kunlun Mts.
Tien Shan Mts.
Altai Mts.
Hindu Kush
Elburz Mts.
Caucasus Mts.
Stanovoi Mts.
Everest
Kamchatka
Sakhalin
Hokkaido
Honshu
Shikoku
Kyushu
Formosa
Hainan I.
Luzon I.
Mindanao I.
Ceylon
Cyprus
Sicily
Aleutian Is.
Kuril Is.
Ryukyu Is.
Caroline Is.
Marianas Is.
Andaman Is.
Laccadive Is.
Socotra I.
G. of Aden
G. of Oman
G. of Siam
G. of Tongking
Moscow
Leningrad
Archangel
Sverdlovsk
Omsk
Tomsk
Novosibirsk
Irkutsk
Yakutsk
Okhotsk
Vladivostok
Tashkent
Samarkand
Bukhara
Khiva
Ulan Bator
Peking
Shanghai
Nanking
Canton
Hong Kong
Macao
Tokyo
Yokohama
Seoul
Manila
Bangkok
Rangoon
Calcutta
Delhi
Bombay
Madras
Karachi
Lhasa
Teheran
Baghdad
Basra
Mecca
Medina
Jerusalem
Istanbul
Cairo
Paris
London
Berlin
Vienna
Rome
Colombo

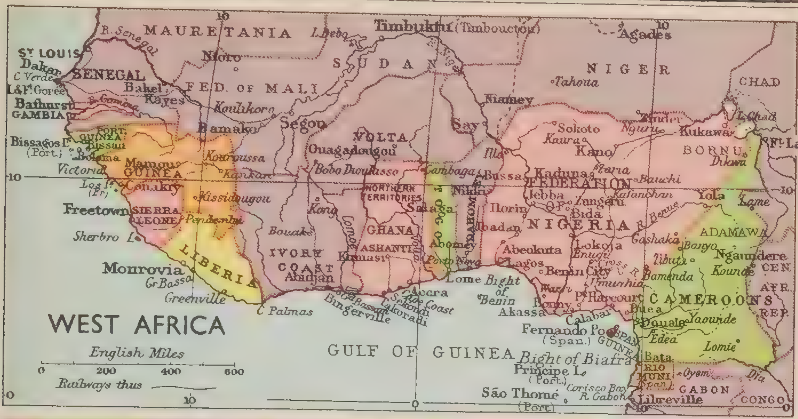
S.W. ASIA
English Miles
0 100 200 300 400
Railways thus
U. S. S. R.
CASPIAN SEA
BLACK SEA
MEDITERRANEAN SEA
RED SEA
Persian Gulf
Gulf of Oman
AFGHANISTAN
W. PAKISTAN
PERSIA (IRAN)
IRAQ
SYRIA
JORDAN
TURKEY
ANATOLIA
GREECE
EGYPT
LIBYA
Cyrenaica
SAUDI ARABIA
OMAN
MUSCAT
TEHRAN
Baghdad
Damascus
Aleppo
Beirut
Cyprus
Nicosia
Crete
Rhodes
Istanbul
Ankara
Alexandria
CAIRO
Port Said
Suez
Medina
MECCA
Jidda
RIYADH
Basra
Mosul
Isfahan
Shiraz
Mashhad
Kerman
Tabriz
Baku
Tbilisi
Erzurum
Trabzon
Sivas
Konya
Izmir
Bursa
Adana
Kuwait
BAHRAIN
Muscat
Ras al Hadd
Benghazi
Tropic of Cancer
English Miles
0 50 100
LEB.
SYRIA
Damascus
Haifa
Tel Aviv-Jaffa
Jerusalem
Amman
Dead Sea
JORDAN
Gaza
Beersheba
EGYPT


INDIA, PAKISTAN
CEYLON & BURMA
English Miles
Railways thus
ARABIAN SEA
BAY OF BENGAL
INDIA
TIBET
BURMA
SIAM (THAILAND)
CEYLON
EAST PAKISTAN
AFGHANISTAN
CHINA
SOUTH CHINA SEA
GULF OF SIAM
ANDAMAN SEA
NEPAL
Bhutan
BOMBAY
KARACHI
CALCUTTA
MADRAS
DELHI
Lhasa
Nicobar Islands
Andaman Islands
Laccadive Is.

CHINA AND JAPAN
English Miles
0 100 200 300 400 500 600
Railways thus
PACIFIC OCEAN
SEA OF JAPAN
MONGOLIA
MANCHURIA
INNER MONGOLIA
The Gobi
SINKIANG
TIBET
CHINA
KOREA
BURMA
INDIA
ASSAM
EAST PAKISTAN
U.S.S.R.
PEKING
Shanghai
Nanking
Hankow
Canton
Hong Kong (British)
Macao (Port.)
Vladivostok
Harbin
Lhasa
Mandalay
Irrawaddy
Yellow Sea
East China Sea
Tropic of Cancer
Yangtze Kiang
Lan-chow
Kunming
Shikoku
Kyushu
Hakodate
Nagasaki
Kagoshima
Ogasawara Jima
Kazan Retto (Volcano Is.)

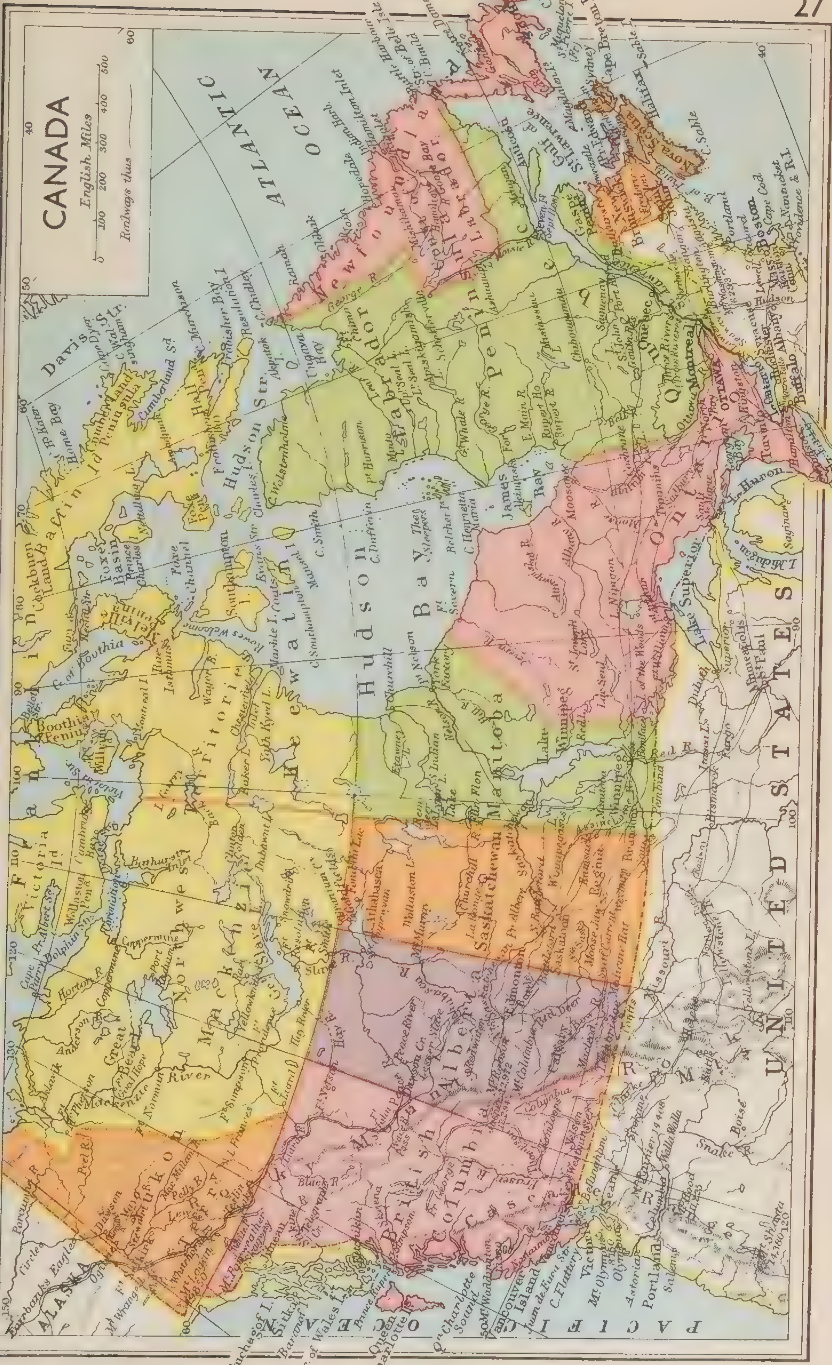

S.E. ASIA
English Miles
0 100 200 300 400 500 600
Railways thus
PACIFIC OCEAN
INDIAN OCEAN
SOUTH CHINA SEA
MARIANAS OR LADRONES ISLANDS
Saipan
Tinian
Rota
Guam (U.S.)
CAROLINE ISLANDS
(U.S.A. Trust Terr.)
Palau (Palaos)
Babelthuap
Yap
Ulithi
Ngulu
Sorol
Woleai
Eauripik
Ifalik
Sonsoral
Pulo Anna
Tobi
Cartaret Reef
St David (Mapia) Is
Equator
PHILIPPINES
LUZON
MANILA
Batangas
Mindoro
Palawan I.
Panay
Negros
Samar
Leyte
MINDANAO
Sulu Arch.
SULU SEA
Jolo
Tawi Tawi
SIAM
Bangkok
LAOS
VIET NAM
INDO-CHINA
Hue
Saigon
CAMBODIA
Gulf of Siam
Kra Isthmus
MALAY PENINSULA
FED. OF MALAYA
Kuala Lumpur
Penang
SINGAPORE
MALACCA STRAIT
SUMATRA
Medan
Padang
Palembang
Bangka
Billiton
BORNEO
NORTH BORNEO
BRUNEI
SARAWAK
Kuching
Jesselton
Mt Kinabalu
Bandjarmasin
CELEBES SEA
CELEBES
Makasar
Str. of Makasar
Manado
MOLUCCAS
Halmahera
Ceram
Buru
Ambon
Banda Is.
BANDA SEA
INDONESIA
JAVA SEA
JAVA
DJAKARTA
Bandung
Surabaja
Str. of Sunda
Bali
Lombok
Sumbawa
Flores
Sumba
Timor
Dili
TIMOR SEA
ARAFURA SEA
Aru Is.
Kai Is.
Tanimbar Is.
Vogelkop
Geelvink Bay
Snow Mountains
NEW GUINEA
Mt Wilhelmina
PAPUA
Port Moresby
TORRES STRAIT
Thursday I.
C. York
Melville I.
Darwin
AUSTRALIA
CORAL SEA
Christmas I.
Enggano
Mentawai Is.
Nias


AFRICA
English Miles
0 100 200 300 400 500 1000
Railways thus
ATLANTIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
EUROPE
ASIA
BRITISH ISLES
Black Sea
Caspian Sea
MEDITERRANEAN SEA
RED SEA
Gulf of Guinea
Mozambique Channel
Equator
Tropic of Cancer
Tropic of Capricorn
SAHARA
MOROCCO
ALGERIA
LIBYA
EGYPT
SPAN. W. AFRICA
MAURITANIA
MALI
NIGER
CHAD
SUDAN
ETHIOPIA (ABYSSINIA)
SOMALIA
KENYA
NIGERIA
GHANA
IVORY COAST
SIERRA LEONE
LIBERIA
CAMEROONS
GABON
CONGO
CENTRAL AFRICAN REPUBLIC
BELGIAN CONGO
ANGOLA
RHODESIA
SOUTH WEST AFRICA
BECHUANA LAND
UNION OF SOUTH AFRICA
MADAGASCAR (MALAGASY REP.)
Paris
London
Lisbon
Strait of Gibraltar
Algiers
Tunis
Tripoli
Alexandria
Cairo
Jerusalem
Istanbul
Mecca
Medina
Khartoum
Omdurman
Addis Ababa
Nairobi
Mombasa
Zanzibar
Dar es Salaam
Leopoldville
Luanda
Lusaka
Salisbury
Beira
Pretoria
Johannesburg
Durban
East London
Port Elizabeth
Cape Town
Cape of Good Hope
C. Agulhas
Ascension I.
St. Helena I.
Tristan da Cunha (Br.)
Canary Is.
Madeira
Timbuktu
Lagos
Dakar
Fezzan
Tibesti
Darfur
England to the Cape 6088 Miles


WEST AFRICA
English Miles
0 200 400 600
Railways thus
MAURETANIA
R. Senegal
Timbuktu (Timbouctou)
Agades
ST LOUIS
Dakar
C. Verde
SENEGAL
Nioro
SUDAN
NIGER
Tahoua
CHAD
Bakel
Kayes
FED. OF MALI
Niamey
Bathurst
GAMBIA
Koulikoro
Segou
Say
Sokoto
Kaura
Zinder
Kukawa
L. Chad
Ft. Lamy
Bamako
VOLTA
Kano
BORNU
Dikwa
Bissagos I.
(Port.)
Bolama
Victoria
Kouroussa
Ouagadougou
Bobo Dioulasso
Gambaga
Bussa
Kaduna
Zaria
Bauchi
GUINEA
Conakry
Kankan
NORTHERN TERRITORIES
FEDERATION OF NIGERIA
Jebba
Zungeru
Bida
Yola
Lame
Freetown
SIERRA LEONE
Pendembu
Kissidougou
Kong
Salaga
Ilorin
Ibadan
R. Benue
ADAMAWA
Sherbro I.
LIBERIA
Bouake
IVORY COAST
GHANA
ASHANTI
Kumasi
Abomey
Abeokuta
Lokoja
Gashaka
Banyo
Ngaundere
Kounde
Monrovia
Gr. Bassa
Abidjan
Porto Novo
Lagos
Benin City
Enugu
Bamenda
CEN. AFR. REP.
Greenville
C. Palmas
Bingerville
Accra
Cape Coast
Takoradi
Sekondi
Lome
Bight of Benin
Akassa
Bonny
Pt. Harcourt
Calabar
CAMEROONS
Buea
Douala
Yaounde
Edea
Lomie
GULF OF GUINEA
Bight of Biafra
Fernando Po
(Span.)
SPAN. GUINEA
Bata
RIO MUNI
Oyem
Principe I.
(Port.)
São Thomé
(Port.)
Corisco Bay
R. Gabon
Libreville
GABON
CONGO


CENTRAL AND SOUTH AFRICA
English Miles
0 200 400 600
Railways thus
CAMEROONS
CENTRAL AFRICAN REP.
Bangui
Mongalla
SUDAN
Juba
ETHIOPIA
L. Stefanie
Buea
Douala
Yaounde
Edea
Lomie
Banzyville
Bondo
Niangara
Libenge
R. Uele
Rhino Camp
UGANDA
GALLA
Moyale
Bata
RIO MUNI
Oyem
Buta
Paulis
L. Albert
Bardera
SOMALIA
R. Juba
Dongou
Nouvelle Anvers
R. Congo
Basoka
Jinja
KENYA
Libreville
Coquilhatville
Stanleyville
Stanley Falls
Entebbe
Lake Victoria
Nairobi
CONGO
R. Chuapa
Ponthierville
L. Edward
L. Kivu
Kindu
GABON
Franceville
BELGIAN CONGO
Ikutha
Witu
Lamu
Malindi
Taveta
Mombasa
Loango
Cabinda
Boma
Banana
Brazzaville
Leopoldville
Matadi
Stanley Pool
Charlesville
Pt. Francqui
Sankuru
Nyangwe
Kasongo
Kongolo
Kigoma
Ujiji
Tabora
Singida
Arusha
Kilimanjaro
Tanga
Pemba I.
TANGANYIKA
Dodoma
Kongwa
Bagamoyo
ZANZIBAR
Dar es Salaam
S. Salvador
Ambriz
Luluabourg
Kabalo
Albertville
Mpanda
Iringa
Mafia I.
Luanda
Caxito
Muyumba
Bukama
Kilwa
L. Mweru
Kilwa Kivinje
Malange
Sandoa
Abercorn
Karonga
Mahenge
Lindi
Dilolo
Kambove
Mtwara
C. Delgado
Lobito
Benguela
Va. Teixeira da Silva
ANGOLA
Nova Lisboa
Elisabethville
Livingstonia
Comoro
NORTHERN RHODESIA
FEDERATION OF
Ndola
Broken Hill
Pto Amelia
Mossamedes
Sá da Bandeira
R. Cubango
R. Kwando
Kalabo
Mongu
Lusaka
RHODESIA AND NYASALAND
Matope
Moçambique
Nampula
Zomba
Blantyre
Pto Alexandre
R. Cunene
Humbe
Kalomo
Victoria Falls
Zumbo
Tete
Salisbury
Pt. Herald
MOÇAMBIQUE
Sena
Quelimane
Chinde
C. Frio
R. Okavango
Livingstone
Wankie
SOUTHERN RHODESIA
MASHONA
MATABELE
Umtali
Beira
Sofala
Mocambique Channel
MADAGASCAR
Tsumeb
Grootfontein
Damaraland
L. Ngami
Bulawayo
W. Nicholson
Swakopmund
Walvis Bay
Karibib
Gobabis
Windhoek
BECHUANALAND
Serowe
Palapye Rd.
R. Limpopo
Tulear
Rehoboth
SOUTH WEST AFRICA
Pietersburg
Inhambane
C. Corrientes
Keetmanshoop
Mafeking
TRANSVAAL
PRETORIA
Johannesburg
Lydenburg
Lourenço Marques
Delagoa B.
SWAZI LD.
C. Ste. Marie
Lüderitz
Kuruman
Potchefstroom
UNION OF SOUTH AFRICA
ORANGE FREE STATE
Kimberley
Newcastle
Ladysmith
Zulu Land
NATAL
Pietermaritzburg
Orange R.
Port Nolloth
Springbok
BLOEMFONTEIN
Basuto Ld.
Durban
De Aar
CAPE PROVINCE
Pt. St. Johns
Beaufort West
East London
St. Helena B.
Worcester
Grahamstown
CAPE TOWN
Cape of Good Hope
Mossel Bay
Great Fish R.
Port Alfred
Port Elizabeth
C. Agulhas
ATLANTIC OCEAN

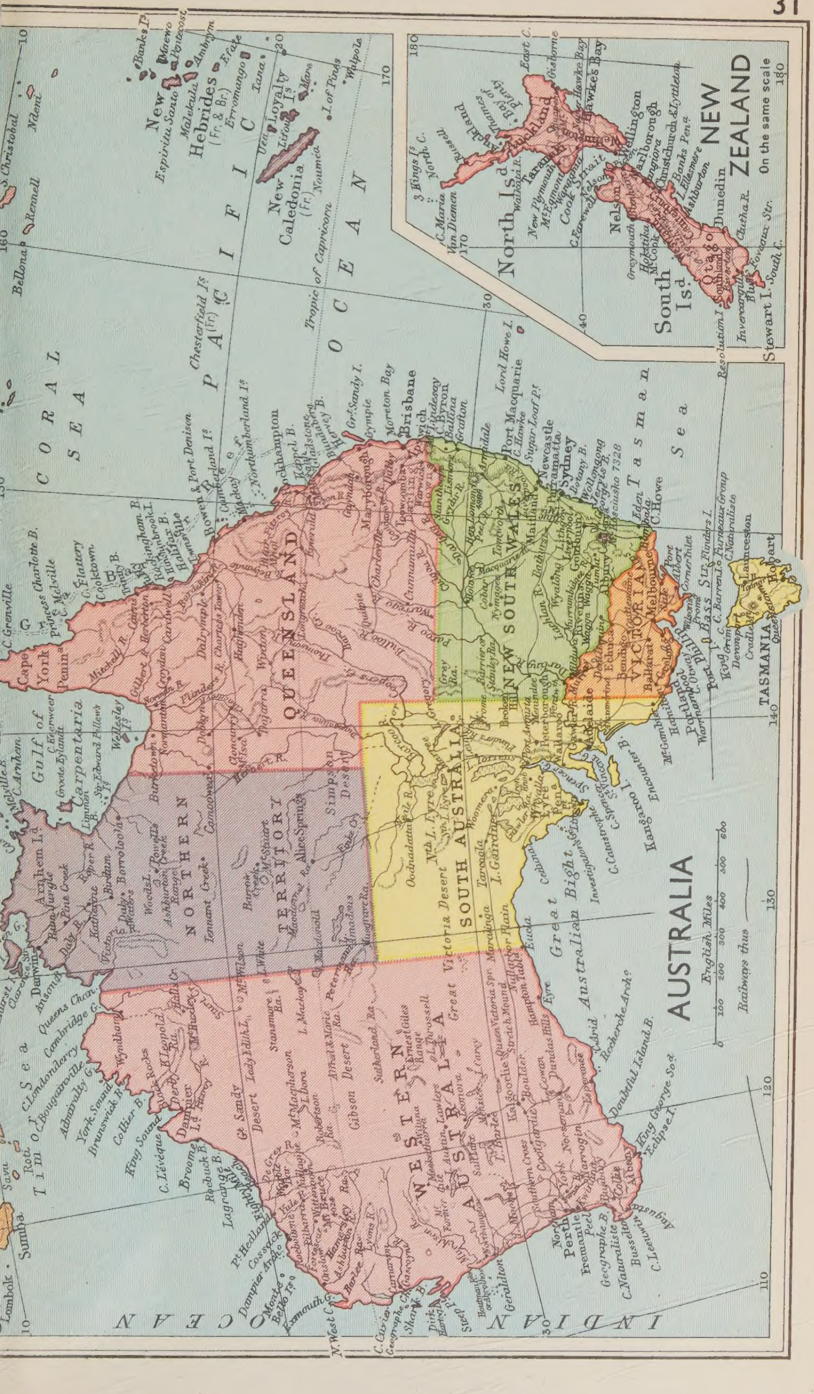
NORTH AMERICA
English Miles
0 100 200 300 400 500 1000
Railways thus
ARCTIC OCEAN
BEAUFORT SEA
Queen Elizabeth Islands
GREENLAND
Spitsbergen
Franz Joseph Fiord
Denmark St
Baffin Bay
Baffin Island
Davis Strait
Disko I.
Godthaab
Prudhoe Ld
Thule
Devon I.
Banks I.
C. Lisburne
Pt Barrow
C. Bathurst
ALASKA
Arctic Circle
Fairbanks
Alaskan Ra
YUKON TERR
Dawson
Juneau
Sitka
Pr. of Wales I.
Pr. Rupert
Queen Charlotte Isles
Queen Charlotte Sd
Vancouver I.
Juan de Fuca St
C. Flattery
NORTHWEST TERRITORIES
Gt Bear Lake
Great Slave Lake
Foxe Basin
Hudson Strait
C. Chidley
C. Farewell
Ivigtut
HUDSON BAY
Churchill
Nain
Labrador Peninsula
Coast of Labrador
Goose Bay
James Bay
CANADA
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
Regina
Winnipeg
Lake Winnipeg
Vancouver
Victoria
Seattle
Portland
Salem
Helena
Bismarck
Boise
Pierre
St Paul
Minneapolis
L. Superior
L. Michigan
L. Huron
L. Erie
Detroit
Toronto
Ottawa
Montreal
Quebec
Halifax
C. Sable
Boston
C. Cod
Providence
New Haven
New York
Philadelphia
Pittsburgh
WASHINGTON
Delaware R.
Richmond
C. Hatteras
Raleigh
Wilmington
Charleston
Savannah
Jacksonville
Atlanta
Memphis
Chicago
Indianapolis
Cincinnati
Louisville
St. Louis
Kansas City
Omaha
Platte R.
Missouri R.
Denver
Salt Lake City
Great Salt Lake
Carson City
Sierra Nevada
San Francisco
C. Mendocino
Los Angeles
Santa Fe
Albuquerque
Tucson
El Paso
Red R.
Dallas
Austin
San Antonio
New Orleans
Mobile
Galveston
Florida
Florida Strait
UNITED STATES
ATLANTIC OCEAN
Bermudas (Br)
PACIFIC OCEAN
Guadalupe
Tropic of Cancer
Lower California
Gulf of California
C. S. Lucas
Mazatlan
San Blas
Guadalajara
C. Corrientes
Socorro I.
Chihuahua
Monterrey
Brownsville
Zacatecas
Tampico
MEXICO
Veracruz
Orizaba
Acapulco
Isthmus of Tehuantepec
Puerto Mexico
GULF OF MEXICO
C. Sable
Havana
Cuba
C. Catoche
Gulf of Campeche
Yucatan
Belize
Bay of Honduras
Bahama Islands (Br)
San Salvador (Watling I.)
WEST INDIES
Hispaniola
Port au Prince
Kingston
Jamaica (Br)
CARIBBEAN SEA
C. Gracias a Dios
GUATEMALA
HONDURAS
Tegucigalpa
Guatemala
S. Salvador
Managua
Nicaragua L.
San Juan
Colon
Panama
Isthmus of Panama
CENTRAL AMERICA
SOUTH AMERICA
120 110 100 90 80 70


CANADA
English Miles
Railways thus
ATLANTIC OCEAN
PACIFIC OCEAN
UNITED STATES
Hudson Bay
Hudson Str.
Davis Str.
Baffin Id
Victoria Id
Labrador
Newfoundland
Quebec
Ontario
Manitoba
Saskatchewan
Alberta
British Columbia
Yukon
Mackenzie
Keewatin
Franklin
Northwest Territories
Alaska
Nova Scotia
Lake Superior
L. Huron
L. Michigan
Lake Winnipeg
James Bay
Montreal
Ottawa
Toronto
Winnipeg
Regina
Vancouver
Halifax
Boston
Buffalo


UNITED STATES
English Miles
0 100 200 300 400 500
Railways thus
CANADA
MEXICO
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
Gulf of California
Lower California
Bahama Is.
CUBA
Havana
Lake Superior
L. Michigan
L. Huron
L. Erie
Ontario
Quebec
Montreal
OTTAWA
Washington
Oregon
California
Nevada
Idaho
Montana
Wyoming
Utah
Colorado
Arizona
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wis.
Illinois
Mich.
Ind.
Ohio
Ky.
Tenn.
Miss.
Ala.
Ga.
Florida
S.C.
N.C.
Va.
W.Va.
Pa.
N.Y.
N.J.
Me.
NEW YORK
Philadelphia
Baltimore
WASHINGTON
Boston
Buffalo
Pittsburgh
Chicago
Detroit
St. Louis
Louisville
Nashville
New Orleans
San Francisco
Los Angeles
Portland
Denver
Salt Lake City
Dallas
Austin
Charleston
Savannah
Long Island
C. Hatteras
C. Mendocino
Vancouver
Victoria

MEXICO, CENTRAL AMERICA AND WEST INDIES
English Miles
0 100 200 300 400 500 600
Railways thus
UNITED STATES
MEXICO
CENTRAL AMERICA
SOUTH AMERICA
ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
Gulf of California
Lower California
Bahama Is.
Great Antilles
CUBA
HISPANIOLA
Haiti
Dominican Republic
Jamaica (Br.)
Puerto Rico (U.S.)
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
Belize
Tropic of Cancer
Havana
Mexico
Guadalajara
Monterrey
Tampico
Veracruz
New Orleans
Galveston
Brownsville
Dallas
Austin
Little Rock
Memphis
Mobile
Pensacola
Charleston
Savannah
Jacksonville
Key West
Nassau
Kingston
Port au Prince
Merida
Campeche
G. of Campeche
Yucatan Str.
Florida Str.
Isthmus of Tehuantepec
G. of Tehuantepec
G. of Honduras
G. of Darien
Colon
Bluefields
Cartagena
Barranquilla
Bermudas


SOUTH AMERICA
English Miles
0
500
1000
Railways thus
NORTH
ATLANTIC
OCEAN
SOUTH
ATLANTIC
OCEAN
PACIFIC OCEAN
CARIBBEAN SEA
Cuba
Haiti
Santo Domingo
Puerto Rico
Jamaica
Guadeloupe
Barbados
Tobago
Trinidad (Br.)
Pto Gallinas
Barranquilla
Cartagena
S. Marta
G. of Darien
Colon
Chagres
G. of Panama
Caracas
Valencia
Trujillo
Merida
Barinas
Bucaramanga
Socorro
Bogota
Medellin
COLOMBIA
Cali
Popayan
Pasto
Buenaventura
Tumaco
Esmeraldas
S. Francisco
Bahia
Quito
Chimborazo
Guayaquil
ECUADOR
Cotopaxi Vol.
Antisana Vol.
Loja
C. Blanco
Talara
Paita
C. Aguja
Chiclayo
Trujillo
Moyobamba
Cajamarca
Iquitos
Nauta
Cerro de Pasco
PERU
Huacho
Callao
Lima
Oroya
Ayacucho
Cuzco
Andes
Chincha Is.
Pisco
Atico
Mollendo
Arequipa
El Misti
Arica
VENEZUELA
Ciudad Bolivar
R. Orinoco
Mouths of Orinoco R.
R. Essequibo
Georgetown
New Amsterdam
Paramaribo
Cayenne
C. Orange
BRITISH GUIANA
SURINAM (DUTCH GUIANA)
FRENCH GUIANA
Sa Pacaraima
Esmeralda
Mouth of Amazon R.
Macapá
Marajó I.
R. Para
Belem (Para)
S. Luis
Parnaiba
Fortaleza (Ceara)
Equator
R. Amazon
Manáus
Rio Negro
R. Branco
Japura R.
Tefé
Santarem
Obidos
Tabatinga
R. Javary
Jurua
Purus R.
R. Madeira
Porto Velho
R. Roosevelt
R. Tapajos
R. Xingu
S. João do Araguaia
R. Araguaya
Tocantins
Caxias
Teresina
Oeiras
Petrolina
Juazeiro
Macau
João Pessoa
Goiana
Recife (Pernambuco)
BRAZIL
Campos
Selvas
Rio Branco
Riberalta
R. Guapore
R. Madre de Dios
BOLIVIA
La Paz
Sorata
Huacaca
Cochabamba
Sucre
Chuquisaca
Potosi
L. Poopo
Tarija
Mato Grosso
Villa Bella
Cuiaba
Goias
Goiania
Brasilia
R. S. Francisco
(Bahia)
Salvador
B. of Todos
Valença
Itabuna
Ilheus
Minas Novas
Pto Seguro
Caravelas
Diamantina
Sabara
Belo Horizonte
Itacolumi
Vitoria
Campos
C. Frio
Niteroi
Rio de Janeiro
Juiz de Fora
S. Paulo
Santos
Iguapé
Cananea
Paranaguá
S. Francisco do Sul
Sta Catarina
Florianópolis
Curitiba
R. Paraná
R. Paraguay
Corumbá
Chaco
Concepcion
PARAGUAY
Asuncion
Posadas
Corrientes
Pto Alegre
L. Patos
Rio Grande (S. Pedro)
Salto
Paysandú
URUGUAY
Fray Bentos
Colonia
Maldonado
Montevideo
Rio de la Plata
C. S. Antonio
Mar del Plata
C. Corrientes
Pisagua
Iquique
Cobija
Tocopilla
Mejillones
Tropic of Capricorn
Antofagasta
Taltal
Chañaral
Caldera
S. Ambrosio
S. Felix
Copiapo
Serena
Mt Aconcagua
Valparaiso
Santiago
Juan Fernandez (Chile) Is.
Chillan
Talca
Talcahuano
Concepcion
Lebu
Valdivia
Corral
Puerto Montt
Chiloé I.
Chonos Archo.
G. of Peñas
Wellington I.
Pto Natales
Str. of Magellan
Punta Arenas
C. Froward
Jujuy
Oran
Salta
S. Miguel de Tucuman
Catamarca
R. Bermejo
Formosa
Resistencia
La Rioja
Cordoba
Sta Fé
Parana
Gualeguaychu
S. Juan
Uspallata Pass
Mendoza
San Luis
Rosario
Chivilcoy
Buenos Aires
La Plata
ARGENTINA
Tandil
Colorado
Bahia Blanca
R. Negro
Chubut R.
Carmen de Patagones
G. of S. Matias
Rawson
G. San Jorge
Deseado
Pt S. Cruz
Patagonia
Falkland Is. (Br.)
Stanley
Strait of Magellan
Tierra del Fuego
Staten I.
Cape Horn
S. Georgia (Br.)


AUSTRALIA
English Miles
Railways thus
NEW ZEALAND
On the same scale
North Isd.
South Isd.
Stewart I.
Wellington
Auckland
Christchurch & Lyttelton
Dunedin
Napier
Nelson
Cook Strait
QUEENSLAND
NEW SOUTH WALES
VICTORIA
SOUTH AUSTRALIA
WESTERN AUSTRALIA
NORTHERN TERRITORY
TASMANIA
C O R A L
S E A
P A C I F I C
O C E A N
I N D I A N
O C E A N
Tasman
Sea
Timor Sea
Gulf of Carpentaria
Great Australian Bight
Tropic of Capricorn
New Caledonia (Fr.)
New Hebrides (Fr. & Br.)
Loyalty Is.
Lord Howe I.
Brisbane
Sydney
Newcastle
Melbourne
Adelaide
Perth
Fremantle
Hobart
Launceston
Darwin
Rockhampton
Townsville
Cooktown
Broken Hill
Kalgoorlie
Coolgardie
Geraldton
Albany
Alice Springs
Bass Str.
Kangaroo I.
Cape York
Arnhem Ld.
Simpson Desert
Gibson Desert
Great Victoria Desert
Nullarbor Plain
L. Eyre
L. Torrens
L. Gairdner
Murray R.
Darling R.
Mt. Kosciusko 7328


PACIFIC OCEAN
On Mercator's Projection
Railways thus
NORTH AMERICA
UNITED STATES
MEXICO
CENTRAL AMERICA
SOUTH AMERICA
ASIA
CHINA
JAPAN
AUSTRALIA
NEW ZEALAND
TASMANIA
INDIAN OCEAN
WEST INDIES
Equator
Tropic of Cancer
Date Line
Hawaiian Is
Honolulu
Marquesas Is
Society Is
Tahiti
Fiji Is
Samoan Is
Solomon Is
Gilbert Is
Marshall Is
Marianas
Caroline Is
PHILIPPINES
Galapagos Is
Easter I.
Pitcairn I.
Chatham Is
San Francisco
Los Angeles
Vancouver
Victoria
Yokohama
Shanghai
Hong Kong
Valparaiso
Callao
Patagonia
Yokohama to San Francisco 4525 miles
Yokohama to Vancouver 4200 miles
Honolulu to Panama 4710 miles
Wellington to Cape Horn 4820 miles